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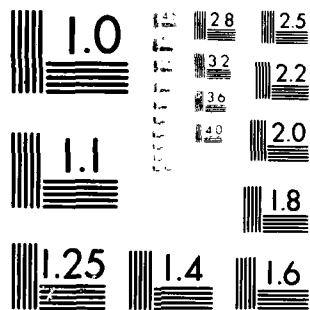
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ORGANIZATIONAL DECISIONS

BERNARD M. BASS

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The nine chapters deal with what is known about the nature of organizational decision processes, research methods and available models, problem discovery and diagnosis, search and design processes, evaluation and choice processes, choice conflict, constraints, decision support systems and suggestions for needed research including a model for examining the backward as well as the forward causal linkages in the organizational decision process.

Preface

This book was prompted by a suggestion from Bert King of the Office of Naval Research that it would be useful to prepare a current state-of-the-art paper. The paper rapidly grew into a book.

In many respects, I began the effort with a somewhat naive and limited perspective about the state of the field since the seminal contributions of March and Simon (1958) Cyert and March (1963) and Thompson (1967). This was probably due to the fact that organizational decision-making has remained long on theory and short on controlled experimental evidence due to the difficulties inherent in collecting such evidence. Nevertheless, the body of theory that has emerged along with the modest amount of experimental support for it is impressive.

The classical order, balance, and simple, one-way causal linkage of problem generating search for solutions, then evaluation and choice, has been replaced by a romantic view of organizational decision-making as a disorderly, unbalanced, two-way process of mutual interaction among problem, search and choice, in which contiguity of problems and solutions may be as important as the causal expectations we have that problems result in search efforts and search efforts result in evaluation and choice.

The book is intended for scholars and practicing managers interested in the subject from both a scholarly and a practical point-of-view. The expectation is that the scholar will find much food for thought as well as specific ideas about the kinds of further research needed to increase the confidence in our understanding of organizational decision processes. In the same way, the hope is that practicing administrators and managers will find important propositions about the subject which can be translated into application in their own situations.

As can be seen by the large reference list, I am indebted to a wide array of scholars for many of the ideas presented.

Particular appreciation is owed to Mrs. Mary Bean for typing the manuscript under trying conditions.

Bernard M. Bass
Binghamton, NY



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Organizational Decision-Making

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CHAPTER 1

THE ORGANIZATIONAL DECISION

What are the processes of organizational decision-making? What is the state of theory and research in the area? What efforts are being made to improve it? What is known and what needs to be known? What are the variables of consequence involved in the pathology of decision-making in organizations? What can the practicing manager learn about it that may help to improve his or her performance?

To answer these questions, we will explore among the organizational antecedents and intermediate dynamics to describe and understand effective decisions made by individuals and groups who are embedded somewhere in an organizational matrix. We will emerge with a substantive model of organizational antecedents, location, focus, processes, and outcomes that affect decision quality. Improvements will be sought by making the organizational decision-making process more explicit. As we shall see, many of the approaches to such improvements are efforts, as the decision process unfolds, to move to the surface of awareness among decision-makers what now tends to lie at subconscious or deeper levels (Kast & Rosenzweig, 1970).

Importance

Concentration on organizational decision-making is seen to be of particular importance to furthering our understanding of organizational behavior, in general. It is what holds organizations together and makes them progress. The goals, tasks and choices determining the organization's activities are highlighted, broadly illuminating the dynamics of organizational life (Cyert & March, 1963). Furthermore, focus on organizational

decision-making provides the meeting ground for concepts from economics, quantitative methods and behavioral science (Dill, 1965).

There are many concepts and theories about the individual decision-maker and about group decisions but those that are appropriate in the organizational context remain mostly unverified and unapplied to improving our understanding and management of organizational decision-making. Yet so many of the really crucial events of this world are a consequence of the organizational decision-making process rather than that of isolated individual decision-making. It is impossible to attribute the U.S.-Iranian hostage crisis decision-making solely to one Iranian or only to President Carter or just to one short-lived occurrence. Hindsight review suggests that the Iranians slipped by unintended incremental steps from student demonstrations to militant kidnapping officially sanctioned by the Iranian government. Jimmy Carter's decisions beginning with the Shah's medical problems seem to have been strongly affected by a mix of medical misinformation, pressure groups, and his own personal predilections (New York Times, 1981). The Watergate coverup dynamics appeared to be accounted for by (1) little immediate public concern; (2) the psychological homogeneity of the principal decision-makers, who shared an amoral view of the situation and consequently a tendency to reinforce each others' misperceptions; and (3) an inadequate grasp of information by the decision-makers of both the legal aspects of the situation and public opinion (Gouran, 1976). The delayed decisions by Detroit auto manufacturers to switch to small auto production can only be understood in terms of consumer attitudes toward the small car (fostered by a generation of advertising), the gasoline crises, political support for continued low gasoline prices.

differential profitability of small and large autos, short public memory, and long lead times for investment turnarounds. Seeing the failure of Detroit's decision-making during the 1970's as due to management Neanderthalism was gross oversimplification of the organizational decision-making problem. But the question that remains is whether understanding of better organizational decision processes could have produced better decisions in this situation.

Problems and Decisions

A problem exists requiring decision-making if there is a barrier between a current and desired state of affairs. Something blocks reaching a goal. Ordinarily, in organizational problems, the desired state is a steady state.

If a deviance occurs and obstacles prevent return to the steady state, a problem is perceived. Again, a problem arises if the organization cannot automatically move from a current steady state to a more preferred one.

Organizational decision-making is problem solving where the problem is sensed, solutions are sought, evaluated, and accepted or rejected for authorization and implementation. The decisions refer to the judgements directly affecting the courses of action involved in the problem. Although problem-solving and decision-making are often used interchangeably, they are not synonymous. Solving one problem may involve many decisions. (Shull, Delberq & Cummings, 1970). However, smaller decisions may be encapsulated in larger ones so the distinction may not be important.

Decisions are action-oriented. They are judgement which directly affect a course of action (Griffiths, 1958). But the decision process

involves both thought and action culminating in an act of choice. Thought-oriented decision-making can be defined in terms of information acquisition, information processing and communication. The process then is seen as a matter of widening or narrowing the decision-maker's set (MacCrimmons, 1974). On the other hand, action-oriented decision-making defines it in terms of resource acquisition, resource allocation, and commitment (Stricklin, 1966). The process is described as a widening or narrowing of the decision maker's resource set. Both the information processing and the resource processing modes are relevant when trying to understand organizational decision-making.

In organizational decision-making, alternatives of choice are likely to be complex and characterized by multiple attributes and multiple objectives (Zeleny, 1981). Organizational decisional situations contain at least two dilemmas which must be solved simultaneously: the problem itself; and a set of viable organizational arrangements, compatible with the problem solution and the organizational interrelationships (Stricklin, 1966).

Fully programmed machines, or technical measurements of utility followed by mechanical search, are excluded from consideration as organizational decision-making.

"The technical measurement of utility, often employing complex logical and mathematical tools, ... (may be used to yield) an adequate measurement of net attractiveness i.e., if a single number evaluates each alternative, the decision has been implicitly made and its subsequent unravelment is relatively trivial: find the largest (or the smallest) number and select the corresponding alternative. Thus, the technical problem of mechanical search has replaced the actual

decision-making process. No decision making has taken place. Technical measurement, followed by mechanical search, designed to predict the most attractive alternative, have become the substitutes for decision-making and its theory." (Zeleny, 1981, pp. 332-333).

In the same way, decisions may be fixated by habitual effects (Simm, 1960). Based on empirical analyses of decision processes, Feldman (1981), for example, concluded that to the degree that observed behavior is consistent with expectations, "it is noted and stored automatically. It is only when a behavior departs from expectations, or when the task is somehow changed, that conscious attention and recognition processes are engaged" (p. 129).

Our fundamental task will be to examine the non-automatic decision processes of discovery and diagnosis, innovation, search and evaluation, choice, authorization, and implementation in the context of extra-organizational, organizational, team and individual variables that modify the process.

The Process

In the past half century, a variety of increasingly jaundiced views have emerged of the organizational decision process as it is and as it should be. The classical, clearly, perceived goals are now usually seen as the exceptions rather than the rule. The classical requirement of complete search is seen as infeasible, if not impossible. Classical choice with complete information is seen as a chimera. A disorderly rather than orderly process is discerned. Even means-ends logic is seen as only one possibility. Ends may justify the means, not be a consequence of them.

Means and ends may be linked because they happen to appear in the same time and location. But it is not an either-or matter. Rather, we must deal with the amount of order or disorder, sequencing or contiguity, completeness or lack of completeness, and forward or backward linkages as variables in designated decision processes in our search for regularities and generalities.

As idealized by economists and classical management theorists, decision-making is a series of logical steps beginning with identifying a goal, measuring the gap between the goal and the current state of affairs, searching exhaustively for solutions, and choosing the single optimal solution which maximizes benefits or minimizes costs. As first idealized by behaviorists, decision-making is an orderly beginning with the discovery by the decision-maker of a discrepancy between the perceived state of affairs and the desired state. This desired state is usually between an ideal and a realistically-attainable state. Alternative actions are selected or invented, usually just a few of what are possible. One of these alternatives emerges as the action of choice followed by justification for it; then its authorization and implementation. The process cycle is completed with feedback about whether the action resulted in movement toward the desired state of affairs. If the perceived and desired state of affairs have not narrowed sufficiently, a new cycle is likely to commence.

Lindblom (1959) and Soelberg (1967) put the emphasis on the recycling, on the small incremental changes in the final choice, as successive alternatives are compared with an early favorite.

A person may be following some sort of generalized guidelines when

making judgements in ill-structured problems, but he or she would probably regard the experience as unique. However, Soelberg (1967) suggested that an observer would see that:

The decision makers applied few special purpose rules when arriving at their choice.

The decision makers might not be able to specify, in advance, the nature of an ideal solution to their problem.

A number of the decision criteria that they wished to apply were not operational before they tackled the problem.

Many of their choice alternatives were unknown when they began.

Information about the merits and consequences of alternatives were not immediately available from the task environment.

Realistic pictures of the process were captured by Zeleny (1981) and MacCrimmon (1974):

"Decision making is a dynamic process: complex, redolent with feedback and sideways, full of search detours, information gathering, and information ignoring, fueled by fluctuating uncertainty, fuzziness, and conflict; it is an organic unity of both pre-decision and postdecision stages of the overlapping regions of partial decision making." (Zeleny, 1981, p. 333)

"In real decision situations, one seldom observes ... clear, step-by-step process ... Steps in the process proceed simultaneously, some steps are skipped steps are repeated... There are obvious interactions, feedbacks, and cycles. Also, decision situations intermingle; decisions are imbedded in decisions. All these complications are quite real and usually quite rational." (MacCrimmon, 1974, p. 446)

And a five year study of 25 strategic organizational decisions by Mintzberg, Raininghani & Theoret (1976) concluded that:

"... a strategic decision process is characterized by novelty, complexity, and openendedness, by the fact that the organization usually begins with little understanding of the decision situation it faces or the route to its solution, and only a vague idea

of what that solution might be and how it will be evaluated when it is developed. Only by groping through a recursive, discontinuous process involving many difficult steps and a host of dynamic factors over a considerable period of time is a final choice made. This is not the decision making under uncertainty of the textbook, where alternatives are given even if their consequences are not, but decision making under ambiguity, where almost nothing is given or easily determined." (Mintzberg et al, 1976, pp. 250-251).

Thus to the logical search directed by previous objectives, must be added the possibility that alternative objectives may be discovered in the process of search. Organizations that focus too narrowly on achieving only present objectives miss opportunities of uncovering new and more important objectives. Some organizational foolishness, search activity not justified by current objectives, is needed (March & Shapira, 1982).

Coming a full 180° from the classical, orderly, purposive, view of organizational decision-making, March and Romelaer (1976) see that what may be more important to the process is the contiguity in time and place of problems, available solutions, and decision-makers. They agree that the organizational decision process tends toward the disorderly. Policies fail to be implemented. Solutions seem to have vague links to problems. "Decision-makers seem to wander in and out of decision arenas." Their participation is erratic rather than continuous. Proximity to each other of problems, solutions and decision-makers may be more important to understanding a decision process than the logical means-to-satisfy-ends.

Contiguity is also an important consideration because many other organizational events are occurring along with the decision process that may affect the process and be affected by it.

Decision processes offer the time and place to fulfill or violate

role expectations and earlier commitments; to define virtue and truth; to examine what is happening to the organization; to declaim on what justifies its actions; to distribute recognition and blame; to challenge or reaffirm friendships and informal relationships; to discover and express self-interest and organizational interest and to obtain satisfaction from participating in the process (March & Olson, 1976).

The loosely coupled actions of different decision units depends considerably on these considerations of contiguity resulting in a "shifting intermeshing of the demands on the attention and lives of the whole array of actors." To appreciate what problems will draw attention and which will be ignored becomes a matter of studying how attention is focused in a situation of multiple and changing claims on attention.

Although logic (consistency), self-interest and organizational purpose may underlie much of organizational decision-making, allowance must be made for accidental and random causation in organizational decision-making in all of its stages. Serendipitous discovery of problems and solutions are common. A consideration may be initiated by two executives who happen to meet in the corridor which ultimately may lead to decisions or actions by one or another's organization which never would have occurred if they had not met. Contingency planning must allow for the completely unexpected (Bass & Ryterband, 1969).

It is suggested that coin tossing may be a sensible way to deal with certain kinds of decisions about allocating available resources or about schedules when there is no rational way to give more weight to one alternative than another. In the same way, lotteries may be a good way to make distributive decisions; drawing straws, the best way to select a whipping boy.

These iconoclastic views of the organizational decision process may help to explain Stagner's (1966), Bing's (1971) and Mintzberg, Raisinghani and Theoret's (1976) survey results.

Stagner's (1969) survey of 217 executives from 109 firms involved in corporate decision-making concluded that rough estimates were made of anticipated costs and profits which might result from a decision; that company image often outweighed cost considerations; and that considerable importance was placed on company traditions.

Despite the academic availability of a variety of complex optimization routines for investment decisions, most financial executives surveyed by (Bing, 1971) tended to use only the one or two most simple ones rather than the more rigorous analytical procedures. Even with quantitatively-trained-and-oriented project engineers in the aerospace industry, when accuracy is critical and the customer is the Federal Government subjective bases for decisions were mentioned over three times as frequently as sophisticated methods of analysis such as PERT, linear programming, and other decision supports. Many never mentioned using any sophisticated tools in making their important decisions.

Mintzberg, Raisinghani & Theoret (1976) called attention to six disturbances in the 25 strategic decision processes they analyzed which detracted from the ideal, orderly process of discovery-diagnosis-search-design, evaluation/choice-authorization. These were interrupts, caused by the environment, scheduling delays, timing delays and speedups due to the decision-maker(s) and feedback delays, comprehension cycles, and failure recycles inherent in the decision process itself.

Interrupts caused changes in pace or direction of the decision process and were due to meeting unexpected constraints, political impasses, unexpected new options and discoveries. They were most common in high pressure environments and public institutions.

Scheduling delays are due to the need to factor complex decisions into manageable tasks. The managers, faced with a multiplicity of other tasks, as well, introduce scheduling delays to attend to them.

Feedback delays were due to the need to await the results of previous steps and the reaction to them.

Timing delays and speedups are frequent. As Martin & Sims (1956) have noted, managers may time their announcements to when they believe they are likely to do the most good. Managers may purposely speed up or delay a decision process to take advantage of special situations, to await support, to mesh actions with other activities, to bring about surprise, or merely to gain time. Managers try to time the initiation of decisions to facilitate their smooth execution.

Where competitiveness, distrust and disagreement are high, a greater incidence of timing speedups and delays are expected. In crisis decisions, Schwartzman (1971) found that managers used delaying tactics of stalling, bluffing, or finding temporary solutions to reduce pressures.

Comprehension cycling back to earlier phases in the decision process is seen as the norm. The manager

"may cycle through a maze of nested design and search activities to develop a solution; during evaluation, he may cycle to understand the consequences of alternatives; he may cycle between development and investigation to understand the problem he is solving (Diesing, 1967); he may

cycle between selection and development to reconcile goals with alternatives, ends with means. The most complex and novel strategic decisions seem to involve the greatest incidence of comprehension cycles" (Mintzberg, Raisinghani & Theoret, 1976, p. 265).

Failure recycles are observed. Faced with the inability to find an acceptable solution, the decision-makers may delay further consideration or change criteria. Unable to defeat the stronger British Navy outright, with the Dutch fleet that was available John de Witt adjusted his goals to suit his means (Rowen, 1978). Mintzberg et al found typically that organizations faced with failure to find or design an acceptable solution cycled back to the development phase. The decision processes either returned to a special design branch to remove a constraint, developed a new solution or modified an existing one. Sometimes, a previously rejected alternative was reintroduced under the new conditions. Faced with failure of a solution, decision makers try to remove constraints, modify the solution, develop a new solution or accept what was previously unacceptable as a solution to the problem, adjusting the criteria of acceptance.

The Unit

The decision-making unit can be a fully programmed machine, a man-and-machine, a small face-to-face group, a committee, a task force, or a project team embedded in a larger formal organization of such units. As the unit is part of an organization, the unit's decision, whether the unit is a machine, an individual, or committee, is subject to organizational constraints. Such constraints are requirements or limitations imposed (or perceived) on the focal unit's decision making. The constraints may arise from the organization's environment, goals, policies, the behavior of other

units in the organization or individual attributes within the unit.

Organizations imply a charter, implicit or explicit, and norms and roles that transcend the composition of any single decision-making unit. Persistent communication patterns exist between the decision-making units of the organization. The character of such networks also strongly affect the unit and the cascade of decision-making occurring for the organization as a whole.

Within the organizations as a whole, numerous units are involved in decision-making to accomplish the organization's objectives. But a decision made by a particular unit may commit the entire organization to a certain course of action. More often decisions committing the organization are made by several units, are reviewed at several levels in the formal structure, and eventually are authorized by the chief executive or the top administrator (Carter, 1971).

The Supervisor as Decision-Making Unit. When the decision-making unit is an individual supervisor, operating as a member of a formal organization, he (or she) is faced with a bipolarity of aims as old as civilization. Is Man inherently evil and in need of control by higher level decision-making so he can do good? Or, is Man inherently good needing organizational autonomy to self-actualize so that control by higher authority is likely to inhibit Man from accomplishment (McGregor, 1960).

Closely related are the dilemmas in locus and focus of supervisory decision-making. Will the locus for making the decision be the supervisor as in directive supervision or in the subordinate as in participative supervision? Will the focus be on the work to be done, productivity, the task at

hand or will it be on the subordinate's needs and satisfactions? Much of the answer will depend on organizational antecedents and consequences (Bass, 1981).

The Cascade. Based on dissatisfaction with his current location, the army commander decides to cross a stream. Subordinates recommend where to cross. The commander authorizes the crossing. Or, as a consequence of stoppages and breakdowns, a lower level management committee agrees on the need for new equipment. They next convince a higher level manager who authorizes the expenditure. In each instance, the organizational decision is said to be cascading or multi-staged. This is usually but not always the case when the decision units are embedded in a formal organization.

Thus, ordinarily, more than one decision-making unit is sequentially involved in the process from onset to completion. Krouse (1972) constructed a model whose key aspect was the explicit treatment of the decision-making concept as a sequence of choices by which the organization makes a commitment to tentative resource allocations, then enacts experiments to gather information for future decision-making. The organization, in this sequential process, revises its decisions and policy goals, rather than as conventionally implied by the single-step analysis. It is a sequence of adaptive moves.

Ordinarily, what culminates in the decision made by, say the firm's President, is likely to have been the accumulation of many decisions by many people in the organization. According to Rice and Bishoprick (1971), it is useful to conceive an organizational decision as actually a conclusion. The conclusion is based on a premise or a number of premises which in turn are based on information received by particular decision units through their communication channels. A decision of one unit may be the decision premise

of another. Hence there is a growth from many smaller decisions serving as premises for larger decisions, until the final decision takes place. The flow follows functional rather than hierarchical channels.

The organizational decision usually involves an upper management with problems arising from organizational objectives and from feedback from operations and the environment. The management is responsible for planning, direction coordination, and control of lower management. Lower management, in turn, is responsible for planning, direction, monitoring, and control of operations. Such operations generate problems in the flow in supplies to be transformed into outputs of goods and services. Feedback is obtained on whether objectives are being met (Shull, Delbeq & Cummings, 1970).

Ill-Structured Rather Than Well-Structured Problems

It should be clear that we are dealing here with ill-structured problems that do not lend themselves to easily programmed decisions rather than well-structured problems that can be easily programmed.

The usual way of making decisions for dealing with ill-structured problems has been by "seat of the pants" judgement, intuition, and experience. Managers have trouble explaining what techniques they use in making these decisions because they are not consciously aware of how they make them. Executive "intuition" is a very illusive decision-making technique (Luthans, 1973). According to Simon (1958), well-structured problems can be formulated explicitly and quantitatively. As a consequence, they then can be solved by known and feasible computational techniques. For ill-structured problems, the essential variables are symbolic or verbal

rather than numerical. Goals are vague and nonquantitative. Computational algorithms are unavailable. Most practical problems and decisions that executives face everyday, particularly the most important ones "lie much closer to the ill-structured than to the well-structured end of the spectrum" (p. 3).

It also follows that the higher in hierarchical level a manager is in the organization, the more likely he or she is to face ill-structured rather than well-structured problems.

As noted by Mitroff and Emshoff (1979), organizational ill-structured problems ordinarily involve more than one person in their formulation, solution, implementation, and evaluation and include one or more additional characteristics:

1. The problem may be clearly stated but there is no agreement by those dealing with it about an appropriate solution.
2. There is no agreement on a methodology for developing such a solution.
3. There may be no agreement on a clear formulation of the problem, its objective, controllable variables, and uncontrollable variables.
4. They are likely to be mixes of highly interdependent important problems that cannot be formulated, let alone solved, independently of one another. These are what Ackoff (1967) terms "messes".

The programming possible with well-structured problems deals with usually less important decisions which are repetitive and routine. Definite procedures are worked out for handling them. They are not treated as a completely novel situation each time they occur. For the routine, repetitive, programmed decisions, the specific processes for handling them traditionally

have been habitual, clerical routines or S.O.P. operations research, mathematical analyses, computer simulations, and electronic data processing. Or use has been made of an organizational structure of common expectations, agreed-upon and well-understood subgoals and well-defined channels of information. On the other hand, decisions remain unprogrammed when there is no routine for handling the novel or ill-structured problem because it is new, or because its precise nature and structure are elusive or complex, or because it is so important that it must be given special treatment (Cyert, Simon & Trow (1950). Rather, the programmed decisions--"one shot", ill-structured, novel, policy decisions are handled by general problem solving processes. Traditionally this has meant processes of judgement, intuition and creativity, rules of thumb and selection and training of executives. Modern technology can also apply heuristic computer programs and heuristic training of human decision-makers (Simon, 1960).

Whether non-programmed decision processes will require judgement, compromise and/or inspiration depends on whether the sources of ill-structure are due to disagreements and vagueness about the means to solve the problem or the ends to be served (Thompson, 1967).

In the dynamic organization, the decision maker makes mainly unprogrammed decisions for which a high level of judgement and creativity must be exercised (Tosi & Carroll 1976). Supporting this contention, Friedlander (1970) found that the ratio of unprogrammed decisions to programmed decisions is higher in R & D organizations in which there were many changes and where the tasks tended to be nonroutine and complex.

Unprogrammed decision making calls for different kinds of individual and group decision-makers than does programmed decision-making. Unprogrammed

decisions require greater training, competence, and experience. Also, decision-making groups mainly involved with unprogrammed decisions are organized differently. Thus, Duncan (1971) studied 22 decision groups in three manufacturing and three research and development organizations and concluded that decision units organize themselves differently for making routine and nonroutine decisions under different conditions of perceived uncertainty and perceived influence over the environment.

For well-structured problems, computational routines or algorithms may be available to guarantee a solution. For ill-structured problems, lacking quantitative definition and alternatives susceptible to mathematical analysis, more judgement and creativity are required. But even here, as already noted, heuristic solutions can be worked out building on "rules of thumb", and finite, standard, steps to achieve the objective. Heuristic programs can be prepared.

With well-structured problems, a search for an appropriate algorithm is reasonable. But with ill-structured problems, algorithms can rarely, if ever, be obtained,. On the other hand, even for well-structured problems, heuristics that provide satisfactory solutions can be worked out rather than spending the extra effort on algorithm generation and operation. Heuristics lie between routinized responses and de novo, creative responses (MacCrimmon, 1974).

Heuristic programming can assist decision makers in a wide range of problems. Although the concepts such as means-end analysis, breadth vs. depth search underlying heuristic programs are quite general, the heuristics themselves are usually particular to a specific decision problem at hand but theory and area depends very much on which decision contexts are studied.

Heuristic programming is making increasing contributions to management decision-making (Newell & Simon, 1972).

Organizational Rather Than Personal Goals

Once gripped by organizational considerations, the individual decision-maker is faced with what is officially required and what is personally desired (Aram, 1976). Observers such as Barnard (1938), emphasized the importance of distinguishing between personal and organizational goals. Barnard felt decisions for organizational ends were more likely to be logically made than those serving self-interests. Nevertheless, personal choice figures in the organizational decision process: whether or not one will participate and if one participates how much self-interest rather than organizational purposes will be considered.

Ordinarily, one cannot delegate personal decisions to others as one can organizational decisions.

"For example, what may be called a major (personal) decision by an individual may require numerous subsidiary decision (or judgements) which he or she also must make. A similar important decision by an organization may in its final form be enunciated by one person and the corresponding subsidiary decisions by several different persons, all acting organizationally, not personally. Similarly, the execution of a decision by one person may require subsequent detailed decision by him as to various steps, whereas the execution of a similar decision in an organization almost always requires subsequent detailed decision by several different persons". (Barnard, 1938, p. 187).

The importance of self-interest to organizational decision-making is attested to by Patchen (1975) who provided a conceptual framework taking into account self-interests which better described the purchasing decisions

in business firms and what influenced them than did French & Raven's (1959) power conceptualizations of the five bases of power. Argyris (1964) saw the need for integrating individual and organizational goals while Culbert & McDonough (1980) examined the importance of awareness, openness and the need to legitimize consideration of both. More will be said about this when we deal later with conflict in organizational decision-making.

Substantive Sources of Difference in the Organizational Decision Process

In a panel study of 240 finance departments of county, city and state governments' promotion decisions, Halaby (1976) obtained evidence that the analysis of the decision process remains incomplete without a consideration of its substance.

Strategic, policy-making decisions are seen as likely to emerge from different processes than tactical, operational decisions (Chandler, 1962). Strategic decisions deal with the long-term health of the enterprise. Tactical decisions are concerned with the day-to-day activities necessary for efficient and smooth operations. For Selznick (1957), critical decisions must be distinguished from non-critical decisions. Critical decisions are about the goals an organization should pursue and the outputs required to achieve its goals. Tactical decisions are decisions about communication channels, work simplification, personnel selection, morale-building techniques, team organization, and conference methods. For Katz and Kahn (1966) policy decision-making is separated out for special consideration and includes

"...those decisions within an organization which affect the structure of the organization. Policy-making is therefore an aspect of organizational change-the decision aspect. Policy-making is also

the decision aspect of that level of leadership which involves the alteration, origination, or elimination of organizational structure" (Katz & Kahn, 1966, p. 259).

Three basic dimensions are concerned as of consequence about policy decisions: the level of generality or abstraction of the decision; the amount of internal and external organizational space affected by the decision; and the length of time for which the decision will hold.

This leads Katz and Kahn to distinguish among four types of decisions: (1) policy-making as the formulation of substantive goals and objectives, (2) policy-making as the formulation of procedures and devices for achieving goals and evaluating performance, (3) routine administration, or the application of existing policies to ongoing operations, and (4) residual, ad hoc decisions affecting organizational space without temporal implications beyond the immediate event.

Decision processes clearly differ with the different kinds of organizational activities or functions. Parsons (1960) categorized organizational activity into technical, managerial and institutional. The technical core of the organization operates its technology to achieve desired outputs rationally. The extent to which activities result in desired outcomes and unnecessary costs are avoided are the criteria for technical decision rationality. To facilitate the attainment of technical rationality, decisions in the technical core are aimed at eliminating uncertainties and providing closure. Such closure is much less possible in the managerial or institutional cores for they must deal with the less controllable external environment. This, in turn, makes it difficult for the technical core, interlocked with the managerial and institutional, to avoid some uncertainty.

"Nevertheless, persistent attempts are made to attain an environment of certainty within the technical core. To the extent that such shielding is attained, the sources of uncertainty are principally confined to the technology itself, and decisions focus upon maintaining and improving the operation of the transformation processes" (Ebert & Mitchell, 1976, p. 36).

The managerial core involves overseeing the technical core, determining its scope, and facilitating its interactions with the environment consistent with changing requirements introduced by the institutional core. The management **core** mediates between the technical and institutional cores. The managerial core tries to facilitate the closure for the technical core by producing buffering units (such as inventories), smoothing input and out transactions (such as discounts to customers during off-seasons), by anticipating needed changes requiring technical adaptation (e.g. maintaining forecasting units) and by rationing scarce resources (e.g. setting priorities) (Thompson, 1967).

The institutional core is responsible for establishing the organization's identity in relation to its economic, physical and social environment. Thus, it is most affected by environmental fluctuations and change. It is designed and oriented toward coping with environmental uncertainties rather than being shielded from them.

The organization's legitimacy, ability to attract investment capital vital to achieving its goals, and its ability to influence its prospective clients and customers to accept its goods and services, depend on the institutional core's flexibility in dealing with societal codes, laws, norms, values and interests. Thus, the institutional core is responsible for setting and adjusting the organization's goals reflecting the environmental

influences and interests of its various dominant organizational constituencies.

As concluded by Ebert and Mitchell (1976), the interdependency of decision-making among the three cores of the organization are seen as its flexible dealings with the external environment and also making commitments and placing demands on various elements of the managerial and technical cores. Yet it depends upon the technical core to meet these commitments providing the relative certainty in which the technical core can operate efficiently. Mediation and balance between the institutional needs for adaptability and the technical core for certainty are provided by the managerial core. Illustrative is the managerial role of expeditor who tries to handle special rush orders from customers without unduly upsetting the production line.

Organizational and Human Decision Processes

The dynamics of organizational decision-making parallel those of the individual decision-maker. Thus, organizations appear to use strategies in complex problem-solving situations that are functionally similar to strategies employed by individuals (Simon, 1960). However, organizational decision-making, as such, requires much additional exposition. The differences with human decision-making must not be underestimated. For instance, ordinarily, since it involves transactions or influences between people, organizational decision-making is more open to observation and cross-checking than is isolated human decision-making (Barnard, 1938). Nevertheless, in the chapters that follow two streams of research will be considered, organizational decision-making, which has been primarily theoretical, and human decision-making, which

has emphasized experimentation. Organizational analyses have mainly been collections of simple ideas and metaphors aimed at understanding and interpreting naturally occurring organizational events. Research on human cognition and choice is mainly carried out in laboratory settings to provide empirical tests of a small set of propositions about inference and information processing. Yet much communality has been noted (March & Shapira, 1982). Both will contribute to understanding of the various phases of the decision-process in organizational settings which we propose to examine: problem discovery and diagnosis, search and innovation, evaluation and choice, conflict and authorization, as well as constraints on the process, and supports for it. But first, we need to examine the methods to approach the examination.

CHAPTER 2

METHODS AND MODELS

Prescription Versus Description

As Zeleny (1981) points out "knowing how the decisions are made can teach us about how they should be made; the reverse causal linkage, unfortunately, does not follow: (p. 322). Thus, take two decks of playing cards and exchange the hearts and spades so that one deck has three black suits and the other has three red suits. To maximize success in predicting which suit will turn up in the three-fourths black deck, the prescription is to always predict black. But decision-makers actually predict black only three-fourths of the time (Taylor, 1965).

While mathematicians and economists wrestle largely with formal prescriptive models based on deductions from postulates on how things should be if one was and could be completely rational and consistent, behavioral research on organizational decision-making is mainly descriptive. It has been concerned primarily with how, in fact, do managers and administrators actually make decisions. Normative models can be constructed from such information likely to focus on those aspects of decision-making behavior that economic decision models usually ignore or minimize (Simon, 1960).

All prescriptive effort need not remain only an academic exercise. Rather, normative theory can be formulated concerned with prescribing courses of action that conform most closely to the decision maker's beliefs and values. Description of these beliefs and values and how they are incorporated into the decision-making process must precede the development

of normative theory that can be externally validated. In the past, superficial comparisons were obtained between actual behavior and normative models. Now we concern ourselves with the psychological dynamics underlying observed decision-making processes.

Normative models will have a better chance of mirroring reality if they are based on psychologically-sound axioms (MacCrimmon, 1968; Slovic & Tversky, 1974). For example, the paramutual betting and options markets indicate that people in general favor the long shots. Above and beyond this there are wide-ranging individual differences in preferences. The existence of stock market trading in massive frequencies and amounts attests to the extent to which in the same overall environment, thousands of traders reach diametrically opposite decisions, to buy what thousands of others are offering to sell. The traders, differ in objectives, differ in their access to information preferences for risk **avoidance**, and choice strategies. To understand and to predict their decision-making requires careful description of the overall process involved. It becomes important to start with assumptions that are closer to reality than those upon which the early economic theories were based. Yet, economic utility theory still can only say that the utility for a completely rational gambler is the same when wagering \$10 to win \$1 with 9 chances in 10 to win as when wagering \$1 to win \$10 with one chance in 10 to win.

Normative models which provide employment officers with optimums in deciding whether or not to hire a prospect can be constructed if various parameters can be fixed by previous experience such as the known accuracy of judgement (the validity of the predictors against the criterion for performance), the base rate of occurrence of successful outcomes, the selection

ratio, the costs of errors in making choices and the pattern of successful and failing outcomes. Prescription can follow from adequate description.

METHODS

Mathematico-deductive Methods

Computational decision-making has been most appropriate for the classical models of organizational decision-making. Problems are well structured; alternatives are exhaustive and utilities are quantified. But generally as Zeleny (1981) has pointed out in engaging in organizational decision-making, managers do not duplicate "rather recondite mathematics...to maximize utility" as would be called for by most economists and many management scientists. Although considerable effort has been expended to apply simple mathematical rigor to decision-making, it has generally been inadequate to capture the realities of decision-making. The rigor has often been without relevance. The axioms upon which deductions have been derived often are not reality based.

This is not to say that we lack useful specific applications of mathematical analysis to better structured problems or to well-structured parts of the decision process, even when they have required simplification of reality in order to deal mathematically with the data at hand. For example, Ashton (1976) has shown that linear models in general, and linear regression models in particular, are superior to humans in the terms of decision performance even when estimated from the previous decisions of the individual. As we have already noted, human decision-makers make systematic and random errors in the weighting and utilization of information which errors are

exacerbated and compounded in organizational settings. The linear regressions can detect and adjust for these errors. Indeed, as Slovic and Lichtenstein (1971) concluded:

"...much of what we call "intuition" can be explicated in a precise and quantitative manner. When this is done, the judge's insight into his own cognitive process is often found to be inaccurate. (Slovic & Lowenstein, 1971, p. 724)."

Many more specific examples will be cited and the significance of mathematical decision supports will be discussed at length in Chapter 8.

Nevertheless, it is not surprising to learn that practicing production managers avoid making use of the decision supports provided by complex operations research techniques and practicing finance managers avoid complex mathematical models in favor of a few simple rules in investment decision-making (Bing, 1971).

Part of the problem, is that the mathematical, deductive effort has been to prescribe the rules when we still remain unable to fully describe what goes into an effective decision. Only if the mathematics follows reality-based axioms, is much progress likely here.

To be sought are the mathematical structures which describe decision-making behavior when organizational considerations infringe dramatically on the effectiveness of decisions and their outcomes as it actually is observed in real life. As they stand now, elegant mathematical models of preferences fail to mirror decision-making reality. In reality, organizational decisions are based on a progressive comparison of the preference systems of multiple actors, in a fuzzy environment, evolving through interactions under the influence of different political and power systems. The preferences are fuzzy, incompletely formulated, nontransitive, and often incoherent and conflicting.

They differ from one actor to another; they change with new circumstances and during the decision-making process (Roy, in press).

Furthermore, Zeleny (1980) notes:

- "1. Alternatives are rarely prespecified.
2. Creative generation of alternatives is of paramount importance.
3. Incommensurate performance measures cannot be "resolved" by plugging them into a single formula.
4. Tradeoffs, preferences, and attitudes change incessantly.
5. Human choices are neither systematic nor transitive nor consistent, and yet they are rational.
6. Decision makers seek support and aid rather than prescriptions." (p. 331)

He concludes that:

"To quantify and aggregate such variety of factors into a single objective function, into one and only one criterion, represents an unscientific reduction of reality. The decision maker is being forced to think hard about scores of value tradeoffs and attitudes toward risk--only to have this expensive information collapsed into a single number." (p. 331)

For an adequate mathematical account, we need to begin with behavioral approaches, then proceed quite differently culminating in quite different mathematical descriptions which will more closely match reality.

Empirico-Inductive Methods

As we noted in Chapter 1, in certain senses, it is easier to study organizational decision processes in vivo, than individual human decision-making. Organizations have external memories, computational aids, and resources permitting the identification of more alternatives, and the collection of more data on their outcomes. More quantitative criteria are available (Behling & Schriesheim, 1976). At the same time, it is obviously much more difficult to undertake controlled experimentation with organizations than with individuals.

Traditional Methods. Field methods for the study of organizational decision-making have included the case history based on interviews with the key members of the organization and content analysis of available documents: (memos, reports, news accounts, letters, minutes of meetings) and participant observations by the key members. Also use has been made of verbal protocols, diaries, time logs, sociometry, communication and information flows, and responses to questionnaires. Some controlled laboratory experiments and, to a lesser degree, field experiments have been employed, in addition, along with simulations such as business games.

Innovations. More recent innovative methods have included studying the organizations as metaphor, organizational mapping, in-basket techniques, and interactive human-computer systems. Information-seeking has been studied by asking participants to select or purchase available information (Payne, 1976). Eye-movement paralleling decision processes have been examined by Russo and Rosen (1975).

A fruitful example of a simulation for studying decision-making is the Tactical and Negotiations Game (TNG). Participants make complex military decisions in responding to experimenter controlled information. Although the participants believe that they are playing against another team of decision makers, all information that they receive is preprogrammed, to suit research interests. TNG permits assembled individual decision makers or decision making groups and exposing them to a military environment representative of the model to be simulated. Some real-time character for the simulation is obtained in that a decision-making unit can be continuously involved for eight hours or more without interruption.

(What has been found, for example, is that highest levels of risk are reached after approximately six hours of decision making activity. Risk levels tend to stabilize somewhat at that point) (Streufert, 1970).

Through controlled introspection, participants may be asked to build and validate their own discrimination nets. In addition to traditional introspective methods of thinking aloud while making a decision, interviews with decision-makers after-the-fact may be employed. Such interviews can be structured by stimulated recall. Bloom & Brosler (1950) used tape play-backs asking participants to describe what they had been thinking about during the original problem-solving.

Dependence on Memory. Much of the study of organizational processes depends on some form of retrospection and recall. Hence, a critical issue concerns the reliability and validity of memory, the schema in which memories are encoded, and the extent to which they are sources of distortion.

Phillips and Rush (undated) summarized some of the relevant findings:

1. When asked to recall an event, humans often have difficulty distinguishing the objective character of that event from schematic information. Their descriptions, therefore, tend to be biased in the direction of their intuitive expectations, making their recall of the event more consistent with their schema than it actually was.

2. Information that is irrelevant to one's schema may fail to be stored. Even when such information has been stored, it may not be recalled since it is not integrated into relevant schema.

3. Current feelings and beliefs about an event can significantly distort memory of it. Cognitive bolstering of a previously experienced

event results from our tendencies to selectively attend to, or encode and remember, information which strengthens our current stereotypes and expectations.

4. Factual information can be systematically distorted through the introduction of new information embedded in questions. Cues embedded within new information may activate certain schema, which serve as retrieval cues for other encoded information.

Thus, there can be serious impairment in the data based on recall of organizational decision-processes. When asked to recall such processes, managers are likely to respond depending on their own already-established schemas and stereotypes. The very questions posed by the inquiring investigator will affect what is recalled and how.

More Field Research Sought. Browning (1977) calls for more field study and less laboratory study as real organizational groups are influenced by outside expectations and membership changes that make their functioning different from model groups. Mintzberg, Raisinghaini & Theoret (1976) agree with Browning seeing the typical controlled laboratory group decision study as inadequate since they believe that the:

"...structure of the strategic decision process is determined by its very complexity. Oversimplification in the laboratory removes the very element on which the research should be focused." (p. 247)

Although they can cite exceptions (Snyder & Paige, 1958; Witte, 1972), for field work, Mintzberg et al argue in favor of interviews with key members over extended periods of time rather than depending on documents as the best source of data for they believe that strategic decision processes "seldom leave reliable traces within the files of the organization" in documentation.

THEORIES AND MODELS

Role of Theory

Models are simplified representations of the decision-making process: theories are explanations of the process. The theories usually postulate memories, information processing, and a hierarchy of decision rules. Applications of these theories turn these postulates into testable hypotheses by specifying in detail the contents of the memory and the information processes as well as the content and order of the required decision rules (Clarkson & Pounds, 1963).

Theories of organizational decision-making deal with human decision-making embedded in organizational contexts, data banks, information processing, and decision rules. In moving from the individual decision-making manager, in the abstract, to the decision-making manager embedded in an organization, Sayles (1964) sees needed conceptualization becoming more dynamic, decision-making, as such, being shaped as much by the pattern of interaction among managers as by the contemplation and cognitive processes of the individual manager. Sayles rejects as inadequate the static conceptualization of the individual manager with a certain amount of authority that permits him or her to make certain types of decisions, to be carried out by subordinates who have the responsibility to follow instructions:

"This conception of administration and the manager's role produces the neat organization pyramids with their unquestioned hierarchical characteristics and, in the process, deludes many observers into condemning the monolithic structure." (Sayles, 1964, p. 208)

Although synthesis among theoretical explanations have been attempted (Schaefer, 1971), it is difficult to pull together the different theoretical

approaches to organizational decision-making. Ebert and Mitchell (1975) suggest why. The field is a highly interdisciplinary one. Also the theories vary in their level of abstraction and whether they are broad or specific.

Economic Theory of the Firm

According to McGuire (1964), the economic theory of the firm most widely accepted by economists includes the following tenets: (1) the firm has a goal (or goals) toward which it strives; (2) it moves toward its objectives in a "rational" manner; (3) the firm's function is to transform economic inputs into outputs; (4) the environment in which the firm operates is given; and (5) the theory concentrates particularly upon changes in the price and quantities of inputs and outputs.

The economic theory of the firm is operated by economic man who is completely informed as to alternative actions and outcomes facing him, infinitely sensitive to what alternatives are involved, and rational in making decisions (Edwards, 1954). He has a set of utilities that permits him to rank all sets of consequences according to preference and to choose that alternative that has the preferred consequence (Cyert, Simon & Trow, 1956; Simon, 1959). This ability to identify all decision alternatives means that we are dealing with a closed system.

Fundamental to using closed systems is utility theory. Axiomatic is transitivity (If $A \succ B \succ C$, then $A \succ C$) and that decision-makers prefer one of two outcomes or are indifferent. To construct a utility index according to Alexis and Wilson (1967) requires:

1. A set of mutually exclusive and independent events.
2. A procedure for assigning numerical values to each outcome.

3. A procedure for assigning probability measures to each outcome possibility.
4. The assumption that the decision maker is a maximizer.
5. The assumption that the decision maker is willing to gamble." (p. 155)

With closed systems, given an objective function, known constraints and using utility theory, we can determine the complete set of feasible solutions. For highly structured, routine problems, with effective management information systems, coupled with powerful computers using problem solving algorithms, we can literally compute mathematically optimal solutions. Probabilistic methods for dealing adequately with incomplete information are also available for such closed systems to fill in the missing gaps.

Problem-solving algorithms and systematic computing generate and order feasible solutions to permit the selection of an optimal solution. Closed models make it possible to apply linear programming, often with very powerful and useful effects to solve inventory storage, scheduling, and other types of important managerial problems.

Again, mathematical game theory depends on a closed system of clearly defined goals, a given number of alternatives, and players who can estimate the consequences of their choice as determined by their own choice and the choice of others. With a closed system we can be completely rational. We can identify alternatives, order them, and select the best one to attain predetermined goals.

Decision aids abound for closed systems as will be discussed in Chapter 8.

Compatible with the economic theory is the machine model of organizations (Rice & Bishoprick, 1971). The organization is deliberately designed and constructed to accomplish a purpose. Man within the organization is

a component, of the machine.

Decision-making is limited to management. All needed information and wisdom rests with the boss. Labor is treated as a factor in production.

Man is economic and rational, directed toward the single objective function maximizing money income.

Decisions must travel top-down in accordance with a number of universal principles such as the chain of command, span of control and division of labor.

Criticisms of the Economic Theory of the Firm. Barnard's (1938) descriptions of how organizations really made decisions were a far cry from what was required by such economic thinking for closed systems. Stimulated by the criticisms of Barnard (1938) and Simon (1955), Cyert, Simon and Trow, (1956) completed an observational study suggesting that understanding of organizational decision-making required treating the ill-structured problems of the world of business as open, not closed systems of variables. Cyert, Dill and March (1958) published four case studies suggesting that none of the required economic assumptions were valid descriptions of the organizational decision-making process.

In contrast to traditional economic theories, they noted that the search for alternatives was not continuous. Rather it occurred when stimulated by a significant environmental change or a crisis in the organization. Human perceptions of these events played an important role in initiating action. The search for decision alternatives was highly restricted and was far from exhaustive. Simple and objectively unevaluated

guidelines were used to narrow the range of alternatives that were considered. Proposed solutions were not determined by examining all alternatives on an economic basis. Rather, they were actually the preferred action for many organization members long before the decision problem arose. The decision problem appeared to present an opportunity to implement an already preferred course of action. (A well-known failing among executives is to call decision-making "meetings" primarily to announce and to sell decisions they have already made).

Contrary to the assumptions of economic theory, estimates of costs and returns for the preferred alternative were vague, and expressed ambiguously. Only after the decision had been made were detailed cost estimates obtained. Early cost estimates for alternatives were overoptimistic. Only after a time, were the cost implications of the decision examined more carefully.

Perceptual and motivational biases dominated evaluation and choice. Staff analysts prepared a recommendation for the alternative they believed to be preferred by management.

As environmental conditions changed, other problems came to dominate organizational activities, and the implementation program was abandoned.

Alexis and Wilson (1967) further noted that:

"Suboptimization is more typical of organizational decision making (than optimization). The decision maker acts on the basis of the decision framework and information available to his particular unit or department in the hierarchy. He makes decisions from a local point of view. Such decisions may be optimal for the organization as a whole. The organization is affected by the total set of effects; a department may not be. Decisions beneficial to one department may create difficulties elsewhere in the organization which are much greater than the benefits received by the decision maker's department." (p. 157)

More often, suboptimization is the rule even for decisions that lie wholly within the organizational unit involved for the decision-maker is constricted by a limited perspective, possesses limited computational skills, is seldom party to complete information, is subject to a multitude of errors and systematic bias in the process of discovery, search, evaluation, and choice. Reality is simplified in order to be able to deal with it to fit with the capabilities and needs of the decision-maker. It is seldom possible to weigh all the alternatives. For example, when U.S. firms decide to expand production facilities abroad, they do not consider 160 countries as possible locations, then optimize the choice from among them. Rather, they tend to focus on one country because they have already had trading experience in it, exporting has become a problem, and now they estimate whether a correct investment in that country will be more satisfactory than continuing to export to it. Time and costs, prevent the kind of search called for by traditional economic theory (Bass, McGregor & Walters, 1977).

Soelberg (1967) offered a number of other criticisms of traditional economic theories of decision making which depend so heavily on the concepts of single objective functions based on the utility of alternatives and probability estimates.

1. Decision value attributes are usually multidimensional; they are not compared or substituted for each other during choice. Stable utility weighting functions cannot be elicited from decision makers prior to their selection of a preferred alternative. Such weights do not ordinarily enter into decision processing. The noncomparison of goal attributes during

screening and selection of alternatives also negates the decision maker's need for, and the reasonableness and the need for postulating the existence of a multidimensional utility indifference map.

2. Probability theory does not represent how decision makers perceive and deal with uncertainty during unprogrammed decision making. Probabilities which even highly trained decision makers provide are neither additive nor cardinally scaled. Decision makers do not normally think of their choice alternative in terms of multiple consequences. Rather, they think of each alternative as a set of noncomparable goal attributes. Uncertainty is usually additive and depends on the decision maker's personal evaluation of an alternative's uncertain attributes.

The simplicity of information processing computations is a far cry from representing the conditional probability distributions for each alternative which, according to distributive probability theory, decision makers should be associating with each multiconsequential, multivalued alternative.

3. Several alternatives are considered by decision makers at one time rather as would be represented by sequential search models. Evaluation of an alternative is in steps as at each step new information is collected and evaluated about a subset of attributes of the alternative.

Thus, search within alternatives is as important a process to understand formally as the search across alternatives.

However, in all fairness to economic theory of the firm and its economic man, as Luthans (1973) has noted, although exceptions can be found among some extremists:

"Most economists do not claim that economic man is a realistic descriptive model of modern management decision-making behavior. They use economic man primarily for certain theoretical analyses. On the other hand, some aspects of economic man can be useful in describing actual decision-making behavior. For example, a survey of "excellently managed" firms by James Earley (1956) found that short views, innovative sensitivity, marginal costing, and marginal pricing were all preponderant among the respondents. Yet, except for the few indirect exceptions, the economic man model is not realistically descriptive of management decision-making behavior." (p. 194)

Although such economic principles do make a contribution to rationalizing the work place for well-structured and routine work and to organizing for crises, the failure to consider the socioemotional elements of organization, and the impossibility of complete rationality in dealing with most problems, particularly ill-structured ones, resulted in the construction of behavioral models and theories to more closely represent the realities of organizational decision-making.

Behavioral Theories of the Firm

Nonroutine decision making in organizations follows a pattern better dealt with by the psychology of problem solving than by a elegant optimization calculus.

The problem itself may not be adequately sensed or defined. Alternatives may be vague. Search may be avoided because of the costs. The consequences of various choices can only be guessed. The required judgments and estimates are filled with a wide variety of human errors and systematic biases (Cyert, Simon & Trow, 1956).

Formal Models. Formal models abound of the behavioral approach to organizational decision-making. As will be seen, what they have in common is much greater than their differences, despite the passage of 25 years in which they have been surfacing in steady elaborations with some shifts in emphasis.

Simon (1955) pioneered in fashioning a formal model for unprogrammed decision-making containing three phases: intelligence (finding occasions for making a decision); design (finding, inventing, developing, and analyzing alternative courses of action); and choice (selecting a particular course of action from those available). In the same vein, Cyert and March (1963) formulated a behavioral theory of the firm to more adequately portray the realities of organizational decision-making. For them, aspiration levels, not predetermined objectives, are the stimulus to search and choice among alternatives, but the relations between alternatives and outcomes can remain unspecified. Only a relatively small number of alternatives are considered rather than an ordering of all possible alternatives. The effort is to find a satisfactory solution to meet aspiration levels, not the maximization of benefits-to-costs.

With reference to organizational goals, overall goals such as profit, are too general to have any operational effect. Operational goals originate as a consequence of bargaining among coalitions in the firm. What is viewed as important depends on who belongs to the relevant coalition at the time.

New participants enter or old participants leave the coalition. ...operative goals for a particular decision are the goals of the subunit making that decision. ...goals are evoked by problems. Aspiration level(s) (depend on) ...the organization's past goal, the organization's past perfor-

mance, and the past performance of other "comparable" organizations. (p. 115)

As the price of their continued participation in the coalition, members exact from the organization money payments as well as side payments such as policy commitments. Under prosperous conditions, these exactions tend to rise above the minimum level necessary for the participants to be kept in the coalition. Such payments above the minimum required are illustrative of organizational slack.

Operational goals are multiple. Several are likely to be involved in any one decision. Each such goal is more clearly identified with some coalition members than with others. The sales manager is more attentive to the effects of the decision on customers; the production manager, on employees. And each goal imposes an additional constraint upon the decision. That is, the alternative finally chosen must meet the diverse goals of the coalition.

It is not unusual for these multiple goals to be in conflict with each other. Such conflict among them is likely to be only partially resolved through decentralization of decision making. They may be dealt with in sequence rather than giving them simultaneous attention.

Organizational expectations depend on drawing inferences from available information, on hope, and on previous experience. The firm continues to operate under standard decision rules it has been using successfully before.

The intensity and success of search to meet expectations will depend on the extent to which goals are achieved and the amount of organizational slack in the firm. The direction of search will depend on the nature of the problem stimulating search and the location in the organization at which search is focused.

Organizations concentrate on observing selected short-run feedback that will indicate whether current goals are being met. Such search results in short-term readjustments on the basis of available knowledge and is a way to maintain avoidance of uncertainty. Short-run feedback indicates that aspiration levels are being met. Unmet goals are the stimulus for search, search that is simple-minded and biased by the hopes and expectations of the decision-makers. It is simple-minded in the sense that it concentrates efforts in the neighborhood of the problem symptom and current solution before going further out.

Choice usually settles on the first acceptable alternative although maximization rules may be applied to select among alternatives if several have been generated or found. If no acceptable solution appears, aspiration levels are lowered.

Organizations learn. Behavior that is successful becomes codified into rules for attention, search, and choice to be followed in the future. When these rules no longer work, they will be modified.

Figure 1 shows a complete model derived primarily from Cyert and March's theory. They validated their model by using it to generate price and output decisions with data supplied by a department store, and investment decisions from data supplied by a trust department. The price and investment decisions they generated matched quite well the real-world decisions actually reached by the firms. The organization decision processes as seen in Figure 1 according to Cyert and March involve four phenomena: quasi-resolution of conflict, uncertainty avoidance, problemistic search and organization learning, each of which will be discussed in still more detail in later chapters.

Figure 1 about here

Incrementalism. Lindbloom (1959) offered a number of amendments to the basic behavioral model of limited search and goal modifications to make the problem manageable. Pragmatism rather than idealism is the value that dominates the process. Rather than attempting a comprehensive survey and evaluation of a **wide array of alternatives**, the decision-maker focuses only on those which differ incrementally from existing policies and practices. Furthermore, there is no one decision or "right" solution but a "never-ending series of attacks" on the issues at hand through serial analyses and evaluation. Thus, decision-making is remedial, geared more to the alleviation of current imperfections than to the attainment of future goals.

Soelberg (1967) elaborated on Simon and Lindbloom. Intelligence was expanded into a diagnostic activity in which the decision-maker defines operationally the problem he or she intends to solve. Such problem definition may involve: (1) a description of differences between current status and goal on one or more attributes, (2) a description of the **strategy** associated with a previously encountered problem with a similar stimulus configuration, (3) a prescription of an ideal solution to the encountered problem.

The diagnosis includes an investigation of the task environment. This is followed by an attempt to develop an appropriate set of classifications of events to formulate and test hypotheses about the apparent

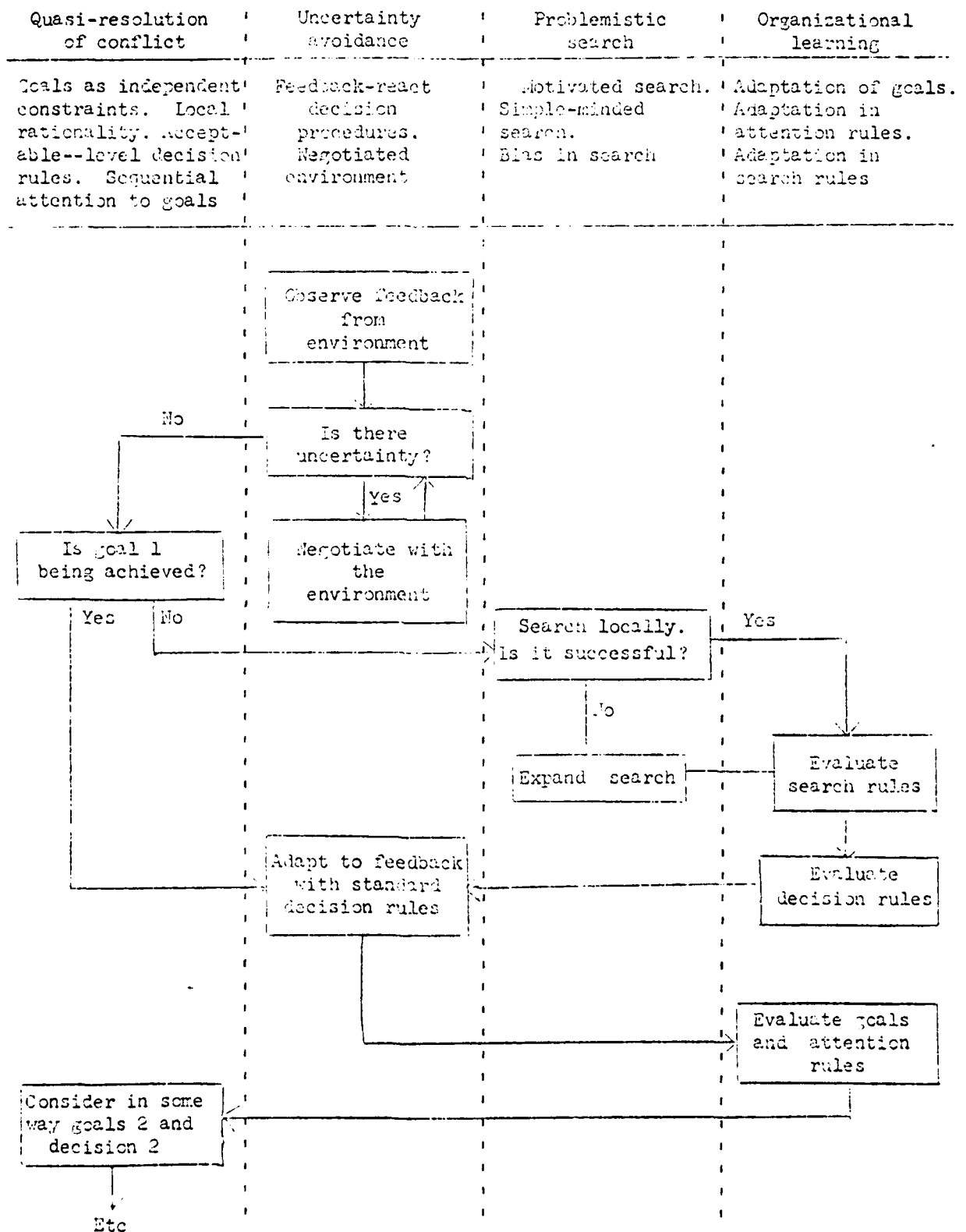


Figure 1: Organizational decision process in abstract form.
(From Cyert & March, 1963)

cause-effect relationships in the environment. Such hypothesized cause-and-effects help generate solution alternatives. Mintzberg et al (1974) likewise found it particularly important to attend to this diagnostic phase.

In the search and choice phases, in agreement with behavioral models, in general, Soelberg argued that unlike what was called for in the traditional economic model, decision makers do not estimate probabilities to attach to a set of mutually exclusive consequences associated with each alternative. Instead, decision makers search within each alternative until they feel they have sufficient information about each important goal attribute of that alternative, or until search resources are exhausted. If the alternative is not rejected, decision makers assign some value, or range of values, to each goal attribute. Choice then follows of one of the alternatives.

Mixed-Scanning. Rejecting both the traditional economic and the incremental models, Etzioni (1967) proposed a behavioral but prescriptive model in which several levels of scanning for problems and solutions are maintained. Truncated or full review of different sectors of the environment are maintained depending on the costs of missing out on an option by failing to fully examine for it. Sporadically, or at set intervals, broad and narrow perspectives are pursued so that the decision-maker neither remains stuck with an errorful incremented approach nor loses sight of necessities by being overly abstract. With mixed scanning, fundamental decisions are made by exploring the main alternatives seen in view of perceived goals. At the same time, details and specifications are omitted so that an overview is

feasible. Incremental decisions are made also but within the contexts set by fundamental decisions.

The environment, organizational level of the decision-maker, and the capacities of the decision-maker are seen to affect the appropriate mix in mixed-scanning. In stable environments, more incrementalism is expected to work better. But in rapidly changing situations, fundamental efforts are required.

"...In some situations, the higher in rank, concerned only with the overall picture, are impatient with details, while lower ranks-especially experts-are more likely to focus on details. In other situations, the higher ranks, to avoid facing the overall picture, seek to bury themselves ... in details." (p.391)

In stable environments, more incrementalism is expected to work better. But in rapidly changing situations, fundamental efforts are required.

With more capability, more all-encompassing scanning is possible; with little capability, the decision-maker may be best-off relying mainly on incremental approaches.

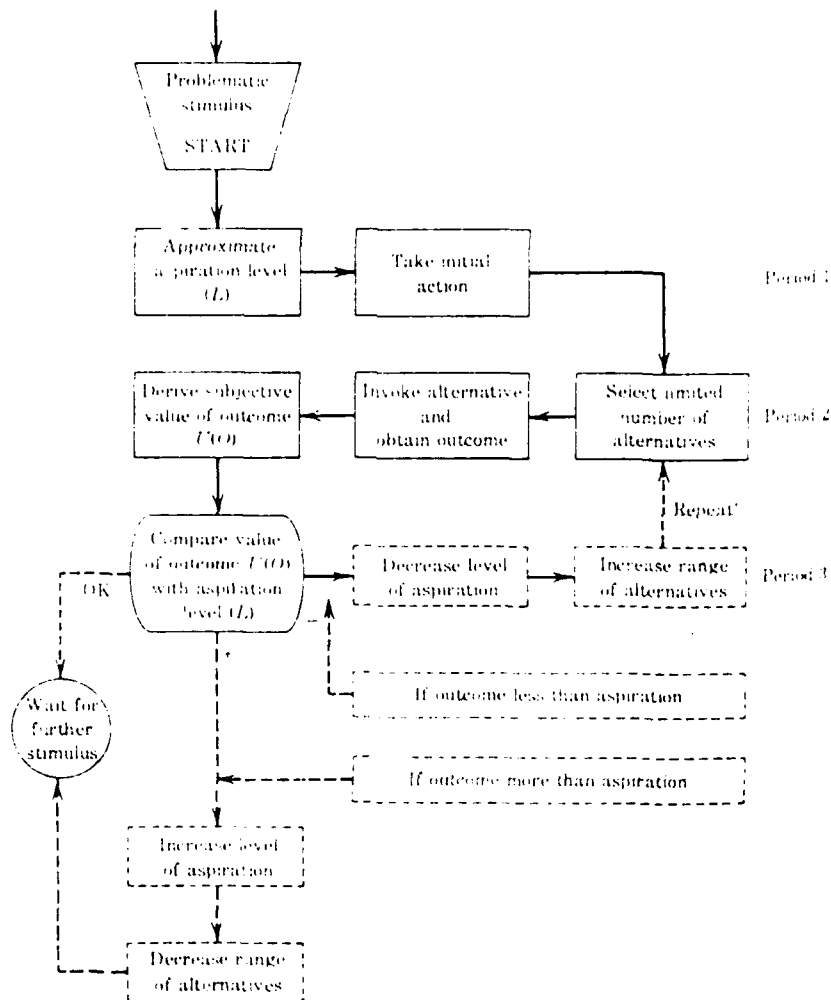
Other Behavioral Models. Numerous other assumptions have been employed to build behavioral models. For example, according to Roth (1974), members of an organization have their own subjective interpretation about what is good for the organization. A single investment strategy of the organization can be seen to emerge from the attitudes toward risk and the authority of each of the different members. When individuals are dissatisfied with the organizational investment, they will attempt to extend their authority to exert a greater influence upon the investment decision. A rule about authority may be subverted by willful individuals. On the other hand,

individuals may acquiesce to a decision they consider suboptimal for the organization to avoid becoming involved in the decision process.

Alexis and Wilson (1967) also begin with a problem as stimulus and emphasize a dynamic, adaptive, aspiration level as fundamental to a model of organizational decision-making. The decision-maker begins with an **idealized** goal structure and defines one or more action goals as a first approximation to his or her ideal goal. Action goals are representative of the decision-maker's aspiration level. As shown in Figure 2 the individual engages in search activity and defines a limited number of outcomes and alternatives but does not attempt to establish the relations rigorously. Analysis proceeds from loosely defined rules of approximation. The alternatives selected or created establish a starting point for further search toward a solution. Search among the limited alternatives aims to find a satisfactory solution, not an optimal one, to reach a modified adaptative level.

Figure 2 about here

Zeleny's (1981) Cohen, March and Olsen's (1972) and March and Romelar's (1976) models of the organizational description process are further elaborations of the behavioral approach. Zeleny sees that organizations strive to do more than just satisfy aspiration levels and yet do less than maximize. For Zeleny, the process begins with a complex interplay between the individual's current beliefs and desires, the currently perceived courses of action and the means to provide a fuller understanding of his or her goals, objectives and alternatives. An initial set of feasible alter-



An open decision model.

Figure 2: (Adapted from Alexis and Wilson, 1967, p. 160)

natives emerges in parallel with currently salient evaluative criteria. This gives rise to predecision conflict as the decision-maker realizes that his or her ideal alternative is not feasible. As a consequence, a search for additional alternatives is initiated. At the same time, the ideal alternative is displaced farther away. Conflict is increased. Evaluative criteria are changed. Search is begun but will diminish if the ideal displacement becomes smaller. Eventually, the ideal and the criteria are stabilized. Conflict is reduced. Partial decisions are made to abandon inferior alternatives. The ideal moves closer to the potential solutions. Justifications and post-decision regret for lost opportunities increase. Information and criteria are modified and new information is sought biased in favor of the remaining alternatives with the ideal stabilized in its newly displaced location. But a last displacement of the ideal alternative occurs when it merges with the finally chosen alternative.

In the garbage can model of Cohen, March and Olsen (1972) and for March and Romelar (1976), contiguity in time and place of decision-makers, problems and solutions are more important than causal links between problems and solutions. The decision-makers wander in-and-out of the process. Similarly, problems and solutions may appear and disappear.

Criticisms of Behavioral Models. Despite the empirical support for some of the behavioral models, Learned and Sproat (1966) pointed to a number of limitations. They see behavioral theories as unable to deal adequately with strategic decision-making since behavioral models fail to allow for superordinate goals precise enough to be operational. Further fault is found in that decision-maker's biases are limited to self-interest and aversion to uncertainty. They are fallible information processors. More-

over the administrative climate in which organizational decisions are made is ignored.

Too much attention may be paid to things as they are rather than what they could be. Possibly underestimated are what training can do to improve decision-making. More attention also needs to be focused on the costs and benefits of systematic, orderly approaches to problem discovery, problem diagnosis, search, evaluation and choice in contrast to the haphazard attack so often captured in behavioral approaches. Nevertheless, once we understand the rules of the game, as it is currently played we can determine what changes in the rules could improve the success, effectiveness, and efficiency of the process.

CHAPTER 3

PROBLEM DISCOVERY AND DIAGNOSIS

The questions arising here involve goal setting and its operationization. What prompts notice that objectives are not being met? What screens are in place to detect such discrepancies? What limits effective screening? What determines whether individual organization members will become involved in the decision-making process? What factors shape the diagnosis of what needs to be done?

Problems and Dilemmas. Whether we are ready to diagnosis a situation depends on whether we discern that we are facing a problem or a dilemma: A problem can be solved in the frame of reference suggested by its nature, by past precedents for dealing with it, or by the application of existing policy. On the other hand, a dilemma is not soluble within the assumptions explicitly or implicitly contained in its presentation; it requires reformulation. Often if we approach a mechanical puzzle with all our customary preconceptions about the nature of the problem, we can never solve it. We must abandon our habitual set and find a new way of looking at it (Rapoport, 1960). While many organizational difficulties are problems which can be solved in their own terms of reference, other discrepancies between current and desired states of affairs are dilemmas. They call for innovative and creative appreciation of what is wrong that needs to be put right (Katz & Kahn, 1966).

In classical management theory, discrepancies arise out of the failure of operations to meet standards set in planning as determined by the control function. Or, current operations may be seen to be unlikely to match the

forecasts of the future, based on strategic planning. Or, conflicts between individual values and organizational needs form gaps in the system (Roberts & Hanline, 1975).

Discrepancy as Trigger

Decisions are needed when a problem exists, when something is not as it should be. A process is initiated in which a change is consciously made to bring about a more acceptable state of affairs. Thus, the organizational decision-maker must be able to describe two states: what is, and what should be. What should be is a standard, an objective, or a criterion against which alternatives can be evaluated.

If the discrepancy between the two states is unacceptably large, efforts will be made to change what is to reexamine what should be. The causes of the problem must be identified to reduce the discrepancy (Kepner & Tregoe, 1965).

The performance standard of what should be may not be explicit. It may be objective or subjective. Subjective performance standards vary among executives depending upon their current and past assignments as well as their motives and personality. As a consequence, if standards are subjective, differences of opinion will arise about the existence and severity of problems. On the other hand, objective performance standards make it easier to agree about them and to gain acceptance organizationally that a problem exists (Tosi & Carroll, 1976).

For Zeleny (1980), the discrepancy between what is and what should be generates a sense of conflict. The dissatisfaction with the current state of affairs provides the decision-motivating tension. There are no suitable alternatives automatically available. Zeleny sees that what really

triggers the onset of the process is the infeasibility of the ideal alternative.

"...The decision maker perceives or measures the maximum (the most preferred) attainable levels with respect to each particular attribute or criterion considered. Although it might be difficult to choose the best automobile from a set of possible alternatives, it is generally simple to identify the most expensive one, the fastest, the heaviest, the most economical, the prettiest, the sexiest, the most elegant, the safest, the least polluting, etc.

The highest achievable scores with respect to all such currently considered attributes from a composite or image of an ideal alternative (which is)...not generally available. If it were, the decision would be straight-forward and trivial."
(p. 335)

According to Mintzberg, Raisinghani and Theoret's (1976) study of 25 organizational decision processes, many different precursors actually trigger recognition that a discrepancy exists and needs to be considered. Opportunities appear to be set off by a single stimulus. They may lie dormant in the mind of one executive until he feels ready to take action. Then, he may act quickly when there is a clear match between an opportunity and a perceived problem. On the other hand, threats, again resulting from a single stimuli, require immediate consideration. But ordinarily, problems involve multiple stimuli calling for diagnostic analyses before moving ahead.

The discrepancy must be above some minimal threshold to be perceived (Lewin, 1946). Attention will shift sequentially among gaps of different thresholds, from one gap to another (Cyert & March, 1963). The threshold is higher for opportunities than for threats (Drucker, 1963) and for gaps based on communications from subordinates rather than superiors (Barnard, 1938).

The perceived discrepancy depends on how validly and realistically we have defined both what is and what should be. The perceived gap or problem

may be truly non-existent except for our misperceptions. The description of the problem may be of superficial symptoms rather than underlying causes. Diagnosis will be faulty. If the search for solutions is instituted based on defining a problem in terms of its symptoms rather than its causes, the problem will reappear with new symptoms (Flippo, 1966). The American Revolution is a case in point. In 1776, the true gap for Americans was between the liberties they had enjoyed as colonists and the threatened loss of their freedoms. Objectively, they remained in a favored position compared to Britons at home. Most Englishmen were not represented in British Parliament either. The total annual taxes paid to Britain by Americans was about \$1.50 per capita (4 percent of what Englishmen paid in taxes at that time). "Taxation without representation" was but an element in the feelings of Americans that they were being treated as second-class citizens about to be relegated politically by a British aristocracy to the same servile status as the Irish peasantry. It was these feelings of a threatened loss of status and downgrading by the British government rather than tax and property issues as such, that generated the willingness to fight a long war for independence by a sufficient number of colonists. There also was a mistrust in the likelihood that the results of negotiations would be faithfully observed (Fleming, 1975).

Scanning and Screening

The earlier that symptoms are detected of what is such as falling sales volume or cost overruns the earlier that actions to correct the problem can be contemplated (Behling & Schriesheim, 1976). Indeed, most managers would like to be more proactive than they actually are (Bass & Burger, 1979). Etzioni's (1967)

mixed scanning model begins with this monitoring function. Feedforward controls (to be discussed later) are a way of facilitating this phase of the decision process. For Etzioni, mixed scanning is the appropriate way for managers to remain vigilant to both smaller, immediate, problems as well as larger, remote ones. Some resources need to be invested in a broad "camera" covering all parts of the organization and its environment, while other resources concentrate on detailed examination, in depth, of selected sectors based on what the broad camera reveals.

Categorization. Potential problems are screened by categorization. A hypothetical threshold of discrepancy is reached between what is on the basis of an initial categorization and what is expected. The decision process is initiated when what is detected and categorized does not easily match available prototypes--primary exemplars of what will serve for later copies of the same condition. Decision processes are initiated when categorization cannot proceed automatically (Feldman, 1972, 1981).

Once the current state of affairs is categorized, its reorganization is biased toward the general characteristics of the category. Falling demand for one's product may fit into the category of a sluggish market with little to do until the market turns around. Yet, in fact, the falling demand may really be due to a surge by a successful competitor. The search for solutions will depend on which category of explanation is selected, i. e. how the problem is diagnosed.

Goals and Objectives

What should be obviously depends on the organization's goals and how clear they are to decision-makers. Goals may be explicit; more often they

are implicit. For a given decision, they are likely to be multiple and interdependent rather than singular. They may be nested in a hierarchy. They may be complementary, compensatory or in conflict. A firm may specify its targeted rate of return on investment. Implicit to this, complementary and nested will be goals to provide for stockholders and management satisfaction.

The institutional core, dealing as it does with the outside environment and the interests of its dominant constituencies within the organization, sets the broad goals which are the premises for objective-setting at the managerial and technical cores. At lower hierarchical levels, objectives need to be operationalized consistent with the goals set at the higher levels. In turn, this promotes stability at lower levels. Each lower level goal becomes a means to a higher-order goal. Acceptance of subgoals at lower levels matching higher-order organizational sanctions and inducements to meet individual member personal values and needs (Simon, 1965).

Stability and Change of Goals. Once set, subgoals become stabilized by the higher cost of innovation, sunk costs and sunk assets (investments such as for equipment, which cannot be easily changed) again curtailing optimizing individual preferences and needs (Simon, 1965).

But performance outcomes affect goals, just as goals affect subsequent performance. Zander, Forward and Albert (1969) contrasted the goal setting views of repeatedly successful and repeatedly failing United Fund Boards. (As might be expected, central board members were more deeply involved in setting the Funds goals each year than were peripheral members). Previous success was seen to prepare the ground for future success; failure, for future failure. Forward and Zander (1971) followed this up with an

experiment using goal setting four-member teams of high school boys. Goals set were affected by the apparent previous success of the team, prior previous success of the larger organization (their school) and external pressure raising group levels of aspiration.

The impact of the goals set on subsequent effort continues to be a subject of theoretical controversy and mixed empirical outcomes. Since performance depends on the probabilities of obtaining valued outcomes (Vroom, 1964), effort should be enhanced by easy goals. But empirically, Locke (1968) has found that effort is enhanced by the setting of hard goals. And Atkinson (1964) sees that for achievement-oriented participants, goals of moderate difficulty--both challenging and obtainable--are optimum. Finally, Shapira (1975) has obtained support for a model which sees hard, challenging, goals as best where participants are intrinsically interested in the work to be done and easy, readily obtainable goals best when only extrinsic pay-offs occur from performance.

Operational versus Non-Operational Goals. March and Simon (1958) distinguished between operational and non-operational organizational goals. Operational goals make possible means for testing actions to choose among alternatives. Promoting good will is not operational, as such. It is related to specific actions only through the intervention of subgoals. Subgoals become operational by being substituted for the more general non-operational goals of an organization. In general, the limited objectives and subgoals lend themselves more readily to using operational criteria for decision-making. Where operational goals are shared, differences about what should be can then be resolved by rational, analytic processes. Where

shared goals are not operational or where the operational subgoals are not shared, differences must be adjusted through bargaining. The outcome becomes a compromise to achieve internal harmony rather than overall organizational objectives. (See also, Thompson & Tuden, 1959)

Goal Clarity. The determination of what should be requires clarity about the organization's goals. For Katz and Kahn (1966), consideration of organizational goals may be instituted: (1) to sharpen and clarify organizational purposes and to exclude irrelevant activities, (2) to add new objectives, (3) to shift priorities among objectives, or (4) to shift the mission of the organization.

Goal and Subgoal Consistency. Many goal examinations come about also to clarify the major organizational mission, or to achieve consistency between it and subgoals which have developed in the organizational structure. Individual units within the organization may develop a "logic of their own". The larger system must redress the resulting imbalance in its functioning. Thus, a university may find that its intercollegiate athletics program has become so professional that it is in open conflict with its educational objectives. The leadership must reaffirm its basic mission and bring athletics into line, or have its goals altered by the deviant athletic program subsystem. Such persistent imbalances will lead to external difficulties precipitating organizational actions to define or redefine organizational goals.

Katz and Kahn along with Blau (1955) see a tendency for executives to pursue a broadening of their missions. Limited directives are expanded over time. "Empire building" is seen as a common attribute of bureaucrats.

Multiplicity of Objectives. As Cyert and March (1963) found, the coalitions of interests that make up the firm's membership (owners, managers, workers, suppliers, clients) result in objectives that are multiple including profitability, employee satisfaction, growth, maintenance of satisfactory operations, client satisfaction, and so on (Dent, 1959; Pickle & Friedlander, 1967). The goals often are hierarchical (i. e. growth, then profitability) and complementary (maintenance of satisfactory operations and employee satisfaction) but they can also be in conflict (supplier versus client satisfaction). Thus, as they become operationalized as objectives, in the cascade downwards in the organization, they generate multiple interactive objectives which initiate decision processes. The manager of the finishing department of the large manufacturing firm needs to bear in mind as he or she makes decisions the multiple needs for efficient production and customer satisfaction, along with maintaining good relations with subordinates, peers, and superiors.

Even if one starts at the top of the organization with a particular single goal, say, profitability, the subgoals that will be operationalized will be difficult to match up as we move from the sales to the manufacturing departments. And given disparate subgoals which may be in conflict with each other, the operational goals that do emerge will be based on bargaining between the different units involved (Cyert & March, 1963). The purchasing department may want to minimize prices of supplies; the production department is more concerned about reliability to meet its goal of quality output. A compromise will be found, satisfactory to both departments.

Organizational Goals as Sets of Constraints. As Simon (1964) has concluded:

"In the decision-making situations of real life, a course of action, to be acceptable, must satisfy a whole set of requirements, or constraints. Sometimes one of these requirements is singled out and referred to as the goal of the action. But the choice of one of the constraints, from many, is to a large extent arbitrary. For many purposes it is more meaningful to refer to the whole set of requirements as the (complex) goal of the action." (p. 00)

Simon doubts that organizational decisions are ever directed toward achieving a goal. Rather they are concerned with discovering ways to deal with a whole set of requirements. It is the set of requirements that is the goal of the actions.

If any of the requirements are selected for special attention, it is because of their relation to the motivation of the decision makers, or because of their relation to the search process that is generating particular actions. The constraints to be discussed in more detail in Chapter 7 that motivate and guide decision makers are sometimes viewed as more "goal-like" than those that limit the actions they may consider or those that test whether a potential course of action is satisfactory. Whether all or only some of the constraints are treated as goals is largely a matter of linguistic or analytic convenience.

Displacement

The broadly-stated goals of an organization such as to make a profit must be made into operational objectives such as to increase new customers by 10 per cent this year. In the course of operationalization, displacement often occurs. The goal of making a profit may be operationalized into winning a seat on the Board of Directors by the Vice President of Marketing. The VP subsequently makes decisions calculated to win him a seat, not necessarily to win new customers. As Behling and Schriesheim (1976) have

noted, organizational purposes are subject to displacement as they become operational. In mutual benefit associations, this may take the form of catering to the interests of the paid professionals of the organization. In the large publicly-held corporation, this often means emphasizing the interests of managers at the expense of the stockholders. In service organizations, the organization may come to serve staff interests instead of those of the clients. The military coup is a displacement where the legal monopoly of armed force is used to give control of the government to the military. The late-night apocryphal drunk, asked why he is searching for his lost keys under the lamppost, answers that it is lighter under the lamppost. Objectives are sometimes set not because of the originally described goals, but because successful actions can be completed to obtain the displaced objectives. The original goal of the bureaucracy of maintaining quality service may be subverted to the objective of maintaining a good public image by heavy investment in good relations with the press.

Organizational controls are instituted to minimize displacement. The VP must present quarterly reports on gains in new customers. Individual decision units are given responsibility for reaching the objectives. Division heads may be given quotas of new customers to obtain.

Aspiration Level. Classical models of decision-making dealt with absolute discrepancies between what is and ideally what should be as the initiative for stimulating decision-making. Behavioral and neo-classical decision-making posit both an ideal condition of what should be and as aspiration level likely to be at variance from the ideal. Various neo-classical models introduce additional elements. The aspiration and the ideal becomes a gap of consequence. Aspiration level is subjective and modified

by incremental learning as to what is possible and what to trade-off. All relevant variables are now subjective matters. Ideals are also modifiable although generally less so than aspirations (Zeleny, 1981).

It is the perceived, not the actual, current state of affairs, that counts. To the extent, the perceived state is at variance with the true state, erroneous directions in search and choice will emerge. Thus, learning and motivation of individuals at various levels in the organization are important dynamics in how goals are set, how problems are defined, and how diagnoses are made. March and Simon (1958) provided a model showing how one's aspiration level depends on expected values of rewards to be obtained from search instituted by dissatisfaction. By searching the environment and his or her past experiences, the individual is able to assess the likely rewards which accrue from various actions. By searching the environment attractive to the extent they fit the individual's values and aspirations. Satisfaction and level of aspiration will increase with increases in the expected value of the rewards. Anticipated satisfactions are what stimulate the initiation of the decision process. As Katona (1953) has concluded, aspirations levels are dynamic, growing with achievements and declining with failures and influenced by various influences such as the performance of one's peers and reference groups. Filley, House and Kerr (1976) set forth and provide the experimental support for the proposition that:

"...continued failure to achieve a minimum standard of satisfaction results in the successive lowering of the standard until an acceptable compromise is reached; conversely, easy success tends to raise minimum standards." (p. 125)

Much qualification is needed. They note that aspiration level is

likely to be raised more by a given amount of success than lowered by a given amount of failure.

Other factors need to be taken into account. For example, the familiar "Doubling up of one's bet" was seen by Levy (1981). After initial failures, the decision to escalate aspirations or curtail them could be accounted for by one's evaluation of sunk costs in the first decision and one's resources still available after the initial failure. If a lot was invested in an initial failure and yet there still was enough money left for further investment, escalation was likely rather than curtailment in aspirations in order to "catch up".

Diagnosis

Antecedent information, beliefs and motivation about an opportunity, a problem, or a threat, lead to attributions about their causes. The attributed causes, in turn, determine anticipations, as well as the onset and direction of search and innovation (Kelley & Michela, 1980). If the cause attributed to low worker productivity is worker motivation, search for improvements will take different directions than if the cause is attributed to worker inability or faulty equipment.

For well-structured situations, the situation is identified and its main characteristics are defined. A model is then constructed to provide the basis for estimating possible outcomes of the decision over a range of possible conditions. Finally, there can be a determination of quantitative measures of costs and benefits appropriate to the situation under consideration. Uniform measurements are sought so as to facilitate subsequent comparisons among the alternatives proposed to deal with the recognized problem (Radford, 1981).

Faced with an ill-structured dilemma, we first need to try to reformulate it to make it recognizable in terms of characteristics with which we are more familiar. We may also need to remain prepared for qualitative rather than quantitative comparisons. The danger exists in this reformulation that we will try to solve a really new and distinct problem with methods that worked primarily on an older, really dissimilar, problem. We must be willing to accept the inability to completely define the problem in advance, since we lack complete information. So we move on to search and to make a trial choice. However, we may cycle back to the definition phase several more times as additional information becomes available during the search and trial choices. Indeed, Maier & Hoffman (1960) found that going back a second time to the same problem already solved improved the quality of the final decision.

Brunswik's (1955) probabilistic functionalism was applied by Filley, House and Kerr (1976) to account for a manager's anticipatory perceptions. According to Brunswik's theory, we subjectively evaluate the probable occurrence of events by associating patterns of actions, sequences, or events learned from past experience with patterns seen in the current situation. We then continuously search for confirmation or disproof of our evaluations and modify our anticipations as new information is acquired and as success or failure is experienced. At the same time, stray, contextual, variables will also be affecting our attention and awareness and what we will do in an on-going process.

The initial stimulus might be the announcement that the firm is losing money. Ways to increase revenues or reduce costs might be considered. Decisions would be made and orders given. The production department would be ordered to cut back inventories and the marketing group to raise prices.

These decisions would be based on the executives anticipation of near-future market demand, the inability to increase sales through special efforts, etc.

Because no market is static, the manager may be faced with the same decision sequence six months later. Forms of feedback, such as weekly sales reports and monthly accounting statements, will be in operation. The manager will make predictions based on past performance, but other variables will also be considered. The manager will be called upon to anticipate the most likely of a wide variety of possible future events, and to alter plans and activities accordingly. Much of the manager's behavior will operate at an unconscious level and will be affected by personal needs and desires. However, as experience is gained in evaluating the unique variables in an enterprise, the manager will typically become more proficient in the art of prediction. (p. 128)

Participation and Involvement in the Decision Process

Which positions in the organization, and which persons, participate further in the decision process once a problem has surfaced depend on a number of factors. Where psychological investment is greater, more participation will occur. The VP for production is more likely to become engaged in deciding on a new plant location than a small investor. Social visibility will make a difference. The town Mayor may be asked or required to participate on a problem about a government loan; the telephone operator will not. Control of resources will make the President highly likely to be involved in budget decisions which will not concern the salesman. Being inside rather than outside the organization will make a difference. The production planner will be involved in decisions of no concern to the customer. Frequency and speed of response to apparent needs for decisions are obviously slower for production planners than for telephone operators (Starbuck, 1976).

But when should one participate in decisions? The screen indicates that a problem exists. Should the executive do something about it? Should

it be brought to someone else's attention or ignored? Should the executive participate directly in the appropriate next steps of searching or inventing solutions to the problem?

Barnard (1938) first articulated answers to the questions as to where one was responsible for making decisions and when one was well-advised to avoid such action. He felt that an executive had to be clear about the boundaries of his new responsibilities so that he would be able to adequately care for his own domain otherwise he could be drawn into other areas and overburdened by other executives who shirked their own responsibilities.

Barnard identified three types of cases requiring an executive's possible initiating the decision process: higher authority, subordinates and self. Requests from higher authority, dealing with interpretation, application and distribution of instructions, require an initiative by the executive although some of the activity can be delegated. Serious dilemmas may be faced if the instructions violate one's ethical sense, or are perceived to be harmful or impossible.

Cases about subordinates stem from the incapacity, the uncertainty of instructions, the novelty of conditions, conflicts of jurisdiction or in orders, or failure of subjective authority. Barnard suggested that executives make these "appellate" decisions when they are important or cannot be delegated. Others should be declined.

The self-generated case is the perceived discrepancy between organizational objectives and current states of affairs which need attending. The executive's ability and initiative, and the organization's adequacy of communications will provide the sense of something needing correction, nevertheless "there is much incentive to avoid decisions but the executive

must decide on those issues which no one else is in a position to deal with effectively." Barnard's famous lines are still worth quoting:

"The fine art of executive decision consists in not deciding questions that are not now pertinent, in not deciding prematurely, in not making decisions that cannot be made effectively, and in not making decisions that others should make." (p. 188)

Other ways of questioning whether or not to become involved have been posed by Shull, Delbecq & Cummings (1970). Can the would-be decision-maker do something about the problem? Are a real set of alternatives likely to exist? How much are some of the variables of consequence under his or her control? Will his effort have a favorable impact? Can the would-be decision-maker influence some future state of affairs or even just become better prepared for the future? Will it pay to take foresightful action?

Unfortunately, much of the American public avoids voting on the basis that their one vote is irrelevant in determining who is elected. One is much more likely to participate in the decision process when a particular future event of importance is seen to depend on one's decision. Self-interest is a critical factor. A manager will volunteer to be a member of an ad hoc committee to decide on activity schedules in the belief that the costs of participation are less than the costs of an undesirable schedule which might be developed in his or her absence. A manager will avoid engaging or being identified in a decision process if high risk of the penalties for failure are seen to outweigh the benefits of success.

According to Soelberg (1967), when faced with ill-structured situations, decision-makers must somehow be induced to become involved, to attain one or more nontrivial objectives. Once involved, they proceed to **survey** their task environment--those elements of the larger world which are relevant to goal setting and goal attainment (Dill, 1962).

Control. Whether or not to move further forward in the decision-process will depend on the results of categorizing the perceived discrepancy as controllable or uncontrollable (Mac Crimmon, 1974). For a particular manager, locating lower price suppliers may be controllable; dealing with higher interest rates may not be controllable. Partially controllable factors can be decomposed into their controllable and uncontrollable elements (Howard, 1971).

In the same way, one conclusion reached from the diagnostic phase may be that the problem is solveable, and that there is likely to be a feasible solution (MacCrimmon, 1974). A construction firm faced with seriously declining demand for its houses may be no solution but to file for bankruptcy due to the firm's inability to control what appears to be the causes of declining demand--high land prices and high mortgage rates.

Priorities. Roberts and Hamlin (1975) suggest that priorities can be established for which decisions with which to become involved. Such priorities can be based on the anticipated gains from involvement in dealing with each problem. A "decision-making" schedule is envisaged based on "intuition, logic and mathematics." The important point here is that the executive is exhorted to consciously decide to engage or not engage and to set priorities for doing so. If priorities cannot be ordered quantitatively, they can be handled qualitatively (Ansoff, 1965). Care must be exerted to avoid attaching too high priorities to short-term expediencies which may detract from long-term strategic capabilities (Radford, 1981).

According to Radomsky (1967), managers' thresholds shift continually depending on their current workload and the number of decisions with which they are currently involved. When putting out a fire, a manager is unlikely

to be actively alert for new opportunities.

CHAPTER 4

SEARCH AND DESIGN

The completely rational view of decision-making saw the need to search for or innovate all possible alternatives before moving on to choose the best from among them. But as we have already noted, only limited rationality is possible in how decision-makers actually proceed. Search and innovation processes tend to be bounded (March & Simon, 1958). Unaware of all the possible alternatives, Simon's (1957) "administrative man" cannot possibly know all the consequences of choosing one alternative over another. The complexity of a problem is reduced to the level at which his limited knowledge and judgment can make the decision. "Administrative man" responds to the perceived, not necessarily, the real problem. The generation of alternatives is further constrained by organizational and individual factors to be discussed in Chapter 7.

Organizational Search as Seen by Cyert and March

For Cyert and March (1963) search is stimulated by a problem; depressed by a problem solution. Search is simple-minded, based on a simple model of causality until driven to a more complex one. Search is biased. Perceptions of the environment and considerations within the organization involved in the search are affected by the individual goals and competencies of the involved participants. Search begins by considering obvious solutions and problems, then moves on to other alternatives only if the obvious solutions are deemed unsatisfactory. This sequential effort is guided by heuristics, which reduce the number of alternatives to a salient few.

The small number of possibilities examined in the entire problem space are accounted for by two rules: search in the neighborhood of the problem symptom and in the context of the current approach to the problem. Other possibilities are ignored. As Simon and Newall (1971) suggest this actually makes good sense when one considers what "all possible alternatives" implies. (The decision-tree for the game of checkers has 10^{40} alternative paths).

Some theory or policy, explicit or implicit, guides and limits the search for solutions. This decides the time, place, methods, and approaches that will be considered. Unfortunately, there often is need for counter theories and counter policies to generate a different array of alternatives among which may lie a better solution (Feyerabend, 1975). The policy of containing Communism lay behind all seriously considered alternatives from 1945 onwards for U.S. policy makers dealing with North Vietnam. Trying to convert Vietnam into another Yugoslav-type ally was never entertained.

Further Conceptualizations About the Stimulation of Search

As seen by Thompson (1967), search by organizations is stimulated by the effort to reduce uncertainty, to increase closure. The greater the amount of uncertainty present, the more intensive the search is likely to be. Search will continue until uncertainty is reduced to tolerable levels (Driscoll & Lanzetta, 1965).

Again, as seen earlier, deviation from level of aspiration, a function of the decision-making unit's previous successes, failures, and expectations of the future, is conceived as the stimulus for starting the search activity to reduce a discrepancy between the current and desired state of

affairs. The level of aspiration is also a basis for terminating search activity for it provides the criteria for evaluating the alternatives which have been found (Alexis & Wilson, 1967). In addition to aspiration levels, search is also initiated by internal curiosity, conflict, and recognition that problems exist. External information can do likewise. Search can be instituted as a consequence of criterion checking, repetitive procedures, policy statements and other organizational sources. Deviations of performance standards signal possible problems whose solutions are likely to be searched for locally, only to be expanded if localized search fails (FERENCE, 1970). Localization of search will depend on the nature of the criterion checks. They may be highly instrumented and clear so that search can remain narrow. Or they may be more ambiguous so that search has to be broader (Thompson, 1967).

Activities or periodic reoccurring events in the organization also generate problems, again usually to be dealt with locally rather than by policy statements with broader organizational implications requiring broader innovative efforts.

Managers usually do not independently look through their own portfolios for problems needing attention. Rather, they are most often stimulated by others inside and outside the organization. Managers acquire information about alternatives from those over whom they have some control such as subordinates, consultants and salespersons (MacCrimmon, 1974). Such search efforts can be initiated by the manager but LACHO (1969) found in 14 case studies of food brokerage firms that search for additional products was passive. The executives waited for manufacturers' representatives to present products. They made inquiries of manufacturers only

after they heard of a promising account. They made inquiries of broker friends when convenient. Aggressive search for new product lines was uncommon. Even such search, which occurred when faced with a severe goal deviation, was limited to familiar rather than unfamiliar sources.

As seen in the multitude of communication network experiments (e.g. see Shaw, 1964), whether one will be the recipient of search-stimulating information or will have to seek it out from others will depend on whether one is located at the center or periphery of an information network. At the center, one may easily be faced with search-stimulating overload; at the periphery, with underload.

Who gets what search-stimulating information from whom is a key question for understanding the organizational decision process. Blocking, by-passing and intentional and accidental distortion of information is commonly found as the informal communication structure deviates from the communication system prescribed by the organization (Rice & Bishoprick, 1971).

Search is Ubiquitous and Dynamic

For the sake of exposition, we have focused on search as a discrete stage in the problem discovery-search-choice process. In fact, of course, search, itself, can occur in all phases of the decision process. Search may be instituted to recognize and define decision problems. The environment may be scanned to maintain an awareness of the occasion for a decision. Search may be instituted to determine the decision rules to apply to the choice situation, to operational criteria, to the consequences of alternatives, to the worth of alternatives, and to the nature of "ideal"

search generators such as asking salesmen to be looking for new sources of supply (Soelberg, 1967).

Search is seen to be conservative by Cyert and March (1963) in that it unearths relevant information by focusing on what is "nearby". But as MacCrimmon (1974) suggests, such "conservative-focusing" is likely to be inefficient. A more adventurous "focus-gambling" strategy is preferred for quick decisions. Whether search will be instituted, conservative or adventurous, will depend on what the decision-maker anticipates.

Search as Anticipatory Behavior

To become involved in the search process implies that the decision-maker can do something about the continuing problem-generating discrepancy to bring about a more desired future state of affairs or to be better prepared for it. Ordinarily, this will direct search toward past events relevant to predicting the future and efforts to anticipate relevant relationships (Shull, Delbecq & Cummings, 1970). Estimates of the effects of alternatives will be drawn up. These, of course, will be subject to various limitations and biases. Administrative, legal, social, or physical constraints place arbitrary upper-and-lower limits on what is possible. Estimates are biased by motivational factors. Cyert, March & Starbuck (1961) discovered that participants in simulated budgeting, when engaged in cost analyses, protected themselves by overestimating costs. However, when they engaged in sales analyses, they underestimated sales.

Other characteristics of the search process are captured in the heuristics most commonly observed.

Heuristics of Search

The most generally employed heuristic is means-ends analysis. We start with a goal to be achieved and through incremental shifts (Office of the Chief of Military History, 1959) or successive approximations (Barnard, 1938), discover the means to reach the goal, refining purposes and discriminations as we go along using cues, techniques, analogies and rules of thumb based on past experience to both generate and limit what means will be tried (Shull, Delbecq & Cummings, 1970). The search is pragmatic in that it sees what will work. This is in contrast to the algorithmic effort to determine what is logically true or best.

Alternatives are reduced by working forward toward subgoals and working backward from the desired end state to the starting point of the search. Many human, legal, social and administrative constraints further severely restrict what alternatives will be considered (Feldman & Kanter, 1965).

But the ends are not really as firmly fixed as the above would imply. When routine, previously workable, answers are not available, or don't work, limited search is initiated along familiar, well-known paths until the first satisfactory, not optimum solution, is found. But, as will be seen, what standard is set for determining a satisfactory solution is part of how the situation is defined. When solutions are easy to find, standards are raised. When alternatives are hard to find, standards are lowered. According to Perrow (1972), the organization rather than the individual tends to control these standards. (Although, work group collusion against standard-setting by "rate-busting" management is a well

documented phenomenon). The organization can manipulate individual expectations about the ratio of inducements to contributions. So to a considerable degree, search activity is a function of problems as defined by the organization and choices as guided to meet organizational standards.

Dealing with Problem Complexity. Alexis and Wilson (1967) suggest that as cognitive strain increases due to greater problem complexity, search rules are simplified in order to cope with the problem. So when first faced with a problem, simplistic search rules are employed. How were similar problems handled in the past? What are immediate solutions? The "immediate neighborhood of the problem symptoms" is searched for alternatives (Cravens, 1970). Variables within the individual's control are examined before those outside the individual's control (Emory & Niland, 1968). Failure to find or be able to design acceptable alternatives, leads to a search for clarification by reexamining the estimated consequences of alternatives that have been considered. Continued failure to find or develop a successful alternative will then lead to a reduction in the level of aspiration (Cyert, Feigenbaum & March, 1971).

Dealing with Problem Uncertainty. Search is more likely and more intensive, the greater the organization's environmental uncertainty. Ebert and Mitchell (1975) argue that the scope of search will be greater in organizations facing dynamic, unstable environments. Focus will be on searching among those segments of the environment that are controllable rather than uncontrollable as was seen in a study by Kefalas and Schoderbek (1973). This is consistent with Lanzetta's line of investigation (e.g. Driscoll & Lanzetta, 1965) demonstrating that uncertainty results in search to reduce it. Again, Levine & Samet (1973) allowed judges to purchase

information from three fallible sources until they could decide toward which of eight possible targets an enemy was advancing. Information seeking was greater when conditions were more uncertain.

Search or Design?

Little innovation, invention, de novo design, and creativity in the system as a whole is possible at any one time. Many factors restrict and limit efforts to deal creatively with organizational problems. There is specialization of activities and roles so that attention is directed to restricted sets of values. There are attention-directors that channelize behavior. Rules and programs reduce what can be considered. The locale confines the range of stimuli and situations to narrow perceptions. Training and indoctrination enable the individual to proceed uncreatively as preferred by the organization. Goals and tasks form into semi-independent programs again limiting the scope of action (Simon, 1960; Perrow, 1972).

Mintzberg et al (1976) found in 22 of the 25 cases that they studied that the greatest amount of decision-making resources were consumed in search for a single satisfactory solution. Only when no such single alternative could be discovered, was the design undertaken of a custom-made solution or the modification of an available one. Thus only when previous experience or standardized solutions, or other available alternatives cannot be found, will invention or creativity be attempted, bringing something new into existence (Luthans, 1973). Such creativity will be facilitated or constrained by a variety of organizational factors. Obviously, this shift toward creativity, in itself, will depend on organizational history and policy. Consider the many organizations that reject

alternatives "not invented here". For them creativity is required once solutions cannot be found within their own boundaries. Conversely, the use and adequacy of espionage will reduce the need for creativity.

Zeleny (1981) has provided a model which includes contingencies likely to shift the process from search to innovation (Figure 3).

Figure 3 about here

The shift occurs when there is

"...purposeful challenging and extending of one's habitual domain...breaking self-imposed constraints on creativity, learning to invent, evolving and unfolding one's options as well as one's decision criteria-- these seem to be the most important ingredients..." (p. 341)

It may be that the behavioral emphasis on description rather than prescription has focused more attention on search rather than innovation (Alexander, 1979). But more important, innovation may be hindered because of conflicting interdepartmental interests in an organization. Each department sees only the possibilities of its own local, habitual solutions to an organizational problem. The conflict may be allowed to fester as a source of continued irritation, or it may be seen as an opportunity for constructive innovation. Organizations can profit from the invention of new concrete solutions to deal with such conflict (Barnard, 1957).

The choice process awaits the discovery of a feasible alternative. When there are no feasible solutions awaiting discovery, they have to be designed or created by associational or Gestalt (patterning) processes. But search and creative design are not necessarily mutually exclusive. Creativity involves search and adoption as well as invention. The

associational approach to creativity links insight with search (Rothenburg & Hausman, 1976). Complexity-reducing creativity involves systematic search through a problem space. The direction of the search affects its creative possibilities (Marquis, 1969).

The Design of Innovative Solutions

The process of design, itself, is seen by Mintzberg, Raisinghouse & Theoret (1976) to follow certain regularities depending on whether it is a custom-made solution or a modification of already available alternatives. The designers begin creating the custom-made solution with a vague image of some ideal one. They pursue a sequence of nested design and search cycles, working their way through a decision tree. The decisions at each successive node became more narrow and focused. Failure at any node leads to cycling back to an earlier node. A solution takes shape as the designers move along developing their solution without really knowing what it will look like until it is completed.

In solving of 20 to the 25 decision-making cases studied in which designing of innovative solutions was required for lack of already available alternatives, only one custom-solution was fully designed. Only one decision tree was followed to its final conclusion. When what was necessary was search coupled with modifications of existing alternatives, more than one solution might be developed and compared.

Terminating Search and Innovation Processes

Complete search is infeasible, if not impossible. Designing of alternative solutions cannot go on forever. But search and design processes usually stop too early for achieving the levels of effectiveness possible if

search had continued or additional creativity had been attempted. Understanding what contributes to premature termination and what could stimulate further search or innovation, will serve ordinarily to improve the quality of the solution finally chosen.

When involved in a sequence of decision-making, with the option to stop the process if an outcome is achieved that satisfies the decision-maker, termination is likely to occur prematurely and further from optimality, when options are actually increasing in value. This is particularly so just after a large jump occurs in the value of an outcome (Corbin, Olson, & Abbondanza, 1975). Contrarily, decision-makers continue on too long when options are decreasing in value (Brickman, 1972). This seems especially true when the individual decision-maker or decision-making groups are insecure, face resistance (Fox & Staw, 1979) and feel personally responsible for the negative outcomes that have occurred before (Giuliano, Appleman & Bazerman, 1981). However, when sequential outcomes of options vary randomly, stopping is close to optimal (Rapaport & Tversky, 1970). Alexander (1979) built a rational two-dimensional theory to explain preemptive closure inhibiting continued search (or design) which would promote higher quality outcomes. The continued search and generation of additional options were seen to be limited by various constraints of knowledge, time, resources, costs, and power differences.

The search or design phase of the decision process may intensively interact with the preceding problem discovery and diagnosis phase. The search or design phase may also intensively interact with the choice and evaluation phase which follows it. Such continuing interaction implies that preemptive termination of search or design will be avoided. On the other hand, if there is little continued interaction and feedback of the search or design phase with

the diagnostic phase and the choice phase, complete closure and termination will be premature. Avoidance of premature closure permits continuing means-ends interaction. However,

"...some closure is necessary to establish a framework for the synthesis of options, but too much closure, such as rigidly predetermined goals or a problem diagnosis locked in by organizational or disciplinary predilections, may inhibit the emergence of potentially optimal alternatives."
(p. 4)

In addition to **previously** mentioned constraints, Alexander suggests that closure is increased when problems are defined at one institution and plans made in another. Available methodology, as well as theory and ideology, also promote less-than-optimum closure, unduly limiting the range of alternatives. In addition, disciplinary biases, perceptual filters, and personal propensities force premature closure of the gap between diagnosis and search of design. The biased diagnosis calls forth the favored design and closes out other possibilities.

On the other hand, if choice and evaluation processes too readily affect search or design options, valuable opportunities may be lost. (One sees this most often in the untrained group which proceeds to spend much of its total time evaluating just the first option mentioned).

Four idealized possibilities were formulated:

A. ... the free and uninhibited generation of options with feedback linkage to incorporate a variety of problem definitions, and closure to the evaluation stage to avoid premature elimination. B. ... the generation of alternatives, "limited" by any combination of problem definitions, goal articulations, and real or perceived constraints. C. ... preformal alternatives' elimination, where an informal evaluation process selects out the options to be forwarded for formal evaluation. D. ... an integrated and iterative alternative-design and evaluation

process". (p.)

Alexander was able to account for three complex decision-making cases in terms of the above conceptualizations: U.S. Vietnam policy (Donovan, 1970), siting of a third London airport, (Lichfield, Kettle & Whitbread, 1975), and retrenchment of personnel in the University of Wisconsin system. In all three cases, high closure prevented the development of more creative outcomes. Solutions to the Vietnam dilemma were constrained by the dominant and highly accepted "domino theory". The ultimate suspension of the third London airport project was attributed to premature closure of siting options, as well as failure to fully consider timing and need for a four-runway airport. In the Wisconsin retrenchment case, organizational constraints were brought to bear before any options were sufficiently elaborated for formal evaluation

INFORMATION SYSTEMS AND THE SEARCH AND DESIGN PROCESS

A key to understanding organizational search and innovation processes is understanding the organization's information system. For example, keeping good records was seen as fundamental to effective search and choice efforts by Boards of Directors (Tropman, 1980; Heller, 1969). Again, committee effectiveness has been strongly associated with the quality of secretarial service provided (Heynes, 1950). According to Vaidya, Lloyd & Ford (1975), proper message summarizing and message routing are important elements of effective organizational decision-making.

Alexis and Wilson (1967) suggested that particularly important is the ready availability of information to decision-makers, its content relevance, reliability, and freedom from biases.

Availability

The availability of information or its accessibility to a decision unit, the ease of obtaining information, and the speed with which information flows in the organization, is determined primarily by the form of the organization's communication structure as well as the extent the organization has an open, trusting climate. Needless to say, the quality of electronic data processing, retrieval capabilities, input-output, and display features will also be highly important.

Information Overload. But too much information may be available. Particularly with the advent of computerization, decision-makers can be surfeited with too much information. The volume will drive up the costs of storage, screening, and retrieval for searching.

Completely rational arguments would suggest that organizations spend money and effort for information up to the point where added information to solve a problem will be of greater cost than the benefit of the information to improving the effectiveness of discriminating among alternative solutions to the problem. In fact, March and Shapira (1982) declare that the truth lies elsewhere.

Organizations actually gather much information which they never use. Much information obtained is irrelevant to the decisions. They ask for even more, then ignore it. Often, decisions are first made, then information is sought to support it. Problems may be identified only after solutions for them have surfaced. Why? Feldman and March (1981) and March and Shapira (1982) suggest it is because managements monitor as much as they can about what is going on rather than selectively seek specific information to

deal with a specific problem. Furthermore, highly-regarded advice is often bad advice for an organization. "Advice givers typically exaggerate the quality of their advice." Much of it is bolstered by social supports and biased by conflicts of interest and advocates such that the information requires fine filtering. "Organizational information is rarely innocent; thus rarely as reliable as an innocent would suspect." It is more difficult to evaluate the final outcomes of decisions than to evaluate the extent the decision makers used the proper search procedures. So one of the ways that organizational decision-makers compete for reputations is by producing information. The result again is overproduction of information. Still another influence contributing to the collection of too much information is the tendency for redundancy to breed overconfidence. Decision-maker's confidence increases with the increasing information even though usually beyond some relatively early point in the information-gathering process, a threshold in the usefulness of information is reached. Nevertheless, confidence in one's decisions continues to climb steadily as more information is obtained. Thus, toward the end of the information-gathering process, most people are overconfident about their judgments.

This can be seen if our accuracy of predictive decisions about personnel depends on a multiple correlation. After the first few predictors have entered the regression equation, adding predictors, is likely to mainly add redundancy. Yet decision-makers continue to feel more confident about their predictions with the additional data, particularly if they are redundant, that is, if they are correlated with the earlier-obtained predictors. In fact, uncorrelated, non-redundant, additions would be more helpful to augmenting the multiple prediction.

Zeleny (1981) sees all this as an excess craving by organizational decision-makers for more, not better, information. Management information systems often may increase management confidence without improving the quality of their decisions.

Too much information will clog the system even when it is relevant (Campbell, 1968). Miller (1956) found that for accurate short-term retention seven chunks of information was the ordinary limit as an individual decision-maker worked through a problem. However, greater loads could be processed and retained for ready recall by the decision-maker by grouping the information into new chunks and arranging them hierarchically (Simon, 1969).

Streufert (1978) concluded from a series of simulated complex military decision experiments where the load and timing of information input was controlled by the experimenter, ignoring the costs of the information, the best complex decision-making was obtained when one item of information was received by the decision making unit every three minutes. Information received as rarely as every 6 minutes or as frequently as every 2 minutes produced severe decrements in decision making quality.

O'Reilly (1980) completed a survey of over 1500 organizational members showing that perceived information overload was associated with lower performance of decision makers than was perceived information underload. When overloaded, subjects were found by Halfin, Streufert, Steffey & Lanhuse (1971) to underestimate the relevance of information. When actual relevance of information to total amount received was low, relevance was overestimated.

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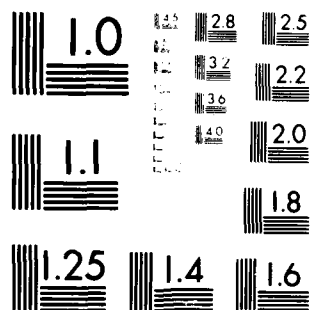
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Relevance of Information

Information will be relevant to the extent it serves a particular task and supplements the prior knowledge of the decision maker. Thus, Wotruba & Mangone (1979) found that the quality management decision-making was dependent on the effectiveness of the reporting by salespersons of relevant marketing information.

It is obvious that up to some optimum, the more relevant the information received by the decision-making unit, the better its decisions (Moskowitz, 1972). But the overproduction of information already noted results in executives receiving too much irrelevant information (Ackoff, 1967). Computer systems can make saturation with irrelevant information, a manager's nightmare.

Unfortunately, there are strong tendencies to use irrelevant information. Tversky and Kahneman (1975) asked subjects to decide the probability that a personality description belonged to that of one of 30 managers or one of 70 lawyers. A second group were assigned the same task except that they were told that there were 70 engineers and 30 lawyers involved. The descriptions actually contained no information that discriminated between engineers and lawyers. Without information they made the optimum judgments of .3 and .7. But when given worthless information, they moved to judgments of .5. Zeleny (1981) concluded that we tend to utilize whatever information is available--even though it may be erroneous or irrelevant. Thus, overloading with irrelevant information is a serious deterrent to effective search and innovation. In the absence of relevant information, gaps are filled with naive rationales often at odds with reality.

Irrelevant information detracts from decision performance, in both level and consistency. Performance here can be improved by a mechanism to filter irrelevant information from the environment. Crucial for such intuitive filtering is experience with a decision task (Ebert & Mitchell, 1975; Ebert, 1972; Kleinmuntz, 1968).

But filtering is one among several possibilities to simplify what is being received. When overloaded by a too complex environment or with too much relevant or irrelevant information, the individual decision-maker can also deal with it by ignoring it temporarily, by processing the information for error (error checking), by putting it into a queue for delayed processing, by using fewer categories and less precision to process the information, by using multiple channels (i.e. several units, instead of one unit) to process the information, or by ignoring the data input altogether (Miller, 1960).

Reliability of Information

The reliability of available information will depend on how information is screened and transformed by the many decision units prior to its immediate application. Reliability can be increased at the cost of increasing redundancy. For example, an organization can arrange for parallel multiple channels of communication.

Unreliability of information may be endemic in organizations because such a large proportion of it is informally distributed. This is the rule rather than the exception. Informal rather than formal channels of information are used more frequently. For example, in a survey of a large light industrial firm, Klauss & Bass (1982) found that about 85 percent of the information used by project engineers to make decisions came from oral communications

and face-to-face contact rather than written documents. And Aguilar (1967), in a study of top management noted that personal sources of information played a greater role than impersonal information. As sources of information outside the organization, documents and meetings were less significant than personal contacts. For inside information of consequence, superiors were a poorer source than subordinates.

As Ference (1970) has noted, information sources are selected more on the basis of the substantive aspects of the problem more than by procedures prescribed by the organization. Information will be sought from sources where bargaining and time lags are not involved (Ebert & Mitchell, 1975).

Distortion of Information

Perhaps again because so much information dispersion is informal, as well as for numerous other reasons, bias of information is also endemic in organizations. It is present in all available information (Alexis & Wilson, 1967).

As information is passed downward through the departments of a system, receipt, interpretation and further transmission will be modified in terms of each decision-making units own needs. Each department will be looking for and sensitive to different kinds and amounts of information; each will filter what it takes in. The resultant transmission to other departments will be systematically altered (analogous to the parlor game for systematically modifying a rumor passed by whispering from one participant to the next). Transmission will be simplified, and particularly of consequence to the decision process, uncertainties will be absorbed (March & Simon, 1958).

MacCrimmon (1974) agrees that information tends to lose some of its uncertainty as it moves through several decision units. It becomes more precise--but the precision is specious. Units further along do not appreciate the uncertainty that really exists (Woods, 1966).

Filley, House & Kerr (1976) list still other factors distorting the available information affecting the search process. More attention will be paid to and more weight given to information that is polarized. Neutral information is undervalued as is information that is inconsistent with what has already been received.

A major source of error emerges when decision-makers have to aggregate different pieces of information to make a single decision. Too much data may be stored in aggregate rather disaggregated form. Marshak (1965) advised organizations to avoid too much aggregation of data for storage, (for example storing annual stock price changes rather than monthly data). One can always aggregate, but it is very difficult to disaggregate when more detail is needed. How much detail to store obviously depends on anticipated needs. That form of data for storage and processing should be pursued which yields the greatest gain from the information keeping cost considerations in mind (Marshak, 1968, 1971).

Other sources of error lie in fallacious statistical inferences. Samples may be treated as if they were truly representative of the total population. Correlations may be seen where they do not really exist. Or, they may be misinterpreted when they do.

The Cost of Information

From what we have said about information overload and irrelevancy,

it is clear that cost of search is ordinarily much greater than optimum. But if we were dealing with a well-structured problem searching for a programmable solution and accepted the premises that information ideally could be complete and that ideally we could precisely price the cost of adding information to make it so, then a zone of cost effectiveness can be determined for typically, as one gains additional information, redundancy increases. At anyone time during the search process, information for choice still remains incomplete. But the cost of additional search may add less in benefit than its cost. Harrison (1981) argued that the cost rises exponentially of continually trying to add information: at some point, as shown in Figure 4, the value of additional units of information declines "precipitously".

Figure 4 about here

At first, as search continues, the cost curve rises rather slowly, because the initial units of information often require relatively little effort. As the search for information continues, it becomes increasingly difficult to obtain.

The marginal-value curve in Figure 4 reflects the value of an additional unit of information. A zone of cost effectiveness is suggested around the point of optimality.

Economic Theory of Teams.

Another normative rationale has been provided by Marschak and Radnor (1972), an economic theory of teams, to deal optimally with three aspects

of organizational search and information acquisition. The theory, again based on a highly unrealistic premise that the organization's members are all in complete agreement, reasons how organizational members should acquire information from the uncertain environment, what communication channels and messages should be utilized to communicate this information to other members, and what actions members should take based on the information they receive. Optimality is achieved when information is acquired, and communications sent, only when the recipient of the information can use it.

Despite its unrealistic assumptions, team theory can be used to generate the same information processing errors in simulation found also in real systems (MacCrimmon, 1972). It also can provide the economic structure for designing management information systems (Emery, 1967).

CHAPTER 5

EVALUATION AND CHOICE

The search process is terminated by a choice among the discovered or invented alternatives. This requires a comparative assessment of the alternatives to estimate which one is most likely to close the gap between the current and desired state of affairs. What underlies such judgments has been the subject of considerable analysis.

Evaluation can be haphazard or it can be orderly. It appears profitable to be more orderly and less haphazard. Failure to do so results in accepting choices on vague feelings about their rightness. Yet, more often than not, decision-makers make a choice from among alternatives on a fairly haphazard basis.

Evaluation and choice cannot be clearly separated. Once an alternative that seems reasonably satisfactory comes along, it is accepted. Criteria for choice and their relative importance fail to be considered explicitly.

But decision-makers should be more systematic. In fact, many strive to approach optimal decisions, although optimality, itself, as we shall see, is a chimera.

If we consider what should be done, criteria need to be established upon which evaluation will be based. Weights may be attached to each of these criteria. Risk preferences need to be explicated. Outcomes yielding as much gain as possible with the least risk of loss are sought. The consequences of implementing each alternative are estimated as well as the potential new problems generated by each alternative (Bass &

Ryterband, 1979).

What emerges from the search process can make the choice process more difficult or impossible. Two equally attractive alternatives may have been uncovered in the search. The decision-maker may be overloaded with acceptable alternatives. Or, it may be now understood that no single discovered or invented alternative will solve the problem. Or, anticipated side-effects may force abandoning any choice from among the available alternatives. In some of these instances, choice may be better left to the toss of a coin. Or, objectives may have to be revised or the search renewed (Harrison, 1981).

Ideally, five constituents can be conceptually distinguished in the overall evaluation and choice process. (See Zeleny (1981) and Mintzberg et al (1976), for example.) Firstly, there is evaluation of the anticipated benefits and costs of available alternatives. This takes place before closure occurs and one of the discovered or created alternatives is finally chosen to close the gap between the current and the desired state of affairs. Evaluations are made of the extent rival alternatives will be likely to close the gap. Benefits and costs in this regard are estimated for each alternative. A second preclosure constituent deals with estimates of the risks and uncertainties that the various competing alternatives will succeed or fail to close the gap. The third constituent is closure-- commitment to one alternative to close the gap. With closure, a process of authorization begins, described in detail by Mintzberg, Raisinghani and Theoret (1976) found in 14 of the 25 longitudinal decisions they observed. The fourth constituent is concentration justifying the choice. The fifth constituent

is evaluation outcomes resulting from implementing the chosen alternative. It is a follow-up of the degree to which the chosen alternative did in fact succeed in closing the gap and to what extent it did so. Were objectives met? Were goals reached? Thus, the five ideal constituents are evaluation of alternatives, risk estimation, commitment, justification, and evaluation of outcomes.

Although experimentally, one may be able to arrange to focus on any one of these constituents exclusively, as Mintzberg et al (1976) observed, it is impossible in real life to isolate these constituents from each other. We do so here for purposes of exposition. While reevaluation, of necessity, must come late in the process, the other constituents are not necessarily likely to appear in any one order. Also a cycling back and forth among them is likely. Furthermore, we have noted earlier that evaluation and choice interact with the search process. Evaluation and choice also interact with the goal setting which occurs in diagnosis. As Behling and Schriesheim (1976) concluded:

"Organizational objectives do change, though much of what is considered to be change is actually expansion of the domain of the organization. Changes occur under three circumstances: (1) when the organization is extremely successful in accomplishing existing objectives, (2) when it is depressingly unsuccessful, and (3) when it is subject to substantial pressure from elements of the task environment." (p. 188)

As we shall see, just as objectives first set in problem discovery and diagnosis guide the direction of search, and just as search experience results in lowered levels of aspiration and readjusted goal settings, search processes also uncover alternatives that guide what evaluations are feasible. But at the same time, evaluation may hinder the scope of the

search. Moreover, objectives and needs may force premature evaluation forcing on needed search. Evaluation and choice may bring on alterations and reinterpretation of objectives and diagnoses. Ordinarily, evaluation and choice follows search, but more search for justification may follow choice than precede it. Evaluation of alternatives in later search may be distorted by prematurely early choice.

PRECLOSURE EVALUATION OF THE ANTICIPATED BENEFITS AND COSTS OF ALTERNATIVES

Criteria for Evaluation of Alternatives

An important aspect in evaluating whether or not a particular alternative may be the desired solution to a problem involves establishing the criteria, implicit or explicit, upon which the judgement will be based. The source, timing, and nature of criteria were seen by Stricklin (1966) as important dimensions for understanding organizational decision-making.

The judgement of adequacy may pursue a minimax, maximin or mixed strategy. With the minimax, we will accept that decision which is likely to yield the least ill effect if the worst happens. The least amount of loss is risked for an acceptable gain. With the maximin, we strive for the greatest gain fixing on the amount of loss we are willing to accept. Probably most frequently employed is a mixed strategy of striving for a reasonable gain avoiding undue risks.

Standard Setting. The level at which the standards are set--the surrogate alternative that is acceptable below which alternatives are unacceptable--affects the chances of locating acceptable alternatives. MacCrimmon (1974)

suggests that it may work out to start with lower standards, then to gradually tighten up.

The earlier diagnosis of the problem often determines the formulation of the criteria which are set up to be matched against its possible solutions. The factors of consequence listed in the diagnosis suggest criteria and result in attending to the same or similar criteria in the evaluation. Concern in the diagnosis about product quality and price to stimulate sales will reappear as criteria of quality and price in the evaluation.

The criteria usually suggest a desired level and direction. The level established may be feasible and therefore be able to serve as a standard. Or, the level may be an ideal, say the lowest possible price at which a profit can be made.

If a feasible level is set, then alternatives found or invented in the search process are now compared against the feasible level as a standard. If the criteria concern an ideal level, then alternatives are compared with each other to ascertain how close they each come to the ideal. An alternative is sought and chosen that is better than the others on each of the criteria. If, as is often the case, such an alternative cannot be found or created, criteria are considered as possible compensatory. For example, as deluxe quality product is abandoned in order to achieve a feasible price. A lower value on one dimension is offset by a higher value on another. Linear weighting is such a compensatory approach (MacCrimmon, 1974).

Following Barnard (1938), Koontz & O'Donnell (1968) suggest for

effective choice in planning, the need to sort out the more important from the less important criteria.

"In choosing from among alternatives, the more an individual can recognize and solve for those factors that are limiting or critical to the attainment of a desired goal, the more effectively and efficiently he can select the most favorable alternative." (p. 153)

Quality vs Acceptance. Maier (1963) emphasized two criteria of effective decision-making: quality and acceptance. Vroom and Yetton (1973) built a leadership model around these criteria. An acceptance-dominated solution is more likely to be implemented subsequently because it has attained such acceptance by those involved. A quality-dominated choice implies comparisons with a technical standard or specified objectives. Katz and Kahn (1966) suggested that decision-makers close to organizational operations will be more concerned with the solution that can be put into acceptable operation easily, not necessarily with the best solution nor the most desirable solution. On the other hand, policy makers, remote from operations, will choose from among alternatives in terms of desired goals rather than the feasibility of converting the alternatives into practical operations.

The dominance of the criterion of acceptability may lead to the rejection of alternatives without considering their worth or quality, because they are judged superficially as impractical by those closer to operations. They may arbitrarily reject high quality, long-term solutions for trivial reasons. Katz and Kahn (1966) argued that if the merits of a long-term plan are fully considered and found to be of high quality, means can usually be found to implement them.

Criteria Depend on Model. To the criteria of quality and acceptance, three others can be added: maximized outcome, displaced ideal and objectives-oriented outcome. The five can be reviewed according to which model of the decision-making process we find appropriate: (1) anticipated utility; (2) satisficing (3) displacement of the ideal, (4) political acceptance and (5) incremental objectives.

Anticipated Utility of Outcome: The Model of Complete Rationality

If we accept the model of complete rationality, then evaluations of the perfectly informed, perfectly sensitive, and perfectly rational, "economic man" should maximize expected utility--or usefulness of the outcome to him. To do so he must adopt a set of axioms. Objectives are fixed; there are no time and cost constraints; alternatives are quantitative and transitive; and the system is closed (Harrison, 1981). Circular judgements must be avoided along with wishful thinking in which the values of outcomes affect the judged probabilities. Only outcomes that help to discriminate among alternatives should be considered (Marschak, 1964). There must be a way of directly comparing the expected values of each alternative. MacCrimmon (1968) found that although executives violated one or more of these axioms in their actual choices, they believed they would accept them as norms of behavior and as guides to how they should make a decision. But as MacCrimmon (1974) notes, the main difficulty with expected utility is in trying to apply it. All possible alternatives to fully determine the decision-makers' differential preferences can never be completely generated; nevertheless, usually only the main alternatives need to be considered. But because the total number of possible relevant

events is usually very large, the number of probability judgements is likely to make it impossible to do a thorough job of handling the uncertainty in the environment. Sensitivity analysis, (Howard, 1968a, 1968b), which analyzes the movement toward or away from optimality with changes in the values of the parameters of the problem, can be employed to address this issue.

The utility function can be obtained for well structured problems where the outcomes can be located on a single dimension. But if many dimensions must be considered, no completely general techniques are available (MacCrimmon, 1974). The utilities of individual members of an organization may be combined to obtain a measure of a group's "social welfare function", but the calculation remains questionable (Radford, 1981).

Other problems with expected utility theory include the fact that a decision-maker must know how much more he likes one thing over another. Indifference curves allow the scaling of utilities, but become very complex mathematically when going beyond several sets of alternatives. The utility scale of one person may not be comparable with that of another. Furthermore, utilities change over time (Rich & Bishoprick, 1971).

Nevertheless, for simple gambles, subjectively expected utility gives a good global fit to data about choice (Slovic, Fischhoff, & Lichtenstein, 1977). But even with well-structured bets, several paradoxes such as the greater preference for longshots can be cited to invalidate some of the required assumptions. Coombs (1975) sees risky choices as a compromise between trying to maximize expected value and trying to optimize risk. Risk preferences are particularly important in his portfolio theory.

Individuals differ widely in their utility functions, how much they are willing to risk for a given amount of gain or how much they value insurance against loss. Executives were found by Swalm (1966) to differ widely in their utility functions ranging from gamblers to extremely conservative risk takers. But they all were conservative about risking prospects of loss for their corporation perhaps because the penalty in organizational life for being responsible for one bad outcome is much greater than the rewards for selecting alternatives that do well.

Satisficing Outcomes: The Model of Bounded Rationality

What is rationality anyway? It is selecting ends that meet needs and capabilities; it is finding means to achieve those ends. But note that needs and capabilities differ. It would be irrational to purchase one shoe unless one was one-legged. It would be rational for a one-legged man to purchase one shoe; it would be irrational for a normal person to purchase one shoe. Diesing (1967) has identified five types of rationality involved in administrative decision-making: technical, social, legal, political and functional. Each type contains its own area of applicability. Quality of product and cost of production are goals of technical rationality. Substituting a new manufacturing process for an old one is rational if it results in a product of lower cost and higher quality. But the new process might achieve its lower cost mainly at the expense of social irrationality by eliminating craft positions which downgrade employment opportunities and the quality of community life. Introducing the new process might be rational in that it eliminated legal objections raised against the old process. It might be rational to introduce the new process because it was more

politically acceptable to the community than the old one. Introducing the new process might be functionally rational. That is, it might work better, be more esthetically pleasing, and fit more smoothly with the overall production process. But whatever the basis of rationality, it is likely to be limited.

Simon (1959) argued that the optimal choice to maximize outcomes is the exception. Given limited information, time and cost constraints, and imperfect sensitivity, the organizational decision-maker, limited or bounded in rationality, tries to discover and select a satisfactory alternative rather than the optimal one. The satisfactory alternative is based on a set of criteria that describe the minimum satisfactory conditions which could be met by an alternative finally chosen to solve the problem. Alternatives are judged one at a time against these minimum standards of acceptability. The first alternative that minimally meets all of them is accepted.

This is satisficing. Satisficing eliminates the need to consistently rank all alternatives on a single dimension. Standards rise when satisfactory alternatives are easily found and fall when they are difficult to locate or invent. Furthermore, choices emerge from organizations conforming to the local rationality of the decision unit, constrained by the situation and the immediate uncertainties of the local decision units within an organization. And so, the units ordinarily make decisions to satisfy criteria which are suboptimal when viewed in the larger totality (Sutherland, 1977). Unlike ministers as a whole, for example, managers, in general, are pragmatic rather than idealistic (Bass & Burger, 1979).

They choose satisfactory solutions. What fits their scheme of values is to choose solutions that work, rather than to avoid choice until the ideal solution is found. So aspirations and objectives are adjusted if a reasonable solution is found. Less effective solutions than originally contemplated may be accepted as a trade-off for lower costs. In Cyert and March's (1963) four cases, two criteria, financial feasibility of a proposed solution, and improvement over current operations, were enough to lead to the choice of a solution.

The Means-End Chain. A choice is rational if appropriate means are chosen to reach desired ends. But the apparent end may be the means to some further end in a means-ends chain. This chain, in terms, is often obscure, and not completely connected. The ultimate ends are incompletely formulated. Conflict and contradiction in choice of means for ends and their linkages are common.

Rationality is not absolute but relevant to the means and ends involved. A choice may be personally rational and organizationally irrational if it only meets personal goals. Or the choice may be personally irrational and organizationally rational if it only meets organizational goals (Simon, 1957).

Multiple Objectives. Multiple objectives and multiple criteria are the rule rather than the exception. This makes judgements about anticipated outcomes difficult and further increase the likelihood of satisficing rather than optimizing.

As Kast and Rosensweig (1970) noted, different decision-making units in the same organization face a different mix of results for various

alternatives. No one dimension can be used to appraise all relevant considerations. What's best depends on the locus and focus of the decision. For the organization, a compromise is needed involving trade-offs for cost, speed, accuracy, safety, quality, and many other factors pertinent to the problem. Organizational decision-making thus usually involves a balancing among objectives to be satisfied. Important also may be the desire to avoid post-decisional conflicts into which a policy may force a decision-maker (Janes, 1959).

Information Failure and Policy. Satisficing rather than optimizing may also be likely because of the need to simplify available information, to meet schedules or stay within budgets. While reasonably complete information for solving a problem may be present in the organization, communication failures may cause its loss to the appropriate decision unit. Precedents and established policies may foreclose the deliberations and prohibit consideration of a whole range of alternatives. Selective discrimination may effectively limit decision-making. "What decision-makers 'see' is what they act upon." (Harrison, 1981). Staff groups may be directed to begin a search for desirable solutions but with the proviso that the search be fast and practical. Final answers are not expected. (Katz & Kahn, 1966)

Optimism. Optimizing requires that our predictions of outcomes be uninfluenced by our valuing of the outcomes. Yet, such is generally not the case. Individuals' expectations of the occurrence of an event were found by Morlock (1967) to vary positively with the desirability of the event's outcomes. Furthermore, less information was gathered before judging that a more

favorable event would occur. Similarly, when possible outcomes had identical chances of occurring Morlock and Hert (1964) found that the likely occurrence of the more favorable alternative was predicted more frequently. We are more likely to be optimists than pessimists in the ordinary course of events.

Intuition. Managers, as pragmatists, tend to pride themselves on their intuition, or their ability to "fly by the seat of their pants". Yet, such intuitive judgments have been shown to be fraught with error and to result in outcomes far from optimum when completely depended upon. Zeleny (1981) noted for example that given 5 seconds in which to intuitively estimate the product of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$, the median estimate is 512 and for $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$, the median estimate is 2250. The true calculated answer, of course, is 40,320.

Implicit Favorite. Decision-makers usually make choices early before any lengthy search has been undertaken and completed (Webster, 1964). While the early choice is not explicit, nevertheless it remains as the implicit favorite and the comparison for alternatives subsequently found (Soelberg, 1967). Final choice is a matter of identifying an implicit favorite, then justifying it as the best possible choice from among the few fully considered. Establishing the implicit favorite may occur quite early in the overall decision process making it easy for an observer to forecast the final outcome early even though the search for other alternatives will be continued. But these later-found alternatives will be looked at with prejudice and with comparison in mind to increase justification of the implicit favorite. Thus, for instance, contracts may be "wired in" to a favorite contractor

by a granting agency even though many other contractor's proposals will be considered for comparison before the final choice is made. Students were seen to hold early career favorites by Soelberg (1967) who was able to predict 87 percent of the career jobs chosen two to eight weeks before M.I.T. graduate students even recognized that they had made their final choice.

Perrin and Goldman (1978) observed professionals, after listening to symptoms, make up their minds on the treatment quite early i.e. "there's a lot of flu running around, therefore treat for flu". First impressions exert a strong influence on the choice process. It may be that particularly potent is a favorable first impression about a person or project.

Also promoting satisficing behavior is the general tendency to equate rapid with effective decision-making. This tendency appears particularly strong in Latin America (Heller, 1969). Furthermore, there is resistance to changing prior choices and there is distortion or ignoring of information which is incongruent with the image of a good decision-maker (Tosi & Carroll, 1976). Once a choice has been made, in the reluctance to change it, more effort sometimes may be expended in the renewed search supporting it than in the search upon which the initial choice was based (Pruit, 1961; Brody, 1965).

The Ideal as Anchor: The Model of the Displaced Ideal

Zeleny (1981) sees satisficing as occurring for trivial, inconsequential decisions. Or, it occurs because decision-makers lack competence and fail to search for or invent superior alternatives. There is no commitment to decision-making excellence. Zeleny conceives of a somewhat different

evaluation and choice process unfolding for effective decision-makers, neither satisficing nor optimizing. He sees the decision-maker initially searching for the ideal, the best solution. However, as discovering or inventing this ideal becomes infeasible, what is deemed achievable takes over. Yet, the ideal alternative remains as a point of reference. With displacement, the choice continues to focus on the alternatives generated so far rather than evoking new alternatives. Displacement results in a reinterpretation and reassessment of earlier alternatives. More differentiation among them is sought to make the final choice easier. This differentiation effort

"leads to a search for new information, not necessarily from the outside, but also for the one which is hidden, implicit, within the system. Raw score measurements are checked, subjective assessments are scrutinized, preferences questioned. Additional decision makers can be brought into the picture, reinforcement and consensus of opinions is being searched for.

This information-gathering and evaluation process could be highly objective and impartial at first. As one realizes that the additional information is unlikely to reverse or appreciably influence the existing preference order, the process becomes more biased and subjective. Only some particular pieces of information are being admitted, other information is consciously or unconsciously ignored, some could be reinterpreted or even dismissed. ...the closer the alternatives are in their attractiveness and the more varied the information acquired, the more information is sought before a decision is taken. There is less need for additional information if the alternatives are sufficiently divergent and the information uniform and single-dimensional. As the predecision process becomes stabilized, a partial decision can be taken.

Partial decisioning involves a directional adjustment of the decision situation. ...discarding some "obviously" inferior alternatives, "returning" previously rejected alternatives back into the feasible set, adding or deleting criteria.

As all alternatives are compared with the ideal, those which are the farthest away can be temporarily removed from consideration. There are many important impacts of such a partial decision. First, whenever an alternative is discarded there could be a shift in the maximum available score to its next lower feasible level. Thus, the ideal alternative could be displaced closer to the feasible set. Such displacement would induce further changes in evaluation of attribute importance and ultimately in the preference ordering of the remaining alternatives. All alternatives would thus be compared with respect to the new, displaced ideal." (p. 335)

A common malfunction arising in organizations is due to a displacement in objectives that occurs at one decision unit, while alternatives still continue to be sought at another unit for the original objectives. Another malfunction occurs when the means to an end become an end in itself. Or, perceived side-payments may result in accepting a displacement which is further rather than closer to optimum.

Anchoring Effects. Well-known is the extent to which judgements are affected by an initial point of reference (Tversky & Kahneman, 1975). Anchors for organizational decisions are precedents, constitutions, vested interests, known positions of vested interests and perceived norms. People watch each other's choices if there exists a prominent option which can serve as an anchor for tacit agreement (Schelling, 1960).

Rationally, according to Arrow's (1967) axiom of Independence of Irrelevant Alternatives, a choice made from a given set of alternatives depends only on the ordering of those alternatives in that set. Only available or feasible alternatives have a bearing on the choice that is made. But Zeleny (1981) infers that empirically the attractiveness of available alternatives depends on whether the unavailable alternative is ideal or mediocre.

The choice between 5 and 10 is trivial if the ideal is 500, but important if the ideal is 11.

With reference to its foreign policies both the U.S. and the Soviet Union decision-makers may have complete domination as their unavailable, ideal option. Rather than making judgements on the costs and benefits of various military defense choices, they are likely to skew their judgements about defensive options towards the chimera of hegemony. For the individual decision-maker operating in the context of an organizational setting, the choice to be made among explicit alternatives may be strongly affected by whether the decision-maker views the organization as benign or malicious.

Satisficing is accepting a compromise choice which ignores the ideal. Such a choice does not eliminate the gap between the current and desired state of affairs. The extent and scope of the problem are not fully considered. To resolve or avoid conflict, decision-makers may even settle for a relatively undesired solution for satisficing can occur from finding a solution to achieve a desired state as well as adjusting the state downward to meet current solutions. We can satisfice by trying to change the world, or we can adapt to the world as it is.

Political Solution: The Model of Accomodation and Adaptation

Harrison (1981) summarized the political elements in organizational choice. Focus is on acceptance rather than quality in the abstract. Decision-makers focus only on those policies that differ from existing policies rather than any comprehensive survey and evaluation of alternatives. Decision making is geared more toward alleviating current problems than toward the development and implementation of choices promising long-range benefits.

As a consequence only a relatively small number of alternatives are considered. For each alternative, only a restricted number of important consequences are evaluated. Important outcomes, alternatives, and values are neglected.

The problem is continually redefined. An incremental approach is used. This allows for continuing ends-means and means-ends adjustments to make the decision more acceptable. Ends and means are not distinct.

A good decision is seen at this time when most of the decision makers agree on the likely outcome. By proceeding incrementally and comparing readily agreed-upon outcomes with established policies, uncertainty is kept low. The political approach is more sensitive to implementation. The aim is to choose an alternative that will work and be used.

Expediency. Immediate pressures may force a hasty but not particularly desirable choice (Paris is worth a Mass). They may force the bypassing of a thorough analysis of the problem and a careful weighing of the consequences of the hasty choice. Momentary relief may be obtained from satisficing without really solving the problem (Katz & Kahn, 1966). Other inadequate responses to such threats may be inertia, panic reaction or various pseudosolutions (Janis & Mann, 1977).

For Zeleny, conflict management aims to move the political compromise toward the unattainable ideal, an overall near-optimization of multiple objectives. Rather than choice being made from explicitly avoidable alternatives, sufficient search and invention is needed anchored by the unavailable ideal. But displacement is necessary. As Katz and Kahn (1966, p. 265) noted organizations "cannot maintain their goals in pristine priority without the risk of becoming ineffective or even extinct". Survival,

itself may become a salient goal, but if it becomes paramount at the expense of organizational flexibility, it can result in disaster.

Strategic Striving: The Model of Objectives Orientation

Managements may not be able to optimize. Nevertheless, they can try to come closer to an optimum solution to reaching a given set of multiple goals. While the process of strategic decision-making tends to be disorderly rather than systematic, it does not have to be.

Thus, Learned & Sprout (1966) rejected satisficing as the conceptualization of consequence. They argued that firms vary in their decision-making practices from those that are dysfunctional to those that are consistent with normative standards. Some firms can establish overall superordinate strategic objectives which can guide decision-units within the firm. Managers can see themselves as stewards needing to attend to such superordinate goals transcending self-interests. Company goals can be more than a bargain between members of a coalition. Firms can do more than follow the decision rule of choosing the first satisficing alternative. Firms can be flexible, keeping their options open. Mandelbaum (1978) suggests that such flexibility may generate more effective choices than what might have even been, at first, considered optimum.

Although the individual decision-maker's own level of aspirations leads to satisficing, such may not be in the best interests of the organization which (for the health of the firm, presumably) should take precedence over self-interests. Long-term considerations will be given more weight when one is oriented by the organization's objectives than by self-modified ones, shorter-term in character (Harrison, 1981).

Linked Choices. Choices oriented by objectives are likely to be interconnected because objectives tend to intertwine. One choice may be embedded in another. A tactical choice may be part of a larger strategic choice. One may facilitate or constrain the other. A constraining linkage may prohibit making a particular choice. A facilitating linkage may provide the opportunity to choose which was otherwise not possible. Linkages may affect preferences of the participants for outcomes. An undesired outcome (low pay) may be acceptable in conjunction with an outcome (challenging work) in a linked choice.

Strategy relates to the final outcome that one wishes to bring about. Tactics are chosen to progress towards the desired outcome. Tactical decisions thus are likely to be nested among strategic decisions. A choice among tactics may be dominated by a previously chosen strategy. A choice among strategies may emerge because of the tactics that already have been chosen. A firm may decide to take a strike after weighing clearly defined short-run disadvantages in the short-run with less clearly-defined benefits of a longer-term strategy. Thus tactical analysis is partitioned into two components. One is concerned with the immediate consequences of a choice of tactics. The second is concerned with the longer term effects, assessing the linkages with a desired strategic outcome (Radford, 1981).

To sum up, we see five alternative models of the choice process to which many others such as the garbage can model (Cohen, March & Olsen, 1972) could be added. The different models may each fit particular limited situations. Near-complete rationality may work reasonably well for particularly well-structured problems; politics and satisficing, for particularly ill-structured ones; and ideal displacement and objectives orientation for

trained planners. The constraints may make a big difference in which model best mirrors reality. Cutting across all these models is the question of how decision-makers deal with the uncertainty they face and the ways efforts are made to reduce such uncertainty to increase the decision-makers' confidence that they are making the right choices.

DEALING WITH UNCERTAINTY

Risk and Uncertainty

For over half-a-century, economists have distinguished between risk and uncertainty (Knight, 1920). We take risks knowing the probabilities of success or failure. We face uncertainty because we lack the information about the probabilities. But MacCrimmon (1968) concluded that experiments with business executives showed few making the distinction between risk and uncertainty in their choice behavior and few thought it was reasonable. Whether the missing information is about probabilities of success or about other matters seems of little consequence to the choice process.

Avoiding Uncertainty. Decision units are usually faced with uncertainties about the problem, about whether to become involved, about the resources available to deal with it, about pending external events affecting the outcome, and so on. Such uncertainty can be equated with lack of relevant information. Uncertainty may be ignored or avoided, without further intervention or negotiation with the environment, nor adaptation to it. On the other hand, efforts may be made to reduce uncertainty. Available information may be processed to better describe the situation. Efforts to model and explain the situation may be attempted. Or, more information

can be gathered from the environment (MacCrimmon, 1974).

Uncertainty may be avoided by ignoring its sources or crediting the sources of information with greater reliability than warranted (to the detriment of ensuing decisions). But "a-wait'and'see" policy of coping with uncertainty can pay off in building up a more adaptive capability to respond quickly as more situational clarity finally emerges (Weick, 1969). Uncertainty may be erroneously avoided by assuming that the future will be a linear extrapolation of the past or that the future will take place as imagined to justify present choices (Cyert & March, 1963). To avoid uncertainty, organizations often adopt strategies stressing solutions to short term problems rather than emphasizing long term plans. Avoided are the difficulties of anticipating future events and conditions, anticipations fraught with greater uncertainty. Again, to avoid uncertainty, an alternative may be chosen because it is assumed that the organization has control over the implementation of the particular alternative.

Reducing Uncertainty

While search efforts are directed toward relevant alternatives, the rules and strategies employed in the search are unusually constrained by the desire to reduce uncertainties (Harrison, 1981). Organizations try to realistically reduce externally-caused uncertainty by interacting with their environment and by attempting to control perturbations in numerous ways. They diversify to spread risks, to diffuse responsibilities, or to level variations in income or use of labor and capital. They hedge to transfer uncertainty. They take out insurances, make only short-run investments, accept choices with short-term payoffs, negotiate long-term

contracts, collude with competition, form cartels and administer prices (the industry price leaders are followed by the other firms in the industry when setting prices).

Uncertainty of operations internally is reduced by standard operating procedures and programming.

Instrumental and Value Uncertainty. Thompson (1967) distinguished between instrumental uncertainty, uncertainty concerning causal relationships, and value uncertainty, uncertainty about preferred outcomes. One can be uncertain about what is wanted and/or how to attain what is wanted. In a turbulent social environment, both uncertainties are high. Both causal relationships and values are in rapid transition and renegotiable between organizations and institutions. But, increasingly, with the continually political and economic shocks of the 1970's and 80's, organizational decision-makers are learning to deal with what Thompson (1967) saw as an untenable situation over a lengthy time period (Alexander, 1972). One result has been for organizations have become increasingly adaptable, structured for quick reaction to unforeseen contingencies. They keep their options open and avoid implementing policies effective beyond the time horizon of known value certainty. Planning horizons are contracted. Long term bond markets collapse.

Response to Uncertainty

With increasing uncertainty, acceptable levels of risk may be increased, but limits will be reached on how much uncertainty can be tolerated (Alexander, 1975). With increasing uncertainty, vision narrows (Feldman, 1981). Perceived vulnerability makes a difference.

Thompson and Carsrud (1976) found support in a laboratory experiment for the proposition that the extent to which risk is avoided depends on the participants' sense of organizational vulnerability. Higher risks will be accepted if it is believed that one is less vulnerable than more vulnerable to the vicissitudes of environmental uncertainties.

During the length of time that a decision is to remain effective, the decision maker must assume that the values involved will remain stable. The decision-maker must feel that the decision-making is based on a stable set of values. The length of time for a planned policy, or the planning horizon depends on premises about the extent the values involved will persist. Thompson (1967) concluded that organizations seek to control their environments, or if not possible to do so, to adapt to them. This was seen by Simpson and Gulley (1962). In comparison to organizations facing little environmental variation in pressures, they found that organizations facing a wide range of pressures were less centralized in authority, emphasised attention to internal communication, and member involvement in organizational activities. But the reverse occurred when environmental pressures were restricted. Again, in a study of 16 social welfare organizations, Aiken and Hage (1968) found that organizations with many joint programs with other organizations were more likely to be decentralized and had more active internal communication channels. They were also more innovative and differentiated, that is, there were a greater variety of occupations in the inter-dependent agencies.

Lawrence and Lorsch (1969) studied firms in industries such as plastics with much environmental uncertainty in contrast to firms in the container

industry which were in a more stable environment. Again, differentiation in internal structure, goals, and interpersonal relations were greatest in the plastics firms, and least in the container firms. Formal integration of efforts to achieve adequate coordination was seen in the plastics industry. But, in the container industry facing a more certain environment, such coordination could remain informal.

Pfeffer (1972a, b, c) found that the more an organization depends on its environment for critical resources, the more likely its managers to spend time with outside organizations. Similarly, organizations that depend on outside financing select more outside members for their boards of directors. When they are more subject to influence by legal regulations they hire more attorneys. As with the social agencies, firms interdependent with other firms are more likely to merge and exchange executives.

Again, as had Lawrence and Lorsch, Khandwalla (1974) found that high performing companies, faced with the uncertainties of competition, were more likely to differentiate and integrate internally to reduce uncertainty while low performing firms facing the same uncertainties were less likely to do so.

Isolation. Following Thompson's (1967) lead, Bobbit, Breinholt, Dokter and McNaul (1974) see a variety of ways organizations deal with environmental uncertainties. The organization buffers or shields the technical core from the uncertain vagaries of its environment. It reduces the immediate effect the environment has on the technical operations of the organization. A number of mechanisms are used. One is isolation. Prisons isolate inmates; cult groups isolate trainees. A company moves a manufacturing operation from a strong union area to a non-union area. A country (e. g. Japan

(1600-1853) closes its borders to foreigners and foreign influences.

Buffering. A second mechanism is the buffer to absorb variations created by environmental factors beyond the organization's control. The buffer may be established outside or inside the organization. Organizations can smooth or level variations before they penetrate the boundaries of the organization. Sales promotions to stimulate purchases during off-seasons are illustrations often used to stimulate buying. Utilities provide special night time rates to level day-and-night usage. Firms will contract for limited amounts of investment, personnel, time and effort with satellite companies. The firm itself will not have to expand or contract in investment and personnel as market conditions change. The satellites must do the expanding and contracting.

The buffer can be internal. Inventories of supplies and finished products are established to enable the organization to maintain steady production in the face of uncertain supply and market conditions. The inventory acts as a permeable buffer. Cadres of personnel may be inventoried based on anticipated organization needs.

Cost of Buffering. As Bobbit, Breinholt et al (1967) note, dealing with environmental uncertainties by buffering is often expensive. Monitoring and control activities must be introduced into the flow of inputs and outputs. Special staff departments are required to service the process. Sometimes, the cost of buffering becomes greater than the gains from offsetting of environmental uncertainties. For example, the military services can compete with each other in hoarding in inventories scarce qualified manpower sources. Too many personnel may be kept in training pools in each service in the desire to avoid possible operational shortages.

Deterministic, routine, buffers such as inventories are likely to be preferred over more creative ways of absorbing uncertainties. But high interest rates may demand greater organizational sensitivity to the environment and alternative buffering solutions. For example, it may be less expensive to air freight machine parts from a geographical inventory center than require scattered inventories closer to the production facilities. Such a central inventory can be much smaller than the combined stock required in all the scattered inventories.

Uncertainty Absorption. March and Simon (1958) noted that as information flows through an organization, it is subject to systematic uncertainty absorption. "The successive editing steps that transform data obtained from a set of questionnaires into printed statistical tables provide a simple example of uncertainty absorption" (p. 165). Uncertainty absorption limits each receiver's ability to judge the correctness of information flowing through the organization. The receiver must remain confident about the editing process since he or she is unable to directly examine the evidence. Direct examination of information is limited to the specialists who gather the original raw data. Direct perception of customer attitudes is limited mainly to the salesmen. The editors who summarize information have a great deal of discretion and can exert influence and power as a consequence.

Uncertainty absorption occurs closer to the source of information when data is more complex and when the organization's language is less adequate. On the other hand, when each unit is likely to develop interpretations, estimates and premises of its own, central, official, editing is needed to assure organizational coordination.

Adaptation and Restructuring. If a more permanent environmental change is anticipated by the organization, variance absorption and variance leveling gives way to planned adaptation. Long-term plans may be developed to transfer seasonally-required employees instead of hiring them at the beginning of each season and laying them off at the end. With anticipated permanently higher or lower environmental demands for its goods and services, preparations will be made by the organization to meet the change in demands. Or, if it does not see itself able to do so, then it may need to engage in rationing its resources by a reallocation process. High interest rates may make it impossible to borrow funds for the needed expansion. Instead, funds will be obtained by selling some less desired units of the organization or reducing budgets of some of the units to favor the expansion of others (MacCrimmon & Taylor, 1976).

As Duncan (1973) found, decision units in more effective organizations were structured differently under differing conditions of perceived uncertainty and perceived environmental influence. Specifically altered in their design were the hierarchy of authority, degree of impersonality in decision making, degree of participation in decision making, degree of specific rules and procedures, and degree of division of labor.

Organizations can be structured to reduce uncertainty by providing continuing search and scanning mechanisms. More information usually has costs but its acquisition reduces uncertainty. Such mechanisms include market and environmental research departments, subscription to information services, espionage, and so on.

Planning may take the form of preparing alternative scenarios. For ill-structured and complex circumstances, multiple contingent possibilities

are handled by decision-makers sketching out alternative scenarios based on estimates of the probable joint occurrences of events. The probable need for the United States to deal militarily at the same time with a Middle Eastern and a Latin American flare up can be estimated (MacCrimmon, 1974).

Risk, Uncertainty, and Subjective Probability

Much has been made of the distinction between risk (probabilities are known) and uncertainty (probabilities are not known). Nevertheless, it is subjective probabilities that are important to decision-making probabilities that are not zero. Executives decide based on some probability estimates implicit or explicit, based on available data, experience, beliefs and needs. In the absence of information, they fill in some of the gaps with hope and expectations. Thus, they can seldom subjectively remain in a completely uncertain situation. Complete uncertainty is an academic chimera. Subjectively, we always have some sense of information about risk possibilities. As noted earlier, MacCrimmon (1974) found that few executives make the risk-uncertainty decision at anytime and few have found the distinction to be reasonable (MacCrimmon, 1968). Complete uncertainty is the complete absence of information. Yet we know that there is a strong cognitive tendency to fill in for missing information, to project information from one's own experience and needs into what may be an objectively random situation. Hypotheses will be formed about random cause-and-effects.

Most empirical studies support the conclusion that individuals are not consistent in generating their subjective probabilities, nor as we note elsewhere are they particularly accurate in matching the objective

probabilities in a situation with their subjective estimates. Subjective probabilities, for example, may be greater than 1.0 for a set of mutually exhaustive and exclusive alternatives which objectively must sum to 1.0. Some experiments show systematic error in findings. The average subjective probabilities for objectively lower probability events are larger than the objective probabilities; the average subjective probabilities for higher probability events are smaller than the objective probabilities involved (Radford, 1981). In the same way, objective losses seem more likely to have more subsequent subjective effects than objectively comparable gains (Slovic, & Lichtenstein, 1968).

Probability estimates are further biased by an "availability heuristic". According to Tversky and Kahneman (1973), events are judged as more likely to occur if they are easy to imagine or recall. Likely occurrences are easier to imagine than unlikely ones. Instances of frequent events are ordinarily easier to recall than instances of infrequent events. Availability is also affected by familiarity, similarity, recency, and emotional saliency. All things being equal, we tend to be overconfident in our judgements of probabilities (Slovic, Fischhoff & Lichtenstein, 1977). However, many such biases are task-specific.

The costs of additional information affect how much uncertainty individual decision-makers are willing to accept. It may be seen as better to live with uncertainty than to pay the price for added information which would increase confidence that the decision-making choice was the right one to make. (Streufert & Taylor, 1971).

Studies suggest that in simple betting situations people may be more comfortable about taking greater risks when they feel that they have the skill to control the outcomes of their decisions than when they feel that

the outcomes of their decisions are due to chance forces beyond their control (Cohen, 1960). Nevertheless, in complex decision making in a simulation of international negotiations, the reverse appears true: those participants who perceived that their situation was due to their own decisions tended to take fewer risks than participants who perceived that their situation was due to forces beyond their control (Higbee & Streufert, 1969).

CHOICE AND COMMITMENT

The third constituent of the choice process is the closing act of choice, of one particular solution, and commitment to it. We have been unable to establish mathematical laws of preferential choice despite considerable effort. Choice behavior cannot be expressed as a simple monotonic function of abilities or scaled values. The task and situation often affect how information is processed into a choice (Slovic, Fischhoff & Lichtenstein, 1977). The importance of a situation is seen to affect willingness to take chances with it. In Exercise Solomon--a risk preference exercise participants accept the riskier but shorter-term payoffs (i. e. exploration of new oil rather than exploitation of known reserves) when the issue is of less importance to the decision-makers. Indian policy-makers can take less chances with agricultural production because of its importance to immediate national welfare.

Our inability to establish laws of choice may be due to the fact that participants use different kinds of rules and strategies as they make a choice. Choices may use different rules at different stages. Early on, participants compare a number of alternatives on the same attribute and use conjunctive rules to reject some alternatives from further consideration.

Later on, they employ compensatory weighting of advantages and disadvantages on the smaller set of alternatives. As the decision becomes more complicated because of incomplete data, information overload, and time pressures, noncompensatory strategies will be used (Slovic, Fischhoff & Lichtenstein, 1977).

Conservatism: The Rule or the Exception? Slovic, Fischhoff & Lichtenstein (1977) observed that a complete reversal has taken place in one decade of research about conservatism-when integrating probabilistic information to make a final choice. With conservatism, posterior probabilities are produced which are nearer the prior probabilities than those specified by the Bayes' theorem. Conservatism was seen as the common finding of Bayesian information integration research (Slovic & Lichtenstein, 1971). But subsequent research found that conservatism was limited to only certain kinds of inferential tasks. When cascaded inferences are required, such as when a physician builds up a diagnosis starting with unreliable cues, posterior probabilities are more extreme rather than those prescribed by the Bayes' theorem. Humans are not good intuitive statisticians according to Peterson & Beach (1967). In evaluating evidence, we are not conservative Bayesians. We are not Bayesian at all. We systematically violate the principles of rational decision making when judging probabilities, when making predictions, or otherwise deal with probabilistic tasks (Abelson, 1976).

Escalation or Curtailment? Within investment decision contexts, negative consequences may actually cause decision makers to increase the commitment of resources and undergo the risk of further negative consequences. After a loss, we may double our next bet.

Levi (1981) completed a simulated military decision-making experiment on escalation or curtailment of commitment of resources as a function of the accountability of the decision maker, the way territorial gains and losses were evaluated, and the perceived stability of the causes of military setbacks. Participants chose to escalate significantly more often when the territorial reference point led them to perceive large rather than small losses of territory and when setbacks were attributed to unstable rather than stable causes. Although accountability for the decisions did not affect the choice to curtail or escalate commitment, it did lead accountable participants to commit more resources if they chose to escalate.

Commitment escalated in a simulation of a business investment decision. When 240 business school students participated in a role-playing exercise, they committed the greatest amount of resources to a previously chosen course of action when they were personally responsible for negative consequences (Staw, 1976). From these results, Staw (1981) constructed a model of the antecedents of commitment to a course of action. First, there was commitment due to the prospective rationality of the perceived probability and value of future outcomes. Second, as a consequence of socialization, commitment became an effort to be consistent with cultural and organizational norms. Third, commitment justified previous actions.

Policy Capturing with Linear Regression Models

Hammond (1966) assumed that most judgments depend upon a mode of thought that is a synthesis of analytic and intuitive processes. The elements involved are cues or attributes, their weights, and their linear and nonlinear relationships to both the environment and the judge's responses. The Brunswik's lens model and multiple regression make it possible to derive equations representing the judge's cue utilization policy. Despite what was

said earlier about the potential for some degree of accident and randomness in organizational decision-making, numerous empirical studies attest to the ability of linear regression models to capture the policies that lie behind people's complex judgments. We capture the policies of a group of decision-makers by calculating the differential regression weights of the different components of their judgments when combined in a multiple regression to predict their final choice. The relative importance they actually attached to each component is obtained as a regression weight (Hammond, 1974).

Linear equations can account for much of the predictable variance in these complex judgments. The coefficients of these equations provide useful descriptions of the judge's weighting policies. They also describe the sources of interjudge disagreement and nonoptimal cue use. The judges studied have included managers, auditors, accountants, loan officers, military officers, trout hatchery employees and United States Senators (Slovic, Fischhoff & Lichtenstein, 1977).

To some degree, the relative importance of different components of judgment or the cues affecting policy-making is a matter of learning.

Multiple Cue Probability Learning. According to reviews of Slovic & Lichtenstein (1971) and Slovic, Fischhoff & Lichtenstein (1977), empirical research has established that: (1) people can learn to use linear cues appropriately; (2) learning of nonlinear functions is slow, particularly when nonlinearity is unexpected; (3) people are inconsistent, particularly when task predictability is low; (4) people fail to consider cue intercorrelations; (5) feedback is not very helpful; (6) improper cue labels mislead judges despite adequate statistical validities of the cues. But the superiority of linear over nonlinear models may be an artifact of the tendency to use predictors

monotonically related to the criterion rather than a truer description of the complex policy capturing process.

But Wright (1974) questions the expectation that weighting is likely to be stable across different conditions. For example, he found that when less time to ponder is available and distractions are greater, subjects tend to place more weight on negative evidence and use fewer attributes. The harrassed decision-maker is extremely alert to discrediting evidence on a few salient dimensions. However, if all alternatives contain the same level of an important attribute, then that attribute is of no further significance in the choice process (Teleny, (1981).

Making Inferences and Applying Rules to Make Choices

In complex decision making, given a multiplicity of cues contributing to predictions of the criterion solution, judges search for rules that will produce satisfactory inferences. The hypotheses they develop about the rule relating cues to criterion is sampled from a hierarchical set based on previous experience. But in using previous experience, judges seem to pay attention mainly to the implications of the most probable events in each earlier stage. They ignore less likely events that could have occurred earlier (Gettys, Kelly & Peterson, 1973).

Judges underestimate the probabilistic nature of the task and keep searching for deterministic rules that will account for the random elements in a task but since there are none, they change rules frequently and may return to previously discarded rules. Even when informed of the correct rules, judges have trouble applying them consistently, particularly if

the rules are nonlinear (Brehmer, 1974; Brehmer, Kuyenstierna, & Liljergren, 1974). Anyone who has played with the Rubik's Cube knows that the task remains difficult to complete even after being informed about appropriate rules for successful rearrangement of the cube.

Actual choice ordinarily involves a great number of nonquantitative factors. The process is crude. Values and facts involving politics, power, emotions and personality must be considered along with continuing change and various uncertainties. "The evaluation-choice routine gets distorted by the stresses from information overloads, intentional and unintentional biases" (Mintzberg et al. 1976). Soelberg (1967) sees that with multiple goals, the same one decision-maker may accept a marginly satisfactory achievement about some goals and try to come closer to optimum on others. Each alternative is evaluated independently although a fully rational approach would dictate otherwise. A screening process is observed in which secondary constraints are used to reject alternatives, i. e. "that plan requires too many rule-changes". A primary goal may determine the acceptability of remaining alternatives which are then compared, unless an "implicit favorite" has emerged. Remaining alternatives will then just be compared with the favorite and probably rejected.

Authorization

In 33 instances, in 14 of 25 observed organizational decision processes, Mintzberg et al. (1976) found that decisions had to be approved by higher authority. The unit originally reaching its final evaluation and choice moves the process to higher authority or outside the organization for authorization. Sometimes, higher authority would be asked to endorse

initiation or search activities by the originating unit.

The larger the organization, or the environment in which the decision units must operate, the more likely it is to suffer from uncertainty and lack of information about the significant sources of authorization for a sequential decision process originating in a remote decision unit. Or, remote constraints may not be taken into account during lengthy deliberations. Literally, years may be spent trying to find the solution to a problem by those units close to it. When agreement on a choice has finally been reached, only then they may discover some remote authority in the organization or some remote legality may completely invalidate the final choice.

It would seem useful early on as a problem is outlined for a careful search to be made about such remote elements and how to take account of them. Several years of academic deliberation by a committee composed of faculty from Psychology and from Management, were required to design and receive authorization for a Ph.D. program in Organizational Psychology by appropriate university councils. Subsequently, one state licensing officer blocked its implementation for another several years by introducing an unexpected interpretation of relevant rules for Ph.D. programs in Psychology. The effect, in fact, was to destroy the program before it could be started. In large hierarchies, it is not unusual to find it taking a decade for an innovative program to be conceived in response to a problem at a local decision unit and for its final authorization to be received from a remote authority. Various committees which meet infrequently must be convened. Various bureaucracies must move mountains of paper from inbasket to outbasket. Innovation in such circumstances is a heroic effort.

JUSTIFYING THE CHOSEN ALTERNATIVE

Francis Bacon observed 350 years ago that "the human understanding when it has once adopted an opinion...draws all things else to support and agree with it". For Katz and Kahn, 1966, p. 261 "Men act first and then rationalize their actions...". Considerable after-the-fact energy is expended justifying the commitment just made. Following Festinger's (1964) cognitive dissonance conceptualization, Zeleny (1981) sees that a process of subjective reevaluation of attributes is initiated. The attractiveness of discarded alternatives is reduced and that of the chosen alternative is amplified. If the decision-making process is dynamic and the components are interactive, then preliminary commitments occur. The ideal, but infeasible alternative, is displaced closer to the set of available alternatives. This is coupled with justifications resulting in a "spreading apart in attractiveness" of the preliminary commitment from the other alternatives. Such justifications increase as the final choice is approached supporting commitment to it. As the final choice is approached, options have become highly restricted. Subjective biases have become dominant. It is difficult to return to earlier rejected alternatives. The usual dominance of rationalization over rationality at this time may be one reason that Maier and Hoffman (1960) found that going back to the same problem a second time after it had been solved the first time resulted in a better solution to it.

If cognitive dissonance is present, there is a selective exposure to information favoring the consonant over dissonant information. Dissonant information is not avoided or ignored, but reinterpreted in the direction of the chosen alternative. New information may be sought, but it is primarily

to increase confidence in the choice already made and to reduce regret about lost opportunities. The implicit favorite model of Soelberg (1967) suggests that an implicit favorite among alternatives is found early, but search continues. Other alternatives are evaluated against it and rejected. Commitment to one alternative occurs after other rejected alternatives already have been overtly reviewed and rejected. A confirmation process is completed. Often, participants in a decision process do not realize it has already occurred. The announced agenda for a meeting may be to search for and to choose a solution to a problem. The hidden agenda may be to explain a solution already chosen by the executive calling the meeting.

EVALUATION OF OBTAINED OUTCOMES

Open systems models of organizations see the organizations as learning and adapting. Choices are evaluated and the feedback is stored in the organization's memory of information, policies, procedures and decision rules to provide the basis for subsequent problem identification and diagnosis (Alexis & Wilson, 1967). Over time, members learn why certain behavior has been successful. This is then exploited through deliberate and conscious planning (Katz & Kahn, 1966).

Implementation

To truly evaluate the adequacy of a decision requires that it be implemented. Too often, such does not happen. Yet, without implementation, decision-making is an academic exercise. The implementation process is such a vast topic in itself that it can only be touched on here. An

important line of investigation by Van de Vall, Bolas & Tang (1976) points to the importance of coupling the concepts and methods in diagnosis and search to the language of those who will be expected to implement the decisions deriving from the search.

Successful implementation of a decision requires avoidance of conflicts of interest, positive rewards for risk taken, as well as understanding of the decision by those who must carry it out. Trull (1966) studied decision-making processes in 100 organizations. Not unexpectedly, he found that the greater the authority of the decision maker, the greater was the effort made by the organization to ensure the decision's success. But, not expected was the less than rational tendency for managers to accept more uncertainty in the outcomes of their decisions without demanding commensurate rewards. This may have been due to their inability to assess the uncertainties in their decisions. As expected, understanding of what was needed in implementation was greater with participation and open communication.

Participation of the executors of the decisions in diagnosis, search, and choice are also seen as particularly important to implementation. Presumably, learning and adaptability are enhanced by participative decision-making. As might have been expected, Cohen and Collins (1974) found that the more effective units in a government agency tended to use participative decision-making processes. (For discussion about the utility of industrial democracy and participative decision-making, see Bass (1981; 203-206, 309-330). Particularly, if one is concerned about implementing a decision, participative approaches enhance understanding of the decision reached by those who must carry it out.

An empirical study by Bass (1972) with managers in 12 countries using a simulation of planning and production demonstrated the utility of

participation in planning. The reasons included better understanding of the plans by those who executed them, more satisfaction and commitment to them, less conflict between planners and doers, fewer communication errors, validating behavior by participating planners, and less competition between the decision-makers and those who had to carry out the decisions.

Criteria for Evaluating Obtained Outcomes

Evaluations following implementation may be realistic comparisons to the extent to which the alternative chosen and implemented, in fact, did solve the problem. Or, these evaluations can be used to justify or rationalize the choice made. The evaluation can be distorted by what outcome was anticipated or desired. The biases in the original estimated effects find their way into the perceived outcomes. Rational or rationalizing reevaluations may result in adjusting aspiration levels. Felt success may raise levels; felt failure, lower them.

Kilmann (1976) argued that most critical for the entire decision process is properly conceptualizing how to evaluate its outcomes. Attention must be given to the effects of the chosen solutions on improving the firm's internal efficiency, external efficiency, external effectiveness, and internal effectiveness. Effects on personnel, structure, technologies, environment, and objectives, and objectives of the firm need to be considered.

With more emphasis on the effects on organizational processes, Shull, Delbecq and Cummings (1970) offered three bases for evaluating the goodness of a decision: (1) the subsequent viability of the decision; (2) the degree of congruency between the anticipated and obtained results with the chosen solution; and (3) the enthusiasm and skill with which the proposal has been

carried out. Another set of criteria for evaluating a decision was proposed by Trull (1966): the decision's timeliness, its use of information, and its compatability with existing organizational constraints.

Post-Decision Cost-Benefits Analysis.

Needed also are ways to judge the value of the resulting improvements against their costs. Cost accounting is commonly employed. Expenditures often can be related to organizational goals through suitable cost accounting (Peters, 1973). Even when such is not feasible, proxy measures may be used. The response time of an ambulance service may be seen as a proxy measure of the benefits. But proxy measures may be unreliable or invalid and have to be chosen with care (Radford, 1981).

The practical difficulties of accurate, reliable, and adequate cost accounting make it necessary to combine it with other evaluations. Profitability and growth are additional indicators of the over-all evaluation of organizational effectiveness, however, "the feedback loop is so long and the information reflects so many causes that the criterion is less than satisfactory. Rate of growth is even more complicated and ambiguous" (Katz & Kahn, 1966).

Cost-benefit analysis requires measuring both the costs and the benefits of outcomes. This focuses attention on the need to specify the outcomes of decisions in terms, for instance, of marginal costs, sunk costs, and opportunity costs (MacCrimmon, 1974). The private sector usually can rely on sales figures, costs of production, revenues, profits, return on investment, and so on, as objective measures for evaluating organizational performance. It shares with public sector organizations the availability of such measures as training times, employee replacement costs, overhead costs, accident rates, and

inventory storage costs. But in the public sector, objectives may not be compatible with economic rationality. The result often is an unrealistic analysis (Treddenick, 1979). As a consequence, various substitutes to cost-benefit analyses have been proposed to evaluate public resource projects including the efficiency method, environmental evaluation systems, value information, and economic uncertainty analysis (Taylor & Davis, 1975).

Estimates of certainty and optimism about outcomes are particularly sensitive to the mutual reinforcement and support that collectivities of decision-makers give each other. Whether they are in conflict or in agreement in perception of the problem, possible solutions and outcomes is obviously of particular importance to the organizational decision process.

CHAPTER 6

DEALING WITH CONFLICT

As decision-makers strive for a mutually acceptable choice, differences among them in perceptions, cognitions, values, interests, needs, and preferred alternatives give rise to conflicts. This is most apparent in complex organizations with highly differentiated structures, and complex tasks, operating in an uncertain environment (Pettigrew, 1973). Conflict is also generated by the differences in the needs and interests of each individual member and the organization as a whole. It is also generated by differences between organizational entities such as departments. Higher authority and greater power may be the basis for resolving a conflict. Or the conflict may be settled adaptively by joint problem-solving or by negotiation and bargaining. For example, bargaining will occur among units of equal power competing for scarce resources. Coordinators and arbitrators may be employed. Optimality can be approached through integration of the conflicting interests to yield mutually advantageous solutions rather than merely trying to compromise the conflicting interests.

But instead of being resolved or reduced through compromise, conflict also can be avoided by inertia, by hasty superficial agreements, or by directing attention elsewhere. Other defensive maladaptive reactions may be employed such as procrastination, buck passing or by individuals providing uncritical support to each other. (Janis & Mann, 1977)

Sources of Conflict

Disagreements about means or ends can lie between individuals, between groups or between organizations as well as between the individual and group, individual and organization, and group and organization. Thomas, Walton & Dutton (1972) studied the sources of friction and frustration in departments of a telephone company. They revealed the salience of competitive incentives, jurisdictional ambiguities, scarcities of resources within each department, opposing expectations, and inhibited communications due to obstacles in physical communication as well as to verbal and interpersonal difficulties.

An important source of conflict arises in the allocation of resources which price theory suggests can be done optimally but, in fact, can only approach optimality. What corporate headquarters sees as organizational slack may be regarded by individual divisions as necessary buffers for uncertain schedules. A compromise must be worked out.

The incompatibility of unit and organizational goals may be seen when as a move toward optimality, unit profit centers are permitted to purchase supplies on the open market rather than by transfer purchases from a central store inside the organization, depending on which price is lower. Unit profitability is enhanced, but the possible economies of scale envisaged in one large central purchasing agency may be lost.

For Thompson and Tuden (1959), negotiated compromises are most likely to be seen if the disagreements center about ends but not means. Settlement by inspiring authority is likely if disagreement exists about

both ends and means. But if disagreement is over only the means, not the ends, then settlement will be a matter of judgment.

The Individual Versus the Organization. A continuing conflict over means and ends is seen in the differences in approaches to innovation of the enterprising compared to the conforming manager in the large organization. Organizations find it hard to tolerate the entrepreneur. They expect orderly advances. They impose controls too soon on the budding innovations of the entrepreneur who may have to bootleg activities outside the approved budget in order to continue with the innovations. Intolerant of surprises, organizations fail to reward such risk-taking. They overemphasize short-term results and fail to look ahead (Quinn, 1979).

Many other conflicts of interest lie between the individual and the organization. The R & D organization, working within cost limitations imposed by a contract may be striving for a satisfactory product at the lowest possible cost, making use, whenever possible, of available off-the-shelf components. However, the individual engineer may find it more important to design all the components of the new product, forcing up the development costs. The engineer develops himself and gains needed experience in preparation for when the development project is completed and he will need to seek new employment.

Managers can face conflict between their personal moral standards and organizational expectations (Carroll, 1975). Available evidence suggests that most often they seem to compromise themselves (Newstrom & Ruch, 1975). Managers in the public sector see those in the private sector as less ethical (Bowman, 1976) but lack of generally accepted ethical standards for management makes it likely that managerial decision-makers "will continue

to respond to organizational pressures within their own definitions of ethical behavior" (Harrison, 1981, p. 171).

Change, Assumptions and Conflict. Change, in itself, is a source of conflict in organizations. When efforts are involved to change traditional organizational policies, Mitroff and Emshoff (1979) see win-lose negotiations occurring that maintain conflict rather than integrated problem-solving. Organizations seem unable to consider new but radically different alternatives to current policies in a systematic and explicit way. Organizations seemed to be impervious and self-sealing when it comes to sharp changes with the past. Policy conflicts seldom challenge the basic underlying assumptions supporting the new and old ways. Rather, contention remains superficial and the real conflicts in assumptions remain unresolved. Data alone is insufficient to convince the opponents of change. Both opponents and proponents can selectively muster the data to provide convincing support for their own positions based on different assumptions. Ego involvement, polarization and hardening of positions makes any synthesis impossible. A usual outcome is no decision until the original problem mounts into a crisis responded to hastily and inadequately. New policies challenging the assumptions underlying the old policies are what are needed.

The failure to examine underlying assumptions not only reinforces continuing worn-out policies, but it may also make it impossible to even formulate a better strategy, much less get it accepted. Katz & Kahn (1966) see conditions where organizations

"suffer from the failure to recognize the dilemma character of a situation and from blind persistence

in sticking to terms of reference on the basis of which the problem is insoluble. ...management (may) try a series of related efforts which are doomed to failure because the problem as conceived is insoluble" (p. 277).

Mitroff and Emshoff (1979) offer an approach to deal with proposed policy changes systematically involving specifying assumptions, engaging in a dialectic analysis, integrating what emerges from the dialectics to create acceptable assumptions for which data will point to the best strategy.

RESOLVING CONFLICTS IN DECISION-MAKING

Conflicts may be reduced or eliminated by the toss of a coin. More often, conflict about the nature and importance of a problem and its solutions may be resolved by the dictation of the more powerful interests in the organization to the less powerful. Or, it may be resolved by persuasion. We are most likely to see when several decision-making units of an organization deal with a conflicting issue, the formation of coalitions, negotiation and joint problem-solving.

Authority and Power

Problem discovery, search, and choice, as we have noted earlier, can be accidental or random. Organizations can stumble into problems without much awareness; search can be by blind trial-and-error, and choices made by tossing a coin. But much more often, power affects where search will be directed and what choice will be made. The most powerful person may make the choice, ignoring the beliefs, values and opinions of the others.

Power is used to generate support for one's demands for scarce resources, promotions and positions, when clear priorities have not been established by the organization. The final decisions that emerge reflect the different amounts of power mobilized by the parties in competition (Pettigrew, 1973). The marketing department may have a strong case for increasing the advertising budget which may fall on deaf ears of the President who may decide to decrease rather than increase it because of personal dislike of individuals in the advertising agency involved.

Individuals may not be able to influence an organizational decision because they lack access to the locus of decision-making. Power may be a matter of location or the openness of communication flow in an organization. Whether superior or subordinate, whoever controls the communication channels has the power to decide. Such was seen by McCleary (1960) in a prison. The way power is distributed in an organization strongly determines who decides for whom. Classical management calls for specifying where authority is to reside so that someone is responsible for supervising all essential activities of the organization. The industrial pyramid of superior-subordinate relationships and chains of command are mandated. Decision-making below is minimized by official structuring of positions with clear, written job specifications and role assignments (Bass, 1981).

Superiors and higher management lose power over decisions if they are seen as illegitimate or incompetent. They lose power if they are rejected as representatives of the unit they supervise and cannot control the rewards and penalties supposedly available to them to distribute. Subordinates and subordinate units gain power in the decision-process norms, by legislation (such as with industrial democracy), by collective action,

or by possessing exclusive knowledge and competence. Subordinates most often gain power over decisions when superiors become dependent upon them (Mechanic, 1962). Scheff (1961) described this as occurring between nominally superior physicians and nominally subordinate hospital attendants.

Patchen (1973) conceptualized the interplay among the more and less powerful organizational members in terms of the role and resources of the more powerful interacting with the role and needs of the less powerful. Table 1 displays the suggested kinds of interactions and their effects.

Table 1 about here

For Hinings, Hickson, Pennings & Schneck (1974) decision-making power of units within an organization results from their contingent dependency on one another. This is created by their respective needs to cope with uncertainty. A unit is more powerful if it is more central to the workflow, if its operations are immediate and pervasive, and if no substitutes can be found for its contribution to the organization. Coping with uncertainty is most important to a unit's power, followed by its immediacy, nonsubstitutability, and pervasiveness. The public relations department has less power within the firm than the production department.

Based on a study in four hospitals, Jackson (1966) proposed a simpler scheme. Units within the hospitals derive their power and authority to make decisions from emerging approval-disapproval norms and expectations which crystalize the norms. Units are also seen to have different conflict

Person exerting influence			Target(s) of influence			
Characteristics	Resources	Decision role with respect to target	Characteristics	Needs	Decision role with respect to influencer	Effect of influencer on target
Expertise: special training, special experience, etc.	Knowledge about how to reach certain goals	Investigates, makes tests, gives information to others	Unexpert	Wants to find best ways to reach goals	Reviews information presented by experts	Sees new options; sees new favorable or unfavorable consequences following various actions
Occupies important position in hierarchy	Control over material rewards (money, promotion, etc.)	Makes request, coupled with promise of reward for compliance	Occupies less important position in hierarchy	Wants rewards controlled by influencer	Decides whether to accede to request of others	Compliance seen as means to rewards
Occupies important position in hierarchy	Control over material penalties (fines, demotions, etc.)	Gives order, coupled with threat of punishment for noncompliance	Occupies less important position in hierarchy	Wants to avoid punishment but maintain self-esteem	Decides whether to accede to order	Compliance seen as way of avoiding penalty but may be seen as blow to self-esteem
Strong; successful; has attractive qualities	Approval	States own opinions, preferences	Less strong, less successful	Wishes to be similar to, approved by, influencer	Hears opinions, preferences of influencer	Sees compliance as way of being similar to, approved by, influencer
Occupies legitimate position of authority; secured position by legitimate methods; is affected by certain decisions (by virtue of work needs, responsibilities, etc.)	Symbols of legitimacy; label of others' action as right or wrong Own cooperation; may also have some resources listed in other rows	Announces decision; asks for support Vigorously makes preference known to others	Occupies position of subordination, accepts legitimacy of other's position Peers or final decision-making authority	Wishes to fulfill moral obligations Want high level of cooperation from influencer	Gets request from authority Decide whether to accept recommendation	Sees conformity to requested action as morally correct Sees accepting recommendation as leading to more cooperation by others

Table 1: A framework for analyzing social influence with some examples (from Patchen, 1973, p. 197)

potentials which interacting with their normative power determines their decision-making behavior. When there is a lot of technical uncertainty, experts can be most influential by serving to reduce the uncertainty. But, unfortunately in complex organizations such as large hospitals, the organizational politicians and the experts come in conflict and work to undermine each other's influence.

Persuasion

Decision units are more likely to be persuaded by credible sources that initially includes implicit acceptance of some of the unit's views. The source as well as the message need to be acceptable. Persuasion will be easier to accomplish in more ambiguous situations and with decision units lower in confidence and competence. The persuasion will be more effective if it comes from multiple independence sources (Zimbardo & Ebbeson, 1969).

Beliefs about causation may underlie how decisions are reached. If individuals or units in an organization share goals and beliefs in how to reach them (means and ends agreement), the decision will be a matter of calculation. But if in disagreement only about goals, then compromise will be necessary; if only different in beliefs about cause-effect relations, the means to reach the shared goals, then persuasive judgments will be the basis of decision (Thompson & Tuden, 1959).

To what extent subordinates in a large Spanish bank will attempt to persuade superiors was studied by Filella (N.D.). He found that superiors

and subordinates at higher levels tended to exhibit about the same patterns in attempting to influence each other. However, at lower levels, although superiors and subordinates did about the same amount of persuasion and reasoning with each other, subordinates were much less likely to bargain, use coalitions, friendliness or assertiveness, in trying to influence their superiors.

Nevertheless, in large complex organizations, faced with the uncertainties of internal technologies and external environments, authority and persuasion alone cannot make a central individual sufficiently influential as decision-maker. He must be a power broker as was Robert Moses, the master builder, who dominated and shaped the construction of New York State's roads, bridges, tunnels, dams and parks for over half a century (Caro, 1974). The power broker combines his or her own power and persuasive ability with the ability to form alliances, as needed, with additional sources of power inside and outside the organization. The power broker shapes and controls the formation of coalitions.

Coalition Formation

Coalitions are alliances of organizational members combining their individual powers, resources, and persuasive efforts to achieve greater influence on decision processes than the members could accomplish alone. Coalitions are commonly observed when conflicting interests are present in an organization.

To increase one's negotiating power, one may join forces with others in the larger organization in cliques, cabals, and coalitions that will

exercise influence over promotions and appointments in the firm and give better access to the organization's uncommitted resources (Burns, 1965). The political struggles for scarce resources within the firm are a major source of continuing conflict and bargaining. But despite the "wheeling and dealing", continuing working relations between competing units are maintained by common interests in unit privileges and consensus about minimum standards of efficiency. Conflicts may simply be avoided or reduced, and accommodations shaped in coalitions based on the mutual needs of the conflicting units to continue to live and work together (Crozier, 1964).

Cyert and March (1963) built much of their behavioral theory of the firm around coalition formation. Coleman (1975) described such coalitions forming in educational administrations because of value differences among the groups involved. Stable patterns of interactions between coalitions of groups can be observed. The groups have a collective identity, pursuing interests and accomplishing tasks, coordinated through a system of authority.

Coalitions are particularly important in their effects on how resources are allocated in the organization. Although the organization may strive for optimal distribution as suggested by traditional price theory, it will have to settle for less (Alexis & Wilson, 1967). Corporate staff planners may determine a seemingly, optimally profitable advertising and marketing strategy for introducing a new product. But the manufacturing department, concerned with production costs, and the R & D department, concerned with product quality, may force a compromise. They may demand a shift of some resources from the advertising budget, and a delay in launching a major campaign for the new product, to meet the multiple goals of sales,

cost containment, and product quality. Success in modifying the corporate level decisions will depend partly upon the strength of the manufacturing-R & D coalition. Conversely, if manufacturing and R & D are already in deep conflict, if the goal of cost containment is completely incompatible with the goal of product quality, the coalition of manufacturing and R & S is unlikely to form. The corporate marketing decision is less likely to be modified.

Cyert and March (1963) saw coalition formation as fundamental to organizational functioning. Individuals contract to work for the firm and to participate in its decision processes. But they differ in interests. Their subsequent goals and commitments are a consequence of negotiation which resolve the conflicts in their differing interests. Such resolution occurs when one coalition becomes dominant or it can occur through compromise among equally powerful coalitions. But because of precedents and norms, not everything needs to be continually a subject of negotiation. Continuity is also maintained because past bargains tend to be perpetuated.

Coalitions are less likely to form when rules, objectives, and constraints are clear. However, if the management task is more complex and unstructured, if the required technologies and the environmental situation are uncertain and unstable, coalitions are more likely to arise to influence the means-ends decision processes (Thompson, 1967). The traditional top-down hierarchical flow of decisions can only take place where technology has been standardized and the environment is stable. Within the organization facing many uncertainties, it is the dominant coalition which usually provides stability. For an individual to become the central power figure,

the power broker, in the organization, he or she must learn how to work with the coalitions. Without these "superb politicians" who can work with coalitions, most large complex organizations become immobilized.

Coalition Experiments. Experimental findings are sparse. They usually employ a triad of participants in which resources are distributed 4-3-2. Most studies support Garmeson's Minimum Resource Theory (1961) that the cheapest winning combination, 3-2, is the combination that carries the day. The division of rewards between the weaker party (3-2) is consistently between parity (60-40 split of rewards) and equality (50-50) (Davis, Laughlin & Komorita, 1976).

Joint Problem Solving Versus Negotiating

Walton (1972) outlined the conditions under which decision units can work together to solve a problem, or when they must negotiate an acceptable joint decision.

Problem solving occurs when the joint gain available to both parties is variable. It is a non-zero sum game from which both parties can emerge as winners. The earlier processes of decision-making we have presented will be seen. The total payoffs to both parties will depend on the parties' abilities to discover the compatibility of their interests and to discover or invent ways to work together for their mutual profit.

On the other hand, bargaining to reach a decision occurs when the joint profit available to the parties is fixed, and as yet, their relative shares have not been determined. Whatever one side gains is at the expense of the other. It is a zero-sum game. One party is likely to attempt to modify

the other party's perceptions of the benefits of various courses of action so that the other party will be less resistant to a decision favored by the first party. The first party is likely to attempt to structure the other party's expectations about what outcomes would be minimally acceptable to the first party. The negotiators will take seemingly immovable positions and make threats to prevent the opposition from implementing the same operations. They will rationalize away earlier commitments which become untenable.

"In taking a bargaining position, the verbal or tacit communication is important: How much finality is implied? How specifically is the position indicated? And what consequences seem to be associated with a failure to reach agreement? Each of these considerations requires deliberateness in communicating with the other. However, equally important are the tactics which lend credibility to these communications: presenting one's proposal first, reducing it to writing and persistence in discussion it; arousing one's organization in support of a position; taking a stand publicly; behaving belligerently ..." (Walton, 1972, p. 97)

Bargaining also usually entails the negotiation of side payments to facilitate agreement and overcome conflicts between opposing parties and coalitions (Cyert & March, 1963). Bargaining thus makes use of bluff, persuasion, promises, threats, and mutual adjustments. Or, it may require arbitration by third parties (MacCrimmon & Taylor, 1976). Whether the outcome will be constructive requires further understanding of what is in dispute.

Instrumental Versus Expressive Stakes. What takes place depends upon whether the conflict or lack of compatibility is over instrumental or expressive stakes. Instrumental stakes are outcomes affecting the goal achievement of the conflicting parties. Expressive stakes are the identity

sought and the identity accorded opponents by the participating disputants.

Examples of instrumental stakes in interagency planning include how much emphasis will be given each party's programs and philosophies, how much of each party's scarce resources will need to be committed to the joint effort, how much control each party will be able to maintain over the joint venture, which party's bureaucratic procedures will be paramount, and how will credit for success, or blame for failure, be shared?

Examples of expressive stakes include being seen as superior (or equal) to the opposing party, as similar (or as different) and as aloof (or as committed) or as confident (or as tentative) as the opposing party. If both parties identify needs that are compatible, then they can reinforce each other. But when needs are incompatible, assertions of identity by one party will be frustrated by identity-denying actions by the other.

"Initiatives to assert one's identity include self-reference posturing, and telling anecdotes about past experiences that **lay claim to the preferred attributes**. Identity initiatives also include manipulating the agenda or discussion format in order to facilitate a participant's efforts to do any of the above, as well as choosing physical aspects of the setting for the meeting, for example, the location, the type of conveniences available, etc., which tend to create the appropriate identity." (Walton, 1972, p. 98.

Identity-denying responses may involve passively ignoring the other party's identity bids, continuing to treat the other party as initially perceived and perhaps deliberately undermining its efforts to establish its preferred identity. Management negotiators escalate conflict with union negotiators by accusing them of failing to represent the true interests of the rank-and-file employees. While continuing identity conflicts will inhibit problem solving, identity reinforcement will facilitate problem

solving. Accepting union negotiators as concerned about the health, safety and welfare of the rank-and-file employees can produce agreement on ways to improve both productivity and working conditions. In turn, such problem solving will promote identity reinforcement and reduce identity conflict. On the other hand, bargaining will continue to promote identity competition and to reduce identity reinforcement.

Walton goes on to suggest that problem solving will interfere with bargaining just as bargaining will interfere with problem solving. If one party is pushing for the best quality solution to a problem, its position is likely to be incompatible with one that suggests a compromise around a lower quality solution in order to gain its acceptance by the other party. In the same way, if each party is mainly concerned about winning points in a controversy, the situation is not conducive to a joint search for the best solution to the problem.

Negotiation, of course, is not limited to intergroup relations. For example, in the absence of clear, mandated job descriptions, particularly in technically advanced and dynamic organizations, individuals negotiate over a considerable period of time with other individuals and departments about their job responsibilities (Pettigrew, 1973). Joint decision-making can take place between individuals, between individuals and groups, between groups, between individuals and organizations, between organizations and between groups and organizations.

Improving Joint Decision-Making. Walton's analysis leads to suggestions on how to move toward optimization of joint decision-making. Since one's bargaining effectiveness is reduced by problem-solving (for instance, one

has to be completely open about one's needs when problem solving), one should try to minimize the mixing of the two approaches. This can be done by agenda, by ground rules, and by norms. Or, it can be done by using different people or different locations to settle different conflicts. Settlement by bargaining over respective shares can be first achieved before proceeding to problem solving.

Problem solving can be improved by developing mutually acceptable and acknowledged identities. This promotes trust enhancing the accuracy of interpersonal communication and the willingness of one party to expose tentative ideas and judgments to others. By reducing identity conflicts, judgmental "we-they" distortions can be reduced, reducing potential bargaining deadlocks, and improving problem-solving. Identity conflicts can be reduced by selecting mutually acceptable negotiating representatives, by clarifying the scope of the required decision-making and the extent identities are at risk, by off-the-record discussions where identities are deemphasized, and by confronting the identity issue as an agenda item separated from the rest of the decision process.

It is common for joint discussions to terminate with innocuous or ambiguous outcomes. This is a way of avoiding solutions. Such avoidance occurs readily when the problems involved are long term. Opportunities may be lost by such avoidance, but little is risked and no costs are added to each party's operations. Governmental agencies are inclined to avoid collaboration and to proceed on their own because the combined constraints laid upon both agencies are avoided if each continues to proceed on its own. Interdependent ventures of governmental agencies increase the visibility of each agency to the others, opening it to criticism and attack. Identity may be lost

in the combined efforts (Walton, 1972). Once jurisdictional boundaries are created after forming distinct decision-making units of equal authority and power, it is clear that then trying to coordinate the decision-making units becomes a difficult process. An intervening third party may help two deadlocked units in conflict.

"If the immediate need is to break an impasse allowing a particular interunit decision to be made, then third party interventions can focus exclusively on interunit processes. To break a strictly bargaining impasse involves mediation; to break an impasse based on identity conflict involves conciliation (Walton, 1972, p. 110).

In his chambers, a court judge can appeal to disputing lawyers who respect each other's identities but who in public must advocate immobile opposing positions. Before trial, the judge will consult privately in his chambers, in turn, with each lawyer in a case to determine each party's level of aspiration. If the plaintiff and the defendant are actually not far apart privately, the judge can mediate the dispute. A lengthy trial may be avoided. Publicly, the plaintiff may be suing for \$100,000 in damages but privately expects and hopes to settle for no less than \$30,000. The defending attorney publicly has declared complete lack of responsibility for damages but privately expects and hopes to pay no more than \$20,000 to settle the matter. An out-of-court settlement may be quickly achieved when the judge proposes to split the difference with a \$25,000 payment.

If more general improvement is sought in the interindividual or interunit working relationship, then changes can be made through recourse to superordinate goals to provide better joint payoffs for collaboration. Or, sanctions can be imposed on conflicting units for failure to cooperate. To promote the compatibility of identity needs of the units in conflict, changes in attitude and education would be required.

Integrating the Individual and the Organization. Argyris (1964) argued that the needs of a mature personality and the demands of a formal organization are incongruent. Individuals seek a variety of tasks, a long time horizon, the use of their numerous skills, and psychological independence. Ordinarily, organizations require limited tasks, limited use of one's skills, a short time horizon, and psychological dependency. The incongruity of person and organization can be alleviated. Decision-making can be improved through improving the quality of interpersonal relationships. Openness, trust, and owning up to one's feelings can lead to improved decision making. Culbert and McDonough (1980) started with the same premise as Argyris and emphasized the need to be aware of one's own and others' self-interests. They saw people aligning their self-interests with the task requirements of their jobs. The same tasks can be completed satisfactorily in different ways to meet self-needs as well as organizational needs using flexitime for example.

The rapid growth of many advanced technology firms illustrate how the interests of the organization can be integrated with those of its innovating, entreprising, individuals. During their expansion, these firms placed a premium on their own technical and economic development. Needs rather than solutions were defined. Multiple competing approaches within the organization were encouraged. Those ultimately responsible for production and service were involved in the developmental phases. Longer-than-usual time horizons were accepted. Support for risk-taking projects came from top management. Commitment for them was obtained by making clear their objectives and identifying their high value. The organizations were opportunity-driven rather than focused on rationing scarce resources.

Merging individual entrepreneurial and organizational needs for innovation requires opportunity planning, portfolio planning which supports long-term, developmental activities. It requires toleration of failure for usually only a few of the innovative efforts eventually pay off (Quinn, 1979). It requires domination of the control system by the strategy, protecting innovative teams by setting them off by themselves in an autonomous "skunk-works" unconstrained by larger formal units. Such constraints are among the most salient features of organizational life.

CHAPTER 7

CONSTRAINTS ON ORGANIZATIONAL DECISION PROCESS

To come to grips with organizational decision-making, for the purpose of exposition, we need to take a moving picture of the decision-makers, immersed in the organization, moving through the decision process, as such, surrounded by numerous constraints which the decision-makers may at times act on, but which more often act on the decision-makers, to control what they do as the process unfolds.

ENVIRONMENT, GOALS, AND TASKS AS CONSTRAINTS

Definition

By constraint, we mean a driving force or a restraining force, exogenous to the decision process, which modifies the process. Constraints can curb, check, hold back and narrow the process, but they also can push, facilitate, stimulate and expand it. Although the absence or presence of these constraints make a difference in the process, ordinarily they are beyond the immediate complete control of the decision-makers. Constraints limit the available alternatives. But since decisions are future-directed, the decision-maker usually must estimate the future behavior of the constraints and boundary conditions involved. If decision-makers do have control over these constraining forces, the control is, at best, limited.

Sources of Constraint

What variables and fixed entities constrain the decision process?

Glueck (1976) noted that strategic decision-makers heading business firms are affected by the geography, extensivity, age, size and power of their enterprise; the technology and volatility of the enterprise's environment; the businesses the firm is in or could be in; and the attitudes and experiences of the strategic decision-makers, themselves. Tannenbaum (1950) identified five sources of constraints in the typical organization decision situation: organizational policies and rules, limitations of individuals involved, geography, climate and physical resources, the current state of technology, and money available. Feldman and Kanter (1965) noted:

Organizational decisions are constrained by the actions of the organization itself, by the physical and mental characteristics and previous experience of its members, and by the social, political, and economic environment of the organization and its members (p. 619).

Environmental Constraints

External to the organization are a variety of institutions and forces which limit organizational actions and control the outcomes of its decisions. These include customers and competitors, governmental agencies, parties to contracts, trade associations, and general social customs of the society (Ebert & Mitchell, 1975).

For MacWhinney (1968), these differing environments determine what aspects of the environment are to be of concern, what phenomena should be noticed and what variables should be introduced into the criterion function for the organization's performance. The environment also affects the sense of certainty in decision-making and the need for dealing effectively with risk.

Organization Needs to Match Environment. According to Ashby (1964), the decision-making structure of any system needs to match its environment. A variable environment requires a varied structure. Faced with a more complex environment, an organization becomes more complex to deal with it. His concept of requisite variety proposes that by adding variety of its own, a system can reduce the effect of the variety being faced. Bobbitt, Breinholt et al (1974) add that if faced with both a varied and a dynamic environment, the organization needs to respond with adaptive and decentralized decision-making.

Since how adaptive an organization must be depends on the complexity and rate of change in its environment, it becomes useful to describe organizational environments in terms of whether, in combination, they are high or low in complexity and rate of change. A complex environment contains varied and interactive institutions, customers, technologies, and so on. A simple environment is one of uniformity. Although both complexity and change add uncertainty to the decision process, rapid rate of change probably generates more uncertainty than does environmental complexity (Harrison, 1981). But complexity is still an important consideration.

Altogether, Emery and Trist (1963) identified four ideal types of environments: (1) placid, randomized (simple, stable); (2) placid, clustered (complex, stable); (3) disturbed, reactive (simple, unstable) and (4) turbulent (complex, unstable). There are only a few small organizations coexisting in an unchanging placid, random environment. There is little difference between tactical and strategic decisions in these small organizations. In the placid, clustered environment, organizations grow, differentiate and tend toward centralized control and coordination. Causes of

events can be identified and best actions selected based on probabilities. At the other extreme, in disturbed, reactive, environments, organizations are more competitive. Operational decisions are separated from strategies. Controls are decentralized. In turbulent fields, the environment as well as other organizations within it are sources of uncertainty. Buffering is difficult. The turbulent environment requires internal mechanisms for keeping up both technological change as well as the ability to make both short and long term decisions. But organizations in the simple, stable placid environment require no such mechanisms, but mainly the ability to make short-term, tactical, decisions.

Impact of Environmental Complexity. The complexity of the environment of the decision has been found to play an important role in determining the match in decision-making complexity which accompanies it. It increases up to a certain point with increasing environmental complexity, then it falls off (Schroder, Driver & Streufort, 1967). (A more complex decision contains more differentiation as well as more integration of decision elements. Decision integration is defined as a conceptual relationship between different kinds of decisions made at different points in time. Differentiation is defined in terms of the number of independent concepts or categories used by a decision maker. Integration refers to the relationships among these differentiated categories. The number of independent decision categories used is an index of differentiation). How much complexity in decision-making occurs will depend on the experience of the decision-makers. For some, the environment may be too simple or too complex.

"...the systems differ not only in information-processing capacities, but also in motivation for a

particular amount of input complexity." (Driver & Streufert, 1969, p. 277)

But while experimental evidence was found by Streufert (1970) that increases in environmental complexity produce increasing and then decreasing integration, as environmental complexity increased, differentiation increased and then remained constant.

Consequences of Failure to Adapt. A basic tenet of behavioral analyses is that organizations adapt to their environments. Central to this is organizational coping with environmental uncertainty and instability (Crozier, 1964). Duncan (1972) studied twenty-two decision groups in three manufacturing and three research and development organizations and showed that the groups modified their approach to routine and non-routine decision-making depending on how much influence they perceived they had over their environment and how much uncertainty they perceived in the environment. However, in a laboratory study by Leblebici (1975) simulating bank loan decisions, although the external environment affected perceived uncertainty levels, the latter had little influence on decision-making strategies.

Firms ignore their environments at their own peril. The effects can be serious, sometimes fatal. Dunbar and Goldberg (1978) examined 20 mismanagement cases revealing that external market factors contributed to crises in many of the firms. But even more important was management's lack of appreciation of the changing market conditions. Centralised decision-making, unwarranted expansion of production facilities, marketing strategies aimed at achieving sales at any cost, and the rejection of feedback all contributed to the firm's difficulties. In addition, headquarter staffs, who relied on budget comparisons rather than local knowledge, most often halted promising

efforts by local managers to turn around subsidiaries in trouble.

By examining court decisions of the U.S. Supreme Court and lower courts, Allen (1966) demonstrated that current standard organizational decision rules impose constraints on organization decision makers, even when relevant environmental conditions have changed so much that the expectations of use of a standard decision rule no longer exists. Support was found for Cyert and March's (1963) explanation of this phenomenon. The organizational decision maker avoids uncertainty by using standard decision rules whenever possible. The rules are maintained. Only under duress would they be redesigned. Even when the environment changes suddenly, the firm is likely to be relatively slow in adjusting. It will still usually attempt to use its existing model of the world to deal with the changed conditions.

Boundary Spanners. The extraorganizational environment outside the control of the organization becomes a crucial problem for those organizational decision-makers at the edges of the organization--boundary spanners. Their jobs can be standardized to the extent the environment is stable and homogeneous. Or their decision-making can be routinized in more unstable conditions by special structuring of how to deal with various contingencies. Faced with a heterogeneous, shifting task environment at its periphery, an organization may create specialized structures to deal with its environmental contingencies. In doing so, it removes the need for much decision-making discretion by its individual boundary-spanning job occupants. Contingencies, thus, are dealt with by specialized units or by giving individual decision-makers discretion to do so (Thompson, 1967).

A current example of how organizational decision-making is shaped by

extraorganizational constraints imposed by national and cultural factors is seen in the evidently greater long-range, broader, strategic focus of Japanese firms in contrast to more often observed tactical single-option planning by firms in the United States (Kantrow, 1980). The Japanese, for instance, use multiyear market penetration plans. Financing is through massive debt/equity arrangements operating with only "understandings" as to timing and regularity of interest payments. In the United States, what is required is subordinated income debentures with income contingency provisions (Stanley, 1981) clearly setting out the schedule of fixed payments of principle and interest unrelated to the firm's performance.

Organizational Goals as Constraints

As noted earlier, Simon (1964) argued that many, if not most constraints on organizational decisions that define what actions will be satisfactory are associated with an organizational goal. These goal requirements relate only indirectly to the personal motives of the individual who assumes that role. Organization goals refer to constraints imposed by the organizational role, not to the personal motives of the decision makers.

The organizational decision-making system, is likely to contain constraints that

"reflect virtually all the inducements and contributions important to various classes of participants. These constraints tend to remove from consideration possible courses of action that are inimical to survival. They do not, of course, by themselves, often fully determine the course of action." (Simon, 1964, p. 22)

Assuming the organization is a hierarchy, organizational goals refer particularly to the constraints sets and criteria of search that define roles at

the upper levels.

"Thus it is reasonable to speak of conservation of forests resources as a principal goal of the U.S. Forest Service, or reducing fire losses as a principal goal of a city fire department. For high-level executives in these organizations will seek out and support actions that advance these goals, and subordinate employees will do the same or will at least tailor their choices to constraints established by the higher echelons with this end in view." (Simon, 1964, p. 21)

Given the decentralization of decision-making typical of the large modern organization, constraints are likely to differ for different positions and specializations. While profit would enter directly as a goal or constraint for the corporate head,⁴ at lower levels, it might be meaningless for understanding the local decision-process. Profit will also be a distant or indirect constraint. Thus,

"the decision-making mechanism is a loosely coupled system in which the profit constraint is only one among a number of constraints and enters into most subsystems only in indirect ways. ...most business firms (are) directed toward profit making...operating through a network of decision-making processes that introduces many gross approximations into the search for profitable courses of action. ...(This) goal ascription does not imply that any employee is motivated by the firm's profit goal, although some may be.

"...In actual organizational practice, no one attempts to find an optimal solution for the whole problem (such as a system for controlling inventory and production). Instead, various particular decisions, ...are made by specialized members or units of the organization. In making these particular decisions, ...(they) find a "satisfactory" solution for one or more subproblems, where some of the effects of the solution on other parts of the system are incorporated in the definition of "satisfactory." (Simon, 1964, pp. 21-22).

For example, a production head may face cost overruns. His operations may fail to meet standard costs constraints. In the search for lower costs,

he may discover that longer production runs will solve his problem. But this will reduce the ability of the sales department to meet special customer requirements, constraints introduced by the sales department's goals. Attachment to designated objectives is strongly associated with one's unit identification and one's consequent definition of one's task environment (Alexis & Wilson, 1967).

For the better structured problems, Benson, Coe & Klasson (1975) proposed an algorithm to take advantage of the symmetry between constraints and goal criteria. They use satisfactory goals to form constraints from criteria, confining solutions to those that can be exercised through constraints. In this algorithm, decision makers react to trade-off information either by specifying altered goals or selecting different criteria as an objective function.

Tasks and Technology as Constraints

The organization is not merely a passive reactor to its environment. It determines what goods and services it will offer to what part of a larger segment of the total environment. A university's domain, for example, is the role the university claims as its unique task, the kind of student it tries to serve, the particular curricula and community services it designs, and how it differs from competitors in its offerings (Baldrige, 1971). Convenience food establishments define their own domains in terms of the market segment to which they appeal and the quality of service they try to offer. Some emphasize speed, self-service and simplicity for families in a hurry; others stress table service, larger menus and quality for adults. The former can organize assembly-line service with employees requiring

minimum training assigned to highly specified jobs. Rapid turnover is the rule. The latter need to pay more attention to employee training and attitudes.

The decision process clearly depends on the task it is intended to perform; the purpose it is to serve. Likewise, decisions processes may be affected by or may be about the technology employed by the organization. The organization houses the technology which poses contingencies and constraints on organizational actions. The organization's available technology can determine what is possible in problem delineation, search and choice (Ebert & Mitchell, 1975). "...organizations seek to adjust to the demands of their technological core to permit economic and efficient coordination and scheduling of interdependent parts" (Filley, House & Kerr, 1976, 293).

Thompson (1967) conceptualized technologies as long-linked, mediating, or intensive. Mass production operations are long-linked. The subunits are severally interdependent. The mediating technology is one which links, for example, buyers and sellers, as does a securities exchange or real estate broker. The operations of the mediating technology are standardized to facilitate the matching of multiple clients distributed in time and space. The intensive technology is seen in customized techniques and services applied in varying combinations depending upon the state of the client. One hospital patient may require X-ray, then surgery; another may require laboratory tests and medicinal prescriptions.

Long-linked technology can remain more closed to the outside environment for longer periods of time through the use of inventories, for example, as buffers. But mediating and intensive technologies, more often dealing with services have less control over intrusions. Different types of uncertainty

are faced as a consequence of the different technologies. Single decisions can be more of a disaster in long-linked technology but greater need for flexibility is required for mediating and intensive technologies.

Evidence. Woodward's (1965) study of 100 English manufacturing establishments concluded that the differences in technology—continuous, mass, batch or continuous production—strongly affected decision processes within the firm. In continuous processing, say in a petrochemical refinery, decisions were usually to introduce or change policies of lengthy consequence. They were made in consultation with committees of specialists. At the other extreme, decisions in custom production had no policy implications and set no precedents and were usually directed from the top.

Khandwalla (1974), used a continuum from long-linked to intensive technology for manufacturing firms, from mass-output orientation (continuous or mass production) to batch and custom processes to study 79 manufacturing firms. With more mass output, more buffering and insulation from the environment was seen needed and provided. Vertical integration is one way of achieving such security; the firm gains control over its sources of supply, for example. In turn, this leads to more need for decentralized top level decision-making as more diverse units must be managed along with more sophisticated controls and coordination efforts.

In several laboratory experiments, Mackenzie (1975) illustrated the importance of the technological imperative. Five-person groups each carried out one of two types of tasks. One task required only the strict application of a set of rules in proper sequence of deductions. The other task required the generation of all combinations of a set of elements. These combinations could not be deduced but has to be inferred. Groups

performing the deductive task were much more likely to develop a centralized communication pattern than groups performing the inferential task. That is, with the deductive tasks a single member, could serve as the center of communications for exchange of all messages. But to generate all possible solutions, the inferential tasks required more participation of all members, and therefore less centralization of decision-making.

More will be said later about how centralized structures as such in contrast to decentralized organizational structures affect organizational decision-making.

Combination and Change in Technology. The mix of technologies found within an organization will be important to consider. Most will involve a combination of long-linked mediating and intensive technologies. As these combinations of technologies increase the organization must balance capacities among them. In addition, organizations facing dynamic technologies are likely to experience more frequent changes in organizational goals (Thompson, 1967).

The degree of mix and stability of the technologies suggest that different skills and orientations are needed by decision-makers responsible for the organization's technology. "The individual characteristics required to cope with the shifts in organizational goals that accompany dynamic technologies seem to differ from those necessary for stable technologies." (Ebert & Mitchell, 1975, p. 43.)

Management's Role. Thompson (1967) further argued that the management facilitates technological performance by buffering unpredictable disturbances to the technological core, or by providing a structure that can react to demands from the technological core. Management mediates between the

environment and the technology of the organization. Management helps find ways of accomodationg customers by getting modifications in the organization's technology or getting customers to adapt their demands to what is technically available. Those taking the position that the technological imperative is all-important see that the appropriate span of control, number of organizational levels, and degree of formalization, standardization, and specialization are all to a significant extent determined by the technology of the organization (Filley, House & Kerr, 1976).

Differentiation in the Cascading Process. Decision units in different locations in the hierarchy may value the same task requirements differently, even though the tasks may clearly be specified in organizational manuals. As a decision process cascades downward in the organization, each decision unit will interpret the relevant information about it in terms of its own information needs (Alexis and Wilson, 1967). (This is an illustration of March and Simon's (1958) uncertainty absorption.) What may be optimal for one decision unit following the same organizational decision tasks may be sub-optimal for another unit. Each unit's localized conditions will differentially affect its own problem delineation, search and choices. For example, departments will perceive the situation differently and react differently if their firm initiates a 10 percent across-the-board cut in budgets. An old established department with entrenched bureaucratic subunits may be unable to do anything but pass on the 10 percent reduction to its subunits equally across-the-board. Another department may see the cut as an opportunity to eliminate unprofitable subunits. It may eliminate some subunits while maintaining others at full-strength or even expanding some to achieve a

totally more profitable outcome for the department as a whole.

ORGANIZATIONAL STRUCTURAL CONSTRAINTS

It is obvious that the organizational structure in which the decision-making occurs is likely to affect the decision process. Organizations seem to be characterized by an action versus contemplation dimension. Some have the structures to act quickly upon judgments; others are so structured that they most often lose opportunities to act (Katz & Kahn, 1966). The City of Pittsburgh began its first study for a mass transit rail system in 1918 and periodically engaged in such studies in every decade while many other cities built and abandoned mass transit systems between 1920 and 1950.

Tannenbaum (1950) noted the importance that must be attached to the decision maker's sphere of discretion. The decision maker is limited by the structure and authority relationships unique to his or her organization. Such constraints form an important part of the decision environment for each organizational position. Katz and Kahn (1977) elaborated:

"The organizational context is by definition a set of restrictions for focusing attention upon certain content areas and for narrowing the cognitive style to certain types of procedures. This is the inherent constraint. To call a social structure organized means that the degrees of freedom in the situation have been limited". (p. 277)

Alexis and Wilson (1967) suggested that the organization impacts on the individual decision-maker and channels person-centered behavior toward organization-defined ends by means of the whole collection of experiences and expectations developing out of recurring and nonrecurring situations that form the premises for the individual's decisions.

The organization tries to implant dominating premises to control

and regulate the behavior of its members (Simon, 1960). Organizational structures provide status systems with defined roles. These become premises for individual decisions. The organization likewise provides experiences and information through training and communication. These, too, provide premises for decisions to influence individuals toward organizational goals.

Decision making styles depend on organizational constraints. Keller and Yukl (1969) found that leaders of student organizations engaged much more in joint decision-making than did senior business managers. The managers, in turn, were more likely than student leaders to practice delegation of decision-making to subordinates. Kumar (1977) studied 40 decisions made in 10 hospitals in each of four different organizational contexts. The centralization of influence in decision-making decreased with the increase in technical uncertainty and organizational complexity of the decision-context. This was due to the need in this context for decision information sharing, power sharing, and risk sharing. The absolute influence exerted in a given organizational context increased with the increase in technical uncertainty, organizational complexity, technical obstacles and individual resistance to change.

Multiple Impact

Embedded in an organization, the individual decision-maker is buffeted by demands and influences from a variety of divergent sources within the larger organization. The managerial decision-maker is affected by a number of potentially conflicting standards and evaluated by them (Sayles, 1964). For example, Hegarty & Sims (1979) examined

unethical decision behavior under different simulated organizational conditions. In a laboratory simulation of a marketing decision, 165 graduate business students made a series of decisions on whether to pay a kickback or not. When students were given a letter from the corporate president supporting ethical behavior, their ethical behavior was higher than for those who received a letter that did not support ethical behavior. While profit goals did not influence ethical behavior, an organizational ethics policy significantly reduced unethical decision behavior.

Organizational Structure

The required matching of organizational structure to the demands of the organization's task environment to maximize the organization's effectiveness (Ashby, 1964) also is true about each decision unit within the organization and its operations. The decision unit's structure determines the effectiveness of the decision unit's information processing potential (Duncan, 1972).

Organizations are faced with the dilemma of being both flexible in order to maintain the appropriate match with the shifting environment, yet the organization must be sufficiently reliable to provide the necessary predictabilities to keep it from becoming unorganized chaos. Often, the process of developing stability in organizational functioning prevents the system from having the flexibility to adapt when situations change (Merton, 1940). Weick (1969) suggests that the organization can solve this stability-flexibility **dilemma**, alternating between flexibility and stability in its structuring of activities and simultaneously expressing these two forms in different parts of the organization. Thus, Duncan (1972)

proposed and found some empirical support for such ability to so alternate. When routine decisions were involved, decision units were highly structured (hierarchical, impersonal, non-participative, governed by specified rules and procedures and with labor divided). With less routine decisions, the same units operated with less structure.

Forms of Organization Formal organizations may range in type from the traditional pyramidal hierarchy to the flattened federation of semi-autonomous departments. They may be organized around function or project and may vary in size, shape (tall or flat), and in centralization or decentralization. Clearly, these organizational variations will systematically constrain the decision processes within the organization.

Organizing takes place around function, product, project, geography or combinations of these. The structures created to handle decision processes depend on the goals of the organization, its technology, and its environment as well as history, culture, custom and precedent (Murdia, 1978). Emergency decision-making is facilitated by a clear, hierarchical, machine-modeled, chain-of-command; routine decision-making, by functional organizations; ill-structured problems, by project teams; flexibility, by matrix organizations; and shared participation in decision-making by the lynch-pin plan.

Functional organizations are most typical. They are structurally defined by means-end analysis. The members are grouped by the function they perform: Production, marketing, purchasing, etc. In the functional organization, all unit heads dealing with a function, say manufacturing, report to successively higher heads of manufacturing. At the top there are parallel heads for other functions such as marketing and employee relations. In the

product organization, a miniature organization for all functions is repeated for each product line of the larger organization. Replications in different geographical locations, functionally or by product, may also occur as organizations enlarge.

The functional organization appears to be most appropriate for carrying out routine, repetitive work. Differentiation in goal orientation is possible. The functional structure also permits a degree of integration sufficient to get the organization's work done. Much of this can be accomplished through paperwork and through the hardware of production. Conflict that comes up can more safely be dealt with through the management hierarchy, since the difficulties of resolving conflict are less acute. This is so because the tasks provide less opportunity for conflict and because the specialists have less differentiated viewpoints to overcome. This form of organization is less psychologically demanding for the individuals involved (Walker & Horsch, 1968).

The project organization is composed of temporary work groups brought together to accomplish a specific purpose, usually for a few months to a few years. It is disbanded when the project is completed. Studies of high-technology programs have demonstrated that functional organizations, where expertise in specific areas can be maintained, achieve greater technical superiority of output. But project organizations can meet tighter time and cost schedules (Marquis, 1969).

Walker and Lorsch (1968) suggest that if the task is problem-solving, the product organization seems to be appropriate, particularly where there is a need for tight integration among specialists. The product organization form allows the greater differentiation in time

orientation and structure that specialists need to attack problems. Identifying with a product under a single head encourages employees to communicate openly with each other and to deal constructively with conflict.

In the matrix organization, personnel are permanently housed in functional units where they tend to interact with peers having similar skills. But simultaneously, they are temporarily assigned to projects where the budget and schedule are controlled by the project manager. The matrix organization, combining functional and project attachments for its members, creates problems of dual allegiance to home department versus project team. However, it is seen to foster more flexibility, better control of projects, lower costs, better customer relations, and shorter development time (Middleton, 1967). Decision-making processes in the matrix organization are likely to enhance influence associated with specialized information, informal leadership abilities, and knowledge of how to integrate lateral processes (Knight, 1976).

Likert (1967) introduced a modified hierarchy in which each unit head was also to operate as a member of a group of all his or her peers and their head--the overlapping groups or linch-pin organization. This was to facilitate vertical communication and wider participation in decision-making. Healey (1972) contrasted in a laboratory experiment, an organization with a linch-pin structure and an organization with the more classical line-staff bureaucratic structure to see which would make better non-programmed decisions. Initial levels of performance and rates of improvement failed to differ systematically but lower level personnel in simulations of the traditional hierarchies were less satisfied with the decision-making processes than those with linch-pin structures but the top levels in traditional hierarchies

were more satisfied with the decision-making processes than their counterparts in the linch-pin structures. However, Likert's numerous field studies (Bass, 1981) provide considerable evidence of the efficacy of the shift of organizations toward the linch-pin arrangement.

Rice and Bishoprick (1971) examined other variations from the typical, pyramidal hierarchy. The egalitarian model is based on the voluntary cooperation of the organization's members. Military expeditions of mercenaries who elect their captains, and participate for a share of the spoils, are illustrative. So are the typical voluntary fraternal and professional organizations. Despite the theoretical equality of membership, most of the decision-making is concentrated in the hands of the small, most active, executive committee and the officers at the top.

Federations of autonomous units usually engaged in diverse specializations are illustrated by the business conglomerates with individual profit centers. Management puts the federation together, supplies the units with information and monitors performance. But most operational decisions take place within the units.

Then there is the collegial organization of faculty and administrators. Ideally, technical decisions mainly takes place within the units of independent, egalitarian, faculty specialists, limited to their areas of expertise. Housekeeping and support functions lie with the administration which is likely to be organized in a traditional hierarchy. Coordination of decision-making is achieved through committees, review boards, administration, dogma and tradition. Helsabeck (1971) interviewed administrators, faculty members and students at six small liberal arts colleges about the effectiveness of decision-making at the institutions. He concluded that effectiveness would be increased

if an overall highly participative community senate was responsible for the allocation of resources and authority. But, separate smaller decision-making groups were seen as best to deal with decisions requiring special expertise and little spillover to other groups.

Dual hierarchies of technical and commercial direction are standard in German firms. This increases considerably concern for **technical quality** at the highest organizational level along with commercial concerns. The Spanish Colonial Empire made use of a church hierarchy paralleling the civilian and military. The redundancy, although generating conflict at lower levels, increased the reliability of the upward flow of information to the top.

Role Expectations as Constraints

Different organizational structures constrain unit or member decision-making in different ways primarily by the role expectations they establish for their members.

"Under autocracy, roles are defined by the superior, and the superior directs the activities of the subordinate. ...there are only two roles. The first is a universally capable subordinate, who can do any job assigned to him, if he has the proper direction. The second is a universally capable superior, who can direct the activities of any subordinate on any job that needs to be done. All wisdom, analytic skill, and knowledge are concentrated in the person of the superior. The model is work-oriented, and socio-emotional considerations are ignored ..."

...In a bureaucracy, role expectations are ... embodied in a set of rules, job descriptions, and policies which are then interpreted by the role incumbent. This puts more discretion with the subordinate, and makes the superior more of a planner-judge than a director of operations. It greatly increases the superior's scope, at the expense of his direct control over role performance." (Rice & Bishoprick, 1971, p. 203)

In a systems view of organizations, responsibilities for decision-making may arise from the demands of one's own job; and from the need to accommodate the interests of superior, peers, subordinates, clients, and regulatory agencies. Some responsibilities are established by policy, others by precedence, custom or contract with union or government.

In collegial organizations, decision-making is dominated by professionalism. The administrative superior, ideally,

"is completely removed from the direction of the professional's job performance, and confines his attention to problems of maintaining the professional's work environment and to utilizing his output. The superior consults the professional as a client, rather than as a work director, and because the professional's role is so well defined, the superior can be confident of the incumbent's behavior." (Rice & Bishoprick, 1971, p. 204)

Bureaucratization

Organizations vary in the degree of their formality and governance by rules. The bureaucracy is at one extreme, the informal organization at the other. The rational-legal structure of bureaucracy is characterized by a continuous organization of functions bound by rules. New solutions are not required for each situation. Clients are served in a standardized way. As long as a situation remains stable, bureaucratic decision-making suffices. When a situation becomes unstable, more flexibility is required. Thus, in a study of the decision about continuing the Reserve Officers Training Corps at Stanford University, Benner (1974) examined documents, interviewed personnel, and observed events as they occurred. He concluded that when the issue moves from stable to dynamic, decision making changes from bureaucratic to political.

Each role in a bureaucracy covers a specified sphere of competence, obligations, authority and responsibility. Decisions of labor and hierarchical control are observed. Ostensibly, bureaucrats fill a position based on their training and knowledge of the technical rules and norms. Authority is given to match merit or skill. Skill includes ability to deal with technical and ritualistic requirements along with an appropriate set of values (Weber, 1947).

Bureaucracies, with their characteristic formalism, hierarchy, specialization, rules, impersonal relationships, unity of command, limited spans of control, and delegation of routine matters, provides the formal framework for routine decision making by establishing (1) a common set of presuppositions and expectations, (2) subgoals to serve as criteria of choice, and (3) intelligence responsibilities in particular organizational units (Simon, 1960). Nevertheless, although the bureaucracy's officials seek to attain their goals rationally, they have distinct sets of self-interests in power, income, prestige, security, convenience, loyalty, pride in work and desire to serve the public. They can be typed as climbers, conservers, zealots, advocates, or statesmen. Selective recruitment, indoctrination, and ideology, influence goal consensus in decision-making (Downs, 1966).

As a bureaucracy demands increasing reliability of behavior from its members, personal relationships are reduced, the rules of the organization are internalized by its members and there is an increase in restricted categorization for decision-making (Merton, 1936, 1940). That is, each problem is examined in terms of a small number of categories: the first

applicable one is chosen. Search is reduced by the restricted categorization. But along with the intended emphasis on reliability and defensibility of individual decision-making comes unintended behavioral rigidity, defense of status, difficulty with clients and felt need for defending individual actions. Behavior becomes patterned (March & Simon, 1958). Patterned behavior denies innovative, spontaneous or opportunistic decision-making.

Specialization promotes compartmentalization. The same exact water resources problem is diagnosed differently by bureaucrats in the offices of engineering, economics, and social sciences of the same larger bureaucracy. The goal of optimizing use of the available water is further displaced by personal interests and sets of traditions, whose maintenance become ends in themselves. Displacement also occurs since job performance of incumbents is evaluated by their success in abiding by the rules, not in achieving the functional purposes for which the organization was established.

Informal relations are discouraged making the bureaucracy unable to deal with unforeseen problems and the socioemotional needs of its members. (Rice & Bishoprick, 1971)

Yet, bureaucratic (rational-legal) decision-making, is likely to be more effective than allocating decision-making informally to specific individuals because they happened to be the most powerful, esteemed, liked, or valued members of the group (Price, 1968). This is seen in street-corner gangs, for example (Caplow & McGee, 1958). Where all members of a decision-making group are of equal status (power of position) as in an initially leaderless discussion, emergence as the leader is a struggle for the temporary position and is associated with personal ability, esteem

and likeability (Bass, 1960). Such conflict is avoided or regulated in a bureaucracy where decision-making is allocated to roles rather than individual persons.

Moreover, for the larger organization, the rational-legal bureaucratic style is preferred to authoritarian rule-by-person. In such rule-by-person, decision-making power is lodged in "founding fathers", esteemed leaders, or individual entrepreneurs. Subordinates are subject to the whim of superiors. Expectations are more easily isolated. Instability is more common although such organizations are able to change more quickly.

Otton and Teulings (1970) found in studying the succession of 34 department heads, that if there was more bureaucratization in a department, there was less likelihood of selecting a "strong" decision-maker for successor as department head. But if the successors were outsiders formerly or were **strong leaders**, a rebureaucratization process was likely to be initiated by them. (This fits the general proposition that groups lacking structure to complete tasks find structuring leaders more effective).

Centralization vs. Decentralization.

Organizations vary in the degree to which they are centralized or decentralized in decision-making. Centralization is greatest when all the decisions are made by a single person in the organization. Centralization is least when each individual unit in the organization shares equally in the making of decisions or makes decisions autonomously. Most organizations lie somewhere inbetween (Baum, 1961). Decentralization makes possible coordination among activities with less restrictiveness on the executives involved. Decentralized executives seem to spend less time altogether transmitting or

giving orders and decisions (Ebert & Mitchell, 1975).

With decentralization, responsibilities and expectations are a compromise between the requirements of central authority and the demands of local conditions. Host country nationals who work for multinational firms for instance, must be versatile and creative in compromise decisions where conflict emerges between parent international company and local institutions. Autonomy frees individual decision-making units to pursue some local goals and still cooperate with other units. The organizational benefits in innovation and creativity.

Training opportunities are provided for future top corporate managers with decentralization by giving them increased responsibility and experience in decision-making at lower decentralized levels. Also, top management does not have to deal with many smaller problems costly in use of its time. The large but decentralized organization can work well if objectives are shared and self-discipline is present. Top management can concentrate on goals and strategic decisions; lower levels of management, on operational decision-making. Top management is consultative, coordinating and supporting allowing subordinate executives to pursue self-defined objectives consistent with the larger organizational goals (Rice & Bishoprick, 1971).

Using a computer simulation, Taylor (1976) did find that, as expected, decentralization promoted innovation. And, according to a study of South African and U. S. firms, decentralized decision-making with its greater flexibility of response was more effective for those firms facing a highly competitive environment (Corpen, 1978). But Indek (1965) failed to observe the expected relationship.

Centralized decision making requires that the decision making unit

have the information necessary to make the decision, information available at the lower levels. The cost of sending adequate and accurate information to a central place in both time and money must be weighed against the possible loss of control and coordination when lower level personnel make the decisions.

Centralized decision-making is likely to be found when the organization is owned by a parent organization or higher authority. Such was the case in manufacturing for 116 British, 21 U. S. and 24 Canadian firms as well as for a number of British service organizations. Howes (1963) looked at the effects of centralized decision-making in the Cooperative Extension Services of 13 states composed of land-grant institutions at the center of the extension service and county agencies at the periphery. Centralized decision-making was more common if funds were centralized at the land-grant institutions. But where decision-making was more decentralized, the director could spend more time on public relations and less on internal organizational matters. Staff turnover was less under decentralization but there was less agreement about objectives between field staffs and supervisors.

General Motors has long been touted as the epitome of a large decentralized organization (Drucker, 1946; Sloan, 1965). But more careful scrutiny reveals that increasingly over time decision-making was moved to corporate headquarters and away from the divisions.

...decisions as trivial as leg room, and as important as basic styling, body design, advertising, pricing, capital investment, pollution control, and scheduling in factories that assemble cars for several divisions, are not in the division manager's hands. They are made at the top. The division manager is not thereby reduced to the status of a clerk; in an enterprise as large as, say, the Chevrolet division, he has a great deal to do, and the decisions he makes are important ones indeed. But he is not influencing the goals of

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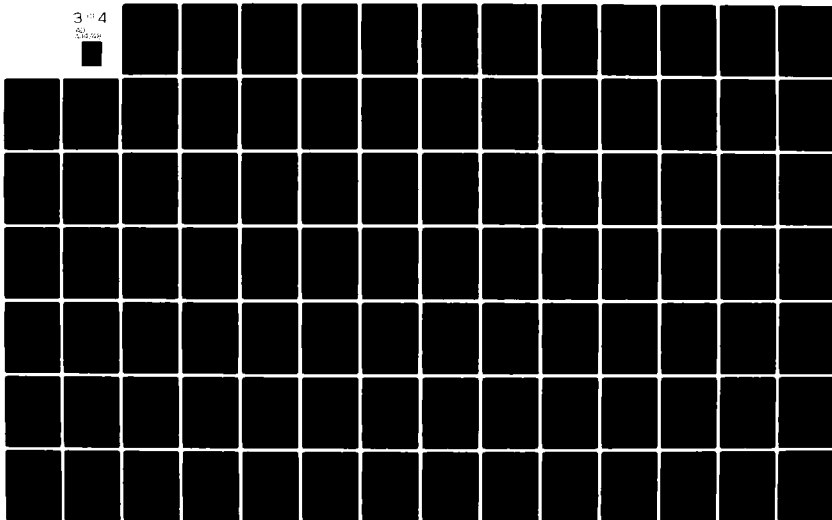
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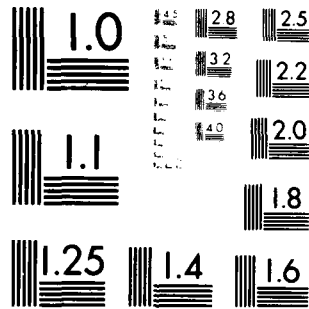
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the organization in any very meaningful sense. General Motors is a highly centralized organization; it just happens to be big and produce a variety of cars, weapons, trucks, locomotives, and so on, so that the density of decision making is correspondingly greater" (Perrow, 1972, pp. 172-173).

Part of the problem may lie in the difficulty in accurately assessing whether an organization really is or is not decentralized. It may be for some types of decisions, say about marketing, but not about others such as finance. For example, international firms must depend heavily on local country advertising specialists rather than attempt to dictate advertising copy from parent headquarters. But, at the same time, they may impose highly centralized production methods everywhere within the multinational organization. Bylsma (1969) found that the introduction of collective bargaining decentralized decision-making in the six Michigan community colleges but only for some problem areas such as salaries, class size, academic calendar, continuing contract, work load and time assignment. Other aspects of academic governance such as academic programs remained centralized.

Controls

In some organizations, constraints that automatically trigger decision-making are seen in the type and amount of controls imposed by policy, rules, norms and sanctions. Here, organizational decision-making can become automatic. Two types of automatic control systems are feedforward and feedback. In feedforward control, deviations or variances from standards are predicted. Then, actions are taken in advance to compensate for anticipated deviations. In the more familiar feedback control, an observed deviation, discrepancy or variance is used to correct the on-going system. Both types of control

are shown in Figure 5.

Figure 5 about here

As sales volume rises or falls, feedforward control can be used to make adjustments in advance of inventories, production volume, purchase schedules, and employment. Adjustments can be made based on sales forecasts to maintain a predetermined relationship of costs and activities to income. Staffing can be based on new sales orders. But strong, well-defined, highly predictable relationships are required for depending on such feedforward controls (Filley, House & Kerr, 1976).

Among its many uses, feedback is employed to control production quality. Finished goods are sampled by inspectors who compare them against predetermined standards. If deviations are observed, directions are sent to the operators to adjust the production methods to correct the deviations. With extreme deviations, new plans of production may be required.

Feedback must rely upon error as the basis for correction and only begins after an error has taken place. Because there is a time lag between a deviation from standard and the consequent corrective action, actual performance fluctuates around the standard. Feedback speed becomes important.

Unobstrusive Controls. The organization does not control decision-making processes as much as the premises upon which the decisions are founded. These premises include the vocabulary that will be used and the preference ordering of goals likely to arise out of negotiations among the subunits of the organization (Simon, 1960).

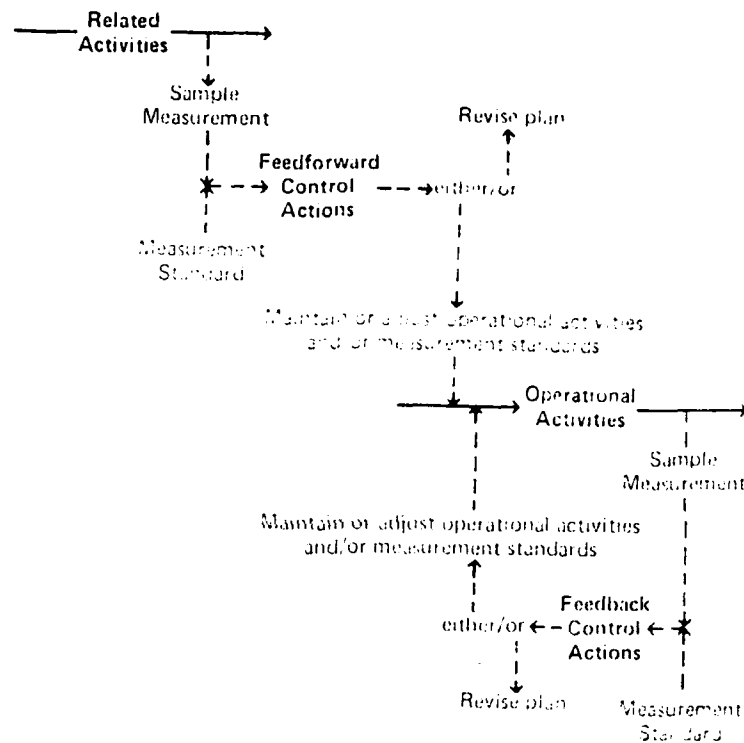


Figure 5. Feedforward and Feedback Control.

(From Filley, House & Kerr, 1976, p. 444)

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Perrow (1972) provided an insightful understanding, following March and Simon (1958), of how organizational decision-making for less well structured, non-routine problems is shaped by a complex set of mechanisms rather than merely a set of specified rules, as suggested by conventional wisdom. These mechanisms unobtrusively control the premises upon which the decisions are made. The general argument is that the individual within the organization does not make decisions based on the prescribed rules for the unit nor are the decisions based on selfless professional judgments. Rather various mechanisms such as uncertainty absorption, organizational vocabularies, available communication channels, and interdependencies of units and programs, affect organizational behavior by limiting information content and flow, thus controlling the premises available for decisions. Also these mechanisms set up expectations which focus on only some aspects of the situation. This further limits the search for alternatives. They indicate the threshold levels as to when a discrepancy requires decision making thus promoting satisficing rather than optimizing behavior (Perrow, 1972).

Formalism As A Constraint

The attention to the formalities of the decision-making process are of considerable consequence. Making convincing presentations to management committees is one requirement for the successful executive or sales representative. In France, in particular, "the fetish for an elegant irreproachable presentation is such at ... 'when a problem is well presented the solution is adopted even if the solution is not as good as the presentation'". (DeGramont, 1969, p. 446-447) Whether "due process" has been observed in the events leading up to a decision will determine the acceptance or rejection

of a decision and the legitimacy of actions based on it. Due process is based on custom, on organizational charter and constitution, on contract and on the laws of the land. Organizations with grievance procedures for employees to follow and collegial organizations, for instance, attach great importance to due process as the means for ensuring the fairness with which decisions will be made.

Degree of Formalization

With extreme formalization in the organization, as a whole, comes an inability of the organization to deal with its socio-emotional problems, particularly in a rapidly changing environment. This was seen in a survey by Gebert (1977) of 600 managers from 30 West German firms. Again, Delaney (1978) observed that organizations more oriented towards form than towards purposes, needs and capabilities were more likely to adhere to established routines and procedures.

Highly formalized organizations are likely to be relatively inefficient. However, Paulson, (1974) found in data from 135 health and welfare organizations, that formalization coupled with decentralization, did tend to produce more effective bureaucracies, although not necessarily more efficient ones when costs of effectiveness were considered.

Dealing with ambiguity is a key to effective decision-making relationships in highly formalized structures because of the opportunities it offers calculating actors dealing with reciprocity, authority, and jurisdictional relationships (Lerner, 1978). Promotion comes more readily to the individual who can distinguish between form and substance, and favors form over substance (Delaney, 1978). (This makes particular sense in the Japanese

scheme of things where individual behavior following an agreement is more important than what is written in the agreement.)

Much of the impact of the formal structure is conditioned by how much organizational change is underway. Particularly affected are the middle managers involved in the direction, rate and consequences of such change (Billings, 1974).

THE IMMEDIATE GROUP AS A CONSTRAINT

The small group within the organization plays an important role in the decision process. Top management, as a whole, is seen to operate like a small, informal, group (Glickman, Hahn, Fleishman & Baxter, 1969). At lower levels, individual decision-makers are likely to be strongly constrained by the norms and aims of the close associates that make up their immediate group, particularly if the group is highly cohesive. Fortunately, a vast literature is already available on small group decision-making (See McGrath & Altman, 1966, for example). More specifically, how individual preferences combine to form the final group decisions is the subject of a variety of lines of investigation. Davis (1973), for instance, has provided a model which builds probability distributions for the group from those of its individual members.

Generally, groups facilitate rather than inhibit effective decision-making. A group decision will be better than that of its individual member working alone (Bass, 1960). Yet, whether committees facilitate or inhibit organizational decisions, according to Decker & Johnson (1976), depend upon their size, their chairperson and members, their working methods, and their secretarial assistance. Obviously, their official and

and unofficial raison d'êtres will also make a difference in whether and when they help or hinder organizational decision processes. Hobbs (1976) found it important to distinguish between two patterns emerging in the organizational roles of university committees: the deliberative, collective decision-making role of member-dominated committees and the one-person advisory role of chairperson-dominated committees.

Depending on the task, there is an optimum number ranging from one to many members for highest quality group decision-making. Each additional member adds helpful information as well as redundancy and increasing communication complexity. If all the required information to make the quality decision is available with one member alone, then adding members is inefficient. Only when added members add more information than complexity is quality promoted (Bass, 1960).

Bass, McGregor and Walters (1977) did find that foreign investment decisions of U. S. firms were judged more effective when made by task forces and Boards of Directors than by the president or individual executive. A survey of several thousand readers of the Harvard Business Review is generally supportive of the need for committees and their positive contributions to the organization (Tillman, 1960). Schoner, Rose & Hoyt (1974) compared the quality of decisions on three economic problems for individuals, two forms of real five-man groups, and three nominal or synthetic groups designed around specific decision rules. Both types of real groups outperformed individuals. That is, real group decisions were better than those of their average individual member. But as is usually the case, the real group decisions were inferior to those of the best member. Real groups with no previous experience with the problems made better decisions than did groups whose members had previously made individual decisions on the same

tasks. Presumably, in groups where members first decided for themselves, it was difficult to move the average member from his or her commitment towards the possibilities of a better group decision. The real groups also made decisions superior to the synthetic group in which a plurality could decide for the group.

Nevertheless, certain theorists such as Steiner (1972) have been able to identify group conditions in which instead of an "assembly bonus effect" from group effort, there are accumulated interferences resulting in losses rather than gains over individual performance. Such occurs in brainstorming for instance, where the individuals in nominal groups usually produce more quality and quantity of ideas that they do when assembled in real groups working together (Campbell, 1968). "Groupthink" in organizations has its costs. As Janis and Mann (1977) have documented, when faced with threats, groups of executives within the organization are likely to procrastinate, "pass the buck" and bolster each other's rationalizations. The defensive avoidance is maintained by the mutual support members give each other.

Group deliberations remain a fact of organizational life. What is needed is the education of its members as to the beneficial and deleterious constraints it imposes on their decision-making. This is particularly true for groups in which consensus, majority vote, or emerging decisions will be by a leader strongly influenced by consultation with the members such as is likely to occur among professionals expected to work on highly unstructured problems.

Types of Teams

Delbecq (1967) and Shull, Delbecq and Cummings (1970) identified four

types of teams of specialists and how their processes are dependent or independent of the larger organization. Important is whether the specialists are cosmopolitans or locals and whether the team task is repetitive or unique. Figure 6 displays four types of decision-making teams: routine, engineered, craft and heuristic.

Figure 6 about here

In the routine group of technical "locales" with repetitive tasks, the decision unit is a staff with an appointed leader. It is most system-oriented. The group concerns itself with specifying quantity and quality objectives, along with critical control points and sequencing. Economy and efficiency are sought by the group. Higher authority specifies objectives and clarifies contingencies. Control is by control points and individual responsibility.

In the engineer group, when tasks are nonrepetitive, but technical specialists are still required along with a designated project leader, the group process is characterized by control points, periodic review, and specific quantity and quality objectives. Yet there is more independent planning and individual responsibility still with strong emphasis on economy and efficiency. There is more negotiation with higher authority about the inputs and outputs of the project unit. Feedback mechanisms about the adequacy of performance are available.

In the craft group, the "tailor-made" definition and solution of problems reside with the group of skilled personnel. The task may still be somewhat repetitive. The decision team is more likely to engage in

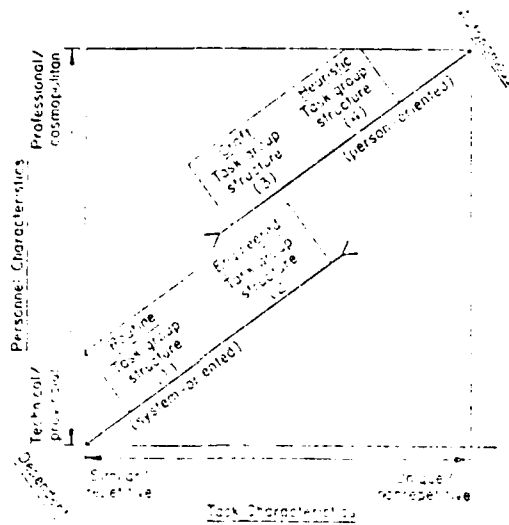


Figure 6 Structures of Organizational Units (Source: Staw, Dyer, and Cummings, 1973, p. 192)

independent action, diagnosis, and consultation with peer review. There will be consultations with higher authority for planning and control. Professionalism is the norm.

Finally, in the heuristic teams, faced with non-repetitive, ill-structured tasks, independent analysis and solution with full participation and majority rule (or consensus) is pursued by the team. It is most person-oriented. There is open support or disagreement. There is little time constraint. Creativity is sought. Higher authority seldom is involved in planning and control. These are usually accomplished by the group as a whole.

These idealized types of teams are thought to be the optimum matches for the four combinations of task demands and necessary personnel.

Effective group work is critical to the success of Likert's (1967) linch-pin organization. Moving traditional organizations towards the Likert Systems III or IV was seen to have long-term payoffs in 40 organizations involving over 200,000 employees. Kennedy (1966) sees the emergence of such a scheme for the California State College system. (For a review, see Bass, 1981, pp. 302-308).

The Risky Shift

Probably the most highly researched team effect on decision-making has been the risky shift, the tendency of individual members to accept more risk in some problem-solving situations when making the same decision as a group than when acting alone. Discussion and consensus increase the risky shift (Wallach & Kogan, 1965). The shift is increased when responsibility is felt to be diffused and one member can be blamed for failure (Kogan & Wallach, 1967).

The group makes possible the sharing of persuasive arguments not originally available to individuals alone and gives members more confidence about understanding the alternatives (Bateson, 1966). The risky shift is more pronounced when group members are not in competition with each other (Kogan & Carlson, 1967) and appears greater in more cohesive and in relatively larger groups (Teger & Pruitt, 1967). The shift may be due to the fact that the more assertive members also are greater risk takers and as a consequence influence the more cautious, passive, members to go along with them (Rim, 1966). It may be due to the greater felt security in the group setting in contrast to being alone.

THE INDIVIDUAL AS A CONSTRAINT

It is obvious that the decision process will be strongly affected by consistent personal differences in values, interests, competencies, personalities, premises, and cognitive and perceptual tendencies among the individuals responsible for the decisions at each stage of the decision process. Also affecting the decision process will be the values, premises, etc. which vary as a consequence of the individual decision-maker's role and position in his or her groups, organization and culture.

To understand the final decisions that emerge from an organization, it may be particularly necessary to determine the premises of the various individuals upon which the decisions are based (March & Simon, 1958). Individuals will differ in their valuing of the organization's goals, their own ideals, their perceptions of the discrepancies between desired and current states of affairs, what resources they think they have available, in what areas to search for alternatives, in their ability and willingness to

innovate, and in the weighting given to alternatives and in their optimism or pessimism in estimating risks. And these change with experiences, successes and failures.

Collins and Moore (1964) found in a study of 110 business firms that it was particularly important to distinguish between entrepreneurs and professional managers. The professional managers were more socially mobile and able to make decisions. They were more dedicated to their work, and adapted more easily to authority and interpersonal relations. The entrepreneurs were less sure of themselves, resisted authority and "wheeled and dealt" in their transactions.

Explicit Values and Premises

The solution to a promotion problem may be completely determined in advance by an implicit premise such as no one is promoted into top management in the firm unless he or she is a member of the owner's family. As Harrison (1981) observed, value judgments and premises may be quite explicit in every aspect of the organizational decision-making process.

- "1. In the setting of objectives, it is necessary to make value judgments about selecting opportunities and making necessary improvements within time and resource constraints.
2. In developing a range of relevant alternatives, it is essential to make value judgments about the various possibilities that have emerged from the search activity.
3. At the time of the choice itself, the values of the decision maker, as well as the ethical considerations of the moment, are significant factors in the process.
4. The timing and means for implementing the choice necessarily require value judgments, as well as an awareness of ethical interests.

5. Even in the follow-up and control stage of the decision-making process, value judgments are unavoidable in taking corrective action to ensure that the implemented choice has a result compatible with the original objective." (p. 64)

Implicit Values and Premises

But even more in need of understanding are the implicit values and premises of the individuals in the decision-making process for more often they remain unconscious below the threshold of awareness. Often goals are selected, gaps identified, searching conducted for alternatives and choices weighted and selected based on a complex set of implicit values that are unclear or unconscious to the decision-maker. No wonder much of the action takes place after-the-fact. "I decide, then I justify. My choice was value-driven, but I was not aware of this. Now that I made my choice, I need to find good reasons for it." To increase awareness of one's values in decision-making, Leys (1962) suggests that decision-makers first try to articulate for themselves a set of relevant but not necessarily completely controlling standards, tests, or criteria. These can be organized in an orderly manner. Pending decisions can be tested against them to increase the match between one's priorities in values and one's judgments.

Kast and Rosenzweig (1970) argue that the effective decision-maker must balance valuing harmony and order with valuing survival and effects on others, of maximum satisfaction and results (the "bottom line") with lawfulness, contrasts, and authorizations, of integrity and self-respect with loyalty, institutional and social demands. The decision-maker:

"...may have to compromise a particular norm or value in a given situation, but he can be reasonably comfortable if he recognizes that certain other values are enhanced by so doing. He must cope with pressures from individuals and/or groups from inside and outside the organization.

Formally and informally, various values are "pushed" at the decision maker, who either discards them or integrates them into his own value system. This is the "balancing act" performed in any judgmental decision process. On balance, what is most important? What tips the scale in this particular situation?

Decision makers in the real world cannot afford the luxury of deciding policy questions in general. This leads to all-encompassing values or standards which do not really apply in specific situations. The decision maker is better advised to develop a sense of the situation and deal with each problem on its own merits..." (p. 416).

A value dimension of particular importance to understanding organizational decision-making according to Katz and Kahn (1966) is the emphasis on ideology or power although they see few organizational leaders as pure ideologists or pure power-brokers. Most actually are likely to accept compromises to achieve power and to attain their ideological goals. On the one hand, President Reagan continued to espouse the conservative ideology of his supporters of the importance of national budget balancing. But at the same time he backed off originally-touted balanced budgets to compromise with economic, social and political considerations.

Systematic differences in values were seen when 245 professional planners and engineers were assessed by Kaufman (undated) in their willingness to permit public participation in selecting a road routing likely to have an effect on the local community. These assessments were found to be related to each individual's values. Public participation was favored by those higher in social and religious values and lower in economic values. At the same time, the professionals, as a whole, were much less concerned with noise and pollution than was the public.

Perceptual and Cognitive Biases

"To err is human". Understanding, predicting and controlling such error is a major aspect in the study of organizational decision processes in all its phases. Faced with real portending disaster, well-known are human propensities to misjudge real conditions in systematic ways as a consequence of perceptual distortions, motivation and habit. Systematic errors have been established in how we attribute causation of events which in turn has systematic consequences on organizational decision-making. For instance, a supervisor who attributes poor performance of a subordinate to dispositional tendencies such as lack of motivation will tend to be punitive. If the poor performance is attributed to situational factors such as luck or lack of training, the supervisor is likely to try to keep the subordinate (Green & Mitchell, 1979).

Feldman (1981) lists ten biases that have been found operating in causal attributions: (1) generally misunderstanding the importance of situational factors and overestimating the importance of individual traits ("He failed mainly because he is lazy"); (2) overly emphasizing situation as cause, if actors; overly emphasizing individual traits, if observers; (3) seeing only the most salient features of the environment as the causal factors; (4) seeing actions with sentimental or affective consequences to the observer as due to individual traits (she rejected me because she dislikes intellectuals); (5) seeing people as more responsible for serious acts than for trivial ones; (6) holding actors more responsible for acts leading to rewards than for acts preventing losses; (7) paying little attention to common behavior in judging a particular action; (8) using own behavior as a standard against which to judge others; (9) ending the search for

explanations with the first plausible one and (10) for liked people, attributing good actions to them rather than situation; for disliked people, attributing good actions to the situation; bad actions to them.

Statistical Sources of Individual Bias. Anchoring effects, failure to consider base rates, mistaken belief in the law of small numbers, and failure to consider the regression towards the mean, are just some of the statistical phenomena that result in systematic bias. Slovic, Fischhoff & Lichtenstein (1977) have listed the consistent biases uncovered in a variety of field studies. They noted, for example, consistent overconfidence in the probability assessments of military intelligence analysts. Likewise there was consistent underestimation by engineers of repair time for inoperative units. As noted elsewhere, Cyert, Simon & Trow (1956) showed that objectives motivate estimates. Students acting as sales managers underestimated costs and overestimated sales. As cost analysts they would do the reverse. More generally, Fischhoff (1976) observed that cost-benefit analysts and those engaged in risk assessments tend to ignore important consequences of possible outcomes reflecting their availability biases--constraints in thinking.

Other Errors. Numerous other examples of constraints in perceptual and cognitive processes were enumerated by Katz and Kahn (1966). These errors are both general as well as likely to differ from one individual to another; some persons suffering more than others in their distorted views of reality.

Individual decision-makers project their own particular values on others. For example, superiors will see their subordinates as committed to the organization's goals as the superiors are. Individual decision-makers will tend to err in oversimplification, and in global and undifferentiated

thinking. We see members of other groups as homogeneous. Particularly, if they are remote, we will fail to differentiate among individuals in the group. (All Chinese are seen to look and act alike).

We tend to view the world in opposing categories, in black or white, with no shades of grey possible. (You must be in one room or another, you cannot be lying across the threshold between the rooms, or standing with one foot in each).

We tend to respond in cognitive, near-sighted response to the immediate, the visible, the distinct, neglecting aspects of a problem or possibilities that are remote in time and place. We ignore what may be less overt, but more important. The executive attends to the most recent subordinate's complaints rather than to the larger organizational needs of more consequence. Oversimplified notions of cause-and-effect are still another source of error. We tend to accept the exciting event as the major cause. We see cause-effect in one direction, not allowing for interaction. Thus, managers are likely to interpret informal restrictions of production by workers as due to a few agitators, or due solely to fears of rate-busting when the restriction may be a complex compromise among workers, shop stewards and immediate supervision to meet management-set standards and worker needs. Again, a project's failure may be attributed to the personnel assigned to it rather than to the complex market changes that really lay behind the failure.

Additional individual constraints on effective decision-making and errorful premises, implicit or explicit, have been noted by Elbing (1970). These include the tendency to evaluate rather than investigate; the tendency to equate new with old experiences which may not be the same; the tendency to deal with problems superficially; the tendency to make decisions

based on a single goal; the tendency to confuse symptoms and causes; the tendency to accept an evaluation based on selected variables, (particularly if available numerically) rather than the fully relevant elements in the situation; and the tendency to make quick decisions rather than in-depth analysis of the problems. Individual differences in these tendencies can be seen as we look at the effects on decision-making of personality and competence.

Furthermore, performance in different phases of the decision-making process will depend on one's intelligence, skill, education, experience, sex and social status. But effectiveness in one phase does not guarantee effectiveness in another.

Personality and Competence.

Individuals differing in their personality, competence, and behavior, differ accordingly in dealing with different aspects of the organizational decision process. Some may be better at diagnosis; others, at searching for solutions. Thus, for instance, willingness to make difficult choices was found by Pollay (1970) to be associated with the achievement potential of decision-makers.

Individuals differ in their decision-making styles which in turn may result in organizational misunderstandings and mismatches between organizational needs and individual assignments. Individual decision-makers also vary in what information is to be accepted, what sequence of events must be followed, and how many errors subordinates will be permitted to make. They vary in what decision-making rules are made explicit or are never stated; in whether proposals are evaluated on the basis of their

intrinsic merit or their political acceptability. They vary in whether change is accomplished within the existing framework, or the rules of the "game" are changed, or an entirely different "game" is attempted. They vary in how much responsibility they delegate (Harrison, 1981).

Numerous studies attest to the extent a supervisor will be directive or participative in his or her decision-making style as a function of his or her personality. Direction seems to be mainly a matter of one's authoritarian personality while participation is more affected by situational circumstances along with a more equalitarian personality (Farrow & Bass, 1977). Participation, consultation, and delegation are more likely to be found among older managers at higher educational and organizational levels with greater seniority, who are more esteemed by their subordinates, and believe in being fairminded (Heller & Yukl, 1969; Pinder, Pinto & England, 1973; Bass, Valenzi & Farrow, 1977).

Hegarty & Sims (1979) found that foreign nationality, Machiavellianism (Mach V Scale), and economic value orientation (Allport-Vernon-Lindzey Study of Values) were positively related to unethical decision behavior. Using a sample of industrial managers, Taylor & Dunnette (1974), consistent with previous studies, showed that dogmatism was associated with a decision-making strategy characterized by rapid and confidently held decisions following limited information search. Willingness to risk was associated with an information-seeking strategy involving rapid decisions made on the basis of little information, but deliberate information processing. Intelligence was positively related to efficiency in processing information, accurate choices, and cautiousness in changing decisions in the face of adverse consequences.

Cognitive Structure. People differ in their "cognitive structures"--the way they organize their perceptions. Some tend toward complexity; others, towards simplicity. According to a line of investigation by Driver and Streufert (1969) and Harvey, Hunt and Schroder (1961), search tactics depend strongly on the cognitive structure of the decision-makers. In contrast to those with complex cognitive structures, those with simple cognitive structures tend to immediately categorize and stereotype. They depend upon simple fixed rules of integration reducing the possibility of thinking in terms of continua. They suffer little internal conflict. They generate few alternative relationships. They reach closure quickly. Their behavior depends mainly on external conditions rather than internal processes. For them, few rules can cover a wider range of phenomena. They make fewer distinctions between separate situations. They are more deterministic. They form fewer compartments for their environment.

The "simplistic" and the "complex" persons differ in the ways they prefer to gather information (Streufert, Suedfeld & Driver, 1965). The simplistics prefer to request summary information about various characteristics of a problem situation. Those with complex structures prefer to act upon the environment, then to observe the resulting response. The simplistics tend to request information about ongoing events, while those with complex structures tend to request information about more novel possibilities (Suedfeld & Streufert, 1966). The "complex" spend more time processing information; generate a greater number of interpretations; consider more alternative implications of information; are better able to integrate discrepant information; acquire more information prior to making a decision; and express greater uncertainty about their decisions. They

are more tolerant of ill-structured problems and can make use of greater information loads.

When faced with increasing failures, the simplistic decision-makers engage in more delegated information search in comparison to the more "complex" decision-makers. Although the amount of self-initiated search is about the same for both the simplistic and the complex thinkers, dyads of members with complex structures do better in utilizing the information obtained (Streufert & Castore, 1971).

Risk-Preferences. Risk-taking is subject to wide individual differences related to personality, experience, maturity, and organizational location. Rigid and dogmatic personalities are overly confident (Brim & Hoff, 1957) and more willing to take risks (Kogan & Wallach, 1964). In ambiguous situations, women are more averse to taking chances than are men (Wallach & Kogan, 1959). Older managers are less willing to accept risks and place less value on risky decisions (Vroom & Pehl, 1971).

Streufert (1978) concluded from a series of simulation experiments of complex military decisions that officers with several years of experience tended to take the smaller risks than did ROTC students. Yet greater risks were taken by college students, in general, than ROTC students. Officers placed in command compared to those without command responsibility were less likely to make risky complex decisions. But, at the same time, they tended to take more risks with simple decisions.

Fifty-one corporate managers were found to differ consistently from each other in their perceptions of the risk and uncertainty in a situation. Perceived environmental variables were less important in contributing to perceived uncertainty than the extent the managers differed from each other in

various cognitive processes (Downey, Hellriegel & Slocum, 1977).

Brim et al (1962) found that those who tend to be dependent on others will be more optimistic about the outcomes of their actions. But they will consider fewer such outcomes in examining alternatives and will be less rational when they rank proposed actions. Those who have a stronger desire for certainty tend to make more extreme judgments in evaluating prospective outcomes.

Creativity. Creativity in an organization depends considerably on the extent it contains creative persons. According to Berelson and Steiner (1967), intelligence is usually but not always necessary for creativity. Creative persons are less likely to be more dogmatic in outlook. They are less likely to be dichotomous thinkers, less conventional, and conforming. They are more willing to consider and express their own irrational impulses, and more likely to have a good sense of humor.

But above and beyond these individual differences in personality and competence which constrain the decision process, are the constraints imposed by the organizational roles taken by the individual members.

Effects of Role

Decision-makers within the organization are influenced by their roles in the family, church and community. Their particular culture and sub-culture affect their aspirations, attitudes toward authority, orientation towards time and money, and interpretations of what is real and what is important (Thompson, 1967). The values of consequence and their weights of course will in themselves vary as we move from one culture to another (Bass, Burger, et al, 1979).

What attributes one attaches to their own organizational role and how it fits with their outside roles affect their decisions about continuing to participate in the organization (Simon, 1960). The decision-makers personal life goals brought into the organizational situation may be matched or mismatched with organizational demands placed upon them by their location in the hierarchy, their task demands and their organizational associates (March & Simon, 1958).

Particularly significant is with whom and with what roles the decision-makers identify themselves: as women, as MBA's, as Prudential salesmen, as prospective early retirees, as old Californians, or as new Republicans. Dearborn and Simon (1958) showed that managers, when presented with a detailed case with much factual and little evaluative material, tended to focus attention on sales issues if they came from the marketing department. They tended to focus on clarifying the organization if they came from the production department and on human relations issues in the case if they came from the legal, public relations or industrial relations departments. Bass, Farrow and Valenzi (1980) noted that such managers saw themselves as much more influenced by external legal, social and political forces in their organizational decision-making if they were in personnel departments rather than finance or production departments. They were also less likely to be seen as directive in decision style by their subordinates.

We tend to view problems from our own vantage point centered in our own sociopsychological space. U. S. policy makers see left-right conflict in developing countries in terms of presence or absence of Soviet intervention. The company executive and the labor union leader look at the same conflict from completely opposing points of view and remain isolated from each other's ideas, concerns, approaches and values (Drucker, 1946).

Hierarchical Level. What decisions will be considered and how they will be processed depends on the level of the decision-maker's position in the organization hierarchy. Upper-level managers focus on goals and the development and maintenance of the organization as a whole. At middle management levels, decisions center on the dividing of broad purposes into more specific ends. The technical and economic problems of action become prominent. At low management levels, decisions are concerned with what is technologically correct conduct (Barnard, 1938). Here also the personal commitment decisions become of relatively greatest aggregate importance.

It follows that what is needed for making decisions such as the kinds and amounts of information required depends on one's management level (Kallman, Reinharth & Shapiro, 1980).

Hierarchical level was singled out by Blankenship and Miles (1968) as particularly important in determining a manager's decision-making style. Upper-level managers require more freedom from their superiors. They also show a stronger willingness to delegate, and to rely on their own subordinates in the decision-making process than do managers at lower levels. Middle-level managers tend to involve their subordinates less in the decision-making process. Lower-level managers are more often at the receiving end of initiatives for decisions by their superiors, and more often are expected to consult with their superiors before proceeding on most matters.

Empirical survey support for these propositions about hierarchical level was provided by Heller and Yukl (1969) who found senior business managers in Britain emphasize delegation as a decision style: second level and first-level managers emphasize making decisions by themselves, then explaining them. But consultation was found most often among middle managers.

Concomitant with rising hierarchical level are other variables which may actually underly the observed stylistic decision-making differences. As level increases, subordinates are more highly educated and experienced. Superiors perceive them to be more competent. Trust levels may be higher, hence more subordinates are permitted to participate at higher levels. But middle managers must remain in more conformance to higher authority; they can risk less. While top managers can take more chances and delegate; middle managers maintain greater security by consulting with subordinates but not relinquishing control over the final decisions reached as in delegation. (For more on how level influences decision-making style, see Bass, 1981, Chapter 19).

Interactions Among Constraints

In real life, it is a mix of organizational, group and individual constraints that moderate the decision process. How much of each is a matter of empirical inquiry with an analyses of variance model to apportion the percent of variance due to each constraint and the interactions. Vroom and Yetton (1974) completed such an analysis of managers' responses to case descriptions showing that particular decision styles chosen could be attributed somewhat to individual differences, but more to the problem situation and the interactions. Whether decision supports are available may make an even bigger difference in the process.

CHAPTER 8

DECISION AIDS AND SUPPORT SYSTEMS

The purpose of most decision aids is to reduce cognitive overload. They do so by decomposing the decision process into its structurally related parts. The decision maker is asked to deal with each part rather than the entire process as a whole. According to Slovic, Fischhoff & Lichtenstein's (1977) review of experimental studies, judgment is improved demonstrably when aids can be employed.

Decision supports can systematically facilitate a line manager's problem-solving behavior by: (1) providing more structure to a less well-structured problem; (2) extending the decision maker's information processing ability; (3) stimulating appropriate concept formation, (4) providing cues to the decision maker of the critical factors in the problem, their importance, and the relations among them; (5) utilizing data which might not have been collected and data which needs to be collected to solve the problem; and (6) breaking out from ineffective mental sets (Hammond, 1974).

Aids can be algorithmic or heuristic paralleling the kinds of search and choice processes possible with well-structured or ill-structured problems. Algorithmic aids always produce the same outcomes for a given set of inputs (including the output of random results if the inputs are random). Heuristic aids are guides which don't automatically lead to a particular pattern of outcomes for a designated set of inputs.

Algorithmic aids provide an explicit programmed set of calculations. Anyone using the algorithmic aide properly will reach the same final

answer. Heuristic aides provide rules whose efficiency will depend on the judgment of the decision-makers. A formula or cookbook is an algorithmic aid; an agenda for staging the decision-making process is a heuristic aid. Problems must be well-structured to make use of algorithmic aids; they need be less so, for heuristic ones.

ALGORITHMIC AIDS

Routine decision-making can be facilitated by programs, S.O.P., maps, flow charts, decision tables, and check lists. For problems that can be reasonably well-structured with routine solutions, for when a single objective function can be assumed, and for which risk estimates can be reasonably complete, the mathematical methods of operations research are available to assist the decision-maker. Typically, an optimum choice is algebraically determined using accepted assumptions about parameters, variables, and the criterion function. Linear and dynamic programming, decision trees, game theory, team theory, waiting-line theory, and probability theory are the better known mathematical methods and theories employed. A mathematical model is constructed starting from assumptions about how to represent in the model the system of real-world variables to be analyzed. What is to be maximized or minimized, the criterion function, is defined. Empirical estimates are obtained by the numerical parameters in the model that specify the concrete situation to which it is to be applied. Mathematical operations are completed to find the alternative, which for the specified parametric values, results in maximizing the criterion function (Churchman, Ackoff & Arnoff, 1957).

Operations research forces more logical descriptions of objectives,

the making explicit of assumptions, and provides more precise descriptions of a wider array of alternative solutions and the ability to compare them (Shuchman, 1963).

Modeling

Given problems and possible solutions with sufficient structural clarity, models can be constructed symbolically, usually mathematically (and on occasion, physically) to represent the important elements in the real situation. Empirical estimates of the values of the variables in the situation, and empirical estimates of the values of the variables in the model that hold for the particular, concrete, situation, can be obtained. An optimization model can be constructed if, in addition, the criterion function is defined so that the expected values of alternatives can be compared using a specified set of decision rules (Alexis & Wilson, 1967). Although, model-building requires the problem to be well-structured, the study of less well-structured problems can be clarified by the attempt to model them. Unfortunately, the attempt may produce oversimplification and distortion of the problem in order to make it amenable to modeling.

Model-Building. As outlined by Harrison (1981), the model for modeling (Figure 7) begins in the real world with the establishment of objectives, the determination of the problems the model is supposed to solve, the identification of the significant fixed and variable entities, interactions and fixed parameters of consequence, and the mapping of their actual flow and the logic of the flow. From this logic, the symbolic model is constructed. (It could be mathematical or physical.) The model is manipulated to make predictions.

The model is validated by the extent the predictions match real world outcomes. The results are used to adjust the model to improve the match of the model with the real world.

Figure 7 about here

Uses. Modeling assumes that a faithful replica of the problem situation has been constructed. But, of course, its projections will only be accurate to the degree that its premises, parameters and specified relationships are reasonable approximations of their real-world counterparts. It is particularly useful in dealing with uncertain real situations to see what kinds of reasonable expectations about outcomes a decision-maker should entertain for various possible antecedent conditions. It is in this sense, that aids are seen as support systems, for the decision-maker, after obtaining a view of what to expect, still must make the final decision.

To illustrate, budgetary models provide a pattern of the task environment of the budgeters and the problems with which they must deal. Such models need to be highly disaggregated to provide understanding of the match between changes in proposed spending to actual spending. By identifying the variables of the task situation that constrain the budget decision makers, modeling can provide a guide to the changes necessary to give more flexibility to budget officers (Bromily, 1981).

Models can be specifically useful for each phase of the decision process. They can help determine the feasibility and effectiveness of various objectives and goals before spending time and effort in search and evaluation. Models can be used in search to uncover a wide range of relevant alternatives

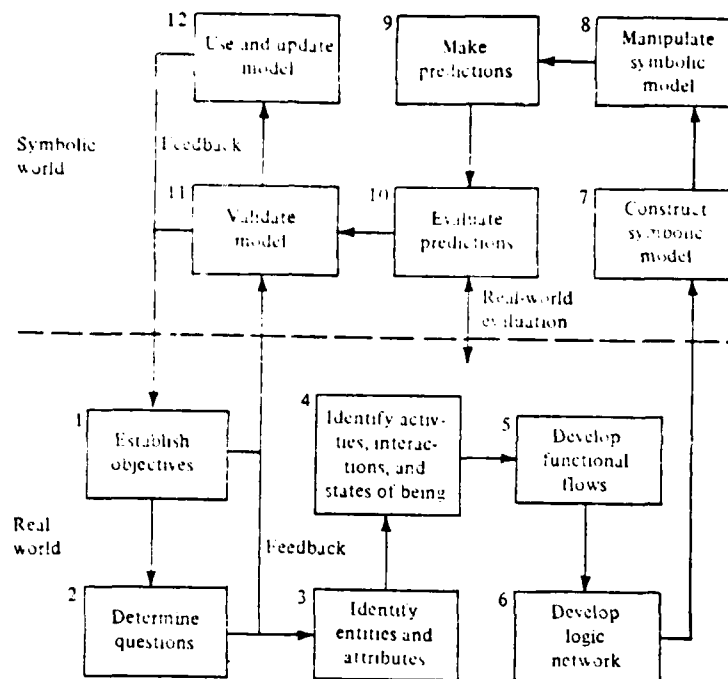


Figure 7: The Model of Modeling

(From Harrison, 1981, p. 285)

at a low cost for the search in contrast to conducting a real search. Alternatives may be evaluated and compared by revising the model until projected outcomes conform to the desired objectives. After the final choice, the model can be used as a control device to monitor how close expected outcomes match real outcomes when the decision is implemented (Harrison, 1981).

Model Types.

Linear programming models deal with a body of known constraints and variables to find an optimum solution. Decision trees reveal a network of possibilities leading to one among alternative outcomes. Dealing optimally with users of services, roads and facilities is the aim of queueing or waiting line theory. Wagner (1969) sees these approaches to such well-structured problems as providing for better coordination among marketing and production, better control of what is happening routinely, and what will happen. It makes possible organizing better systems for transforming materials and providing services.

Models can be highly dynamic, linked to the real world for continuing readjustment of the model itself. Thus, rolling production schedules provide an effective decision support in the search for production optimality to meet demand patterns within cost constraints using forecast windows (Baker, 1977). Nevertheless, because these models always leave out some aspects of the real situation, the estimates tend to be overly optimistic. For example, they are likely to overestimate the potential gains from innovation.

Multiattribute utility theory provides a model for determining the utilities and weights for deciding among alternatives with multiple attributes. Products can be compared which are simultaneously different in price, quality and serviceability.

Team theory is a normative explanation by Marschak and Radner (1972) of information flows which deduces how organizational members should make observations about the environment confronting the organization; what communication channels should be employed, what messages communicated and what actions each organizational member should take based on the information received.

MacCrimmon and Taylor (1976) feel that in well-structured, simple situations, team theory can provide ways of calculating optimal strategies for dealing with communications about uncertain environments. For less well-structured, more complex situations it can be used as a conceptual guide to monitor behavior and avoid information-communication failures.

Sensitivity Analysis

The sensitivity of models can be analyzed. Such an analysis calculates the effect of deviations from the values originally assigned to the various parameters of the model and to what extent the solution departs from optimal as a consequence of such deviations. The analysis checks on whether the optimal solution would be altered if the values assigned to the parameters of the model in the original analysis were changed. If the original solution is unaffected by significant changes in the parameters, it is inferred that the solution is likely to apply over a wide range of conditions. But if small deviations in the parameters result in major changes in the solution,

less confidence can be placed in the choice, or any substitute alternative, for that matter (Radford, 1981).

Applications

Typical problems to which operations research can be applied include: optimum product mixes, dynamic replenishment of inventories, optimum distribution of goods from a number of different sources to different destinations, optimum assignment of work orders to a number of different machines or people, the shortest routes for production flows, inventory management, and critical path scheduling (Radford, 1981).

Operations research fosters a more rational and systematic attack on decision-making. Operating rather than policy problems are handled. Nevertheless, operations research has the potential for contributing to the search for answers to strategic questions because it forces common goals to be the basis of decisions in the different units of the organization (Johnson, Kast & Rosenzweig, 1963). Also, simulation can lay out possible future real time trends in compressed time, following different assumptions about the interplay of the variables of consequence. This gives the strategic planner a better description of his or her options. In comparison to intuitive approaches, operations research provides better descriptions of assumptions and objectives, a more precise definition of the problem and the importance and relation among the factors involved, the information required to obtain an optimal solution, a precise description of the alternative solutions and their costs and benefits, the ability to compare many more alternatives with considerable confidence, and a basis for predicting the consequences of changes (Suchman, 1963).

Implementation

It is one thing to have a mathematical optimization or near-optimization model. It is another to get managers to use it, even for well-structured problems. As Crum, Klingman and Tavis (1979), among many have noted, despite the availability of a variety of mathematical modeling techniques for helping financial decision making; they have not been widely employed by corporate financial managers, partly because of lack of understanding of the underlying relationships by managers as well as poor communications. Necessary for implementation is the formulation of optimization models that are easier to implement. It also seems difficult to introduce better but more sophisticated decision aids. A survey of the decision aids used by European marketing managers by Wensley (1977) found them bound to traditional aids which they felt were proven effective for practical situations. They had little motivation to shift toward better but more sophisticated and untried aids.

Walker (1973) contrasted cases of attempts to apply systems analyses techniques to major policy problems in long range planning for NASA's un-manned planetary exploration program. Early on, the analytic efforts used relatively formal methodologies and concentrated on analysis of scientific, technological and economic issues. The supports had little or no impact on policy outcomes. There was little acceptance by NASA planners for the analytic techniques used. Only when in the later period of 1968 to 1970, when less formal analytical techniques were employed and careful consideration was given to the organizational, political and psychological aspects of the surrounding decision process, did the analytic support processes have a significant

impact on policy outcomes.

Wagner (1969) finds that a limiting factor in the application of mathematical rigor to organizational decision-making problems is the fact that it must depend on the ingenuity of the professional operations researcher. There are few standard applications. Designing particular applications in designated organizations requires considerable skill. "Model formulations remain tailor-made to a large degree". But systems of decision supports for organizations can include not only the professional operations research staffs themselves, but also, the incorporation of their techniques as routines in the management information system for ready routine variance detection, for search and retrieval of data, and for comparative forecasting.

Different arrangements of line personnel, staff specialists, consultants and clients can be employed in the development of OR solutions. Many combinations of researchers and executives are possible. For example, a problem can be broken up into meaningful small ones. The short-run solutions can then be fed to the client until the whole job is completed. The line manager or client can be brought into the project as a team leader or as a team member (Radnor, Rubenstein & Bean, 1966).

HEURISTIC AIDS

For those decisions less amenable to complete and clear structuring, heuristic approaches provide ways to increase the orderliness with which the decision-makers can deal with a problem. These can be quantitative or qualitative. Quantitative approaches, for example, are various orderly processes for quantitatively pooling inputs. These include the Delphi procedure, nominal group estimating, and regression analyses for capturing

policies.

Qualitative, heuristic supports are guidelines to support the increase in the quality of solutions to ill-structured problems. These involve improving the decision process by using special sets such as to force relationships (synectics) or to encourage free association (brainstorming). Other special guidelines may also be employed to improve the process such as rules for staging, for prioritizing and for cause-effect interpretations.

As consistent, repeating, patterns are seen in the behavior of real decision-makers, when confronted with specified circumstances, heuristic computer programs can be written to reproduce them. A model of reality is constructed and a program of rules is determined which can become a decision aid for novices. For instance, one can increase one's familiarity with chess by playing against a computer model which has been programmed to respond as would an expert depending on a set of specified rules and the pattern of several previous moves made by the novice and the model.

Among other systematic ways to assist with ill-structured problems, scenarios can be prepared as an improvement over a less orderly process to detail possible future courses of action and their outcomes in a complex environment. Or position papers can be written advocating particular courses of action, the reasons for doing so, and the anticipated outcomes.

Quality of decision-making can also be enhanced by organizing for creative conflict among those responsible for the decision. Techniques include using a devil's advocate, dialectic argumentation, and adversary dialogues. Finally, organizations can be seen to incorporate checking devices to control their irrational tendencies by using computer programming language, voting rules, waiting periods, and expert advisors.

Supports For The Decision Process As A Whole

Left to their own devices, when dealing with ill-structured organizational problems, as Mintzberg et al (1976) found, decision-processes are unlikely to be orderly. But anything that will promote more orderliness is likely to move managers from satisficing toward more optimal solutions. Thus, making systematic preparations before taking action was seen to be more common among more capable administrators in contrast to those with less administrative knowledge and aptitude (Frederikson, 1962).

Staging. Illustrative of a heuristic to improve decision processes and their outcomes is the rule to separate the stages in decision-making rather than to wander back and forth too frequently from problem diagnosis to search and to evaluation. Thus, when groups were forced to separate the stages in decision-making, they saw themselves as becoming more efficient, more satisfied with outcomes, and more committed to the decisions reached (Goodchilds, Schonfield & Gibb, 1961).

Maier and Solem (1962) encouraged staging in 96 groups of four members each trying to solve a problem. Fifty groups served as controls carrying on freely and spontaneously. The forced-staging groups were asked to present the problem first to get everyone's views about it. Only then were they to explore and discuss all the important factors in the situation. Finally at the end of the search and discussion they were to use the list of factors to synthesize a solution to the problem. Staging promoted higher quality solutions.

The Delphi Technique. Experts complete a series of questionnaires individually about problems, solutions and choices. The composite information gathered

from each questionnaire is shared with the experts and forms the basis for the next questionnaire in the series. The experts are kept apart physically until the end of the process to avoid the dominance of any one of them early on. Many variants are possible (Dalkey & Helmer, 1963). The Delphi technique has been used to delineate problems such as estimating future Soviet military capabilities as well as to stimulate wider search for innovative government policies and to evaluate the quality of life (Cetron & Ralph, 1971).

Some evidence exists that the Delphi approach helps improve the accuracy of forecasts (Business Week, 1970) and it is used regularly by a number of U. S. firms (Luthans, 1973).

Supports for Problem Discovery and Diagnosis

Rules for prioritizing, elaborating and probabilistically information processing are illustrative of supports for problem discovery and diagnosis.

Prioritizing. Setting priorities is seen as of fundamental importance (Drucker, 1963). Attention should first be paid to critical activities, then to those of lower importance. At the same time, a balance needs to be achieved between too much concern about threats, and too little concern for opportunities.

Elaborating. To further delineate the problem, Kepner and Tregoe (1965) offer a set of rules elaborating the nature of the problem in terms of what it is and is not, when it appears and disappears, when it is present and not present and so on. Causes can be sought at times and locations when changes in the state of affairs occur. MacCrimmon and Taylor (1976) add the directions to examine changes in the environment that have precipitated the problem, to factor complex problems into simpler subproblems, and to establish what

is controllable in the situation. They also suggest applying means-end analysis and either working forward or working backward from where one is to where one wants to be. The complexities of the problem can also be reduced by aggregating information available about it. Information can be chunked (grouping information into categories and then arranging them in order of importance). Optimal levels of aggregation are to be sought. For instance, day-by-day changes in stock prices may be too fine to deal with; but yearly changes, too coarse.

The Probabilistic Information Processing System. PIP aims to improve both speed and accuracy of diagnoses in military and business command-and-control systems. Participants generate hypotheses and estimate likelihood ratios which are then aggregated for Bayesian analysis. This enables decision-makers to screen and filter information, to apply weights to different aspects, and to extract what is certain in the information (Edwards, 1962).

Supports For Search And Innovation

Establishing appropriate sets, along with forced and free association are examples of supports of the search and design process.

Appropriate Set. Appropriate attitudinal sets enhance the search process. A set to question helps generate alternatives. A decision-maker may systematically ask; Why? Where? When? Who? What? How? What current resource could be adapted? Modified? Substituted? Transformed? Combined? Omitted? Reversed? (Osborn, 1941). Adopting a set to be original increases the creativity of ideas generated. If one tries to discover or invent unique solutions rather than just any solution more, unique alternatives are produced (Maltzman, Bogart & Breger, 1958). If one adopts a constructive set rather than

a negative or critical set toward ideas, more creative solutions are likely to emerge (Hyman, 1964)

Following MacKinnon (1966) and Corson (1962), Bass and Ryterband (1979) spell out other attitudinal sets of consequence to the search and innovation process:

"The frame of reference the organization sets for its problem solvers is of particular importance. Venturesomeness and wide-ranging research for new and better ways of doing things are likely to be inhibited if emphasis in the organization is always on rules, clearances, and reviews, or if the payoff is to those who maintain stability and order rather than to those who innovate. Search will be inhibited if jurisdictional lines are stressed, so that one executive avoids making suggestions to another about the other's area of responsibility. On the other hand, creativity will be enhanced when organization approves attempts to experiment, to innovate, and to challenge old ways of operating." (p. 441)

Forced and Free Association. Arbitrary combinatory searches, and the "black box technique" (what needs to be inside if ...) depend on forced and free association. A forced search arbitrarily can call forth every permutation and combination of possibilities. Thus, eight alternative designs for a product can be generated by considering it in terms of the eight combinations of low or high price, high or low quality, and high or low serviceability (Zwicky, 1969).

Of particular popularity have been synectics and brainstorming, each illustrating forced and free association (Fulmer, 1974). Although synectics supports all phases of problem solving, in particular, search innovative processes especially can be facilitated (Gordon, 1961). Participants must dismiss their usual ways of thinking about a problem. The participants are required to use analogies, to "make the familiar strange". They play the

role of some element in the problem such as the wheel at the head of the driving rod. They may be asked to consider such questions as: "What do you do, what should you do, how do you feel as the wheel?" They are also asked to make direct analogies between the problem and nature such as the ability of planets to spin. They consider symbolic analogies using mathematical models. They make fantasy analogies such as between saintly halos and round plates. The synectics approach is more structured than brainstorming. It follows a repeatable set of stages using analogies to generate creative solutions and to choose the most favorable alternative. Alternatives are evaluated as they are generated.

Originated by Osborn (1941) as a group procedure, brainstorming members are directed to freely express ideas to avoid criticism and to delay evaluation of any of them until all ideas have been listed collectively. Production of ideas is enhanced if members work by themselves and their ideas are pooled in nominal groups.

Nominal Versus Real Groups. Nominal groups are collections of individual participants whose judgements are pooled to form a collective opinion without any face-to-face interaction among the participants.

And, as we have already seen, the Delphi Technique makes use of nominal groups, permitting real group interaction only after the several rounds of individual work have been completed and the results shared. Experimental studies of brainstorming indicate that real groups may inhibit rather than facilitate the production of ideas in contrast to the same or comparable nominal groups of individuals working by themselves and mechanically pooling their outputs as with the Delphi Technique. Brainstorming work periods need to be extended for real groups to do better than nominal groups. In

addition, cohesiveness is likely to improve real group performance (MacCrimmon & Taylor, 1976).

An empirical comparison by Van de Ven and Delbecq (1974) of the nominal, Delphi, and real group decision-making processes provided support for the nominal group, and secondarily the Delphi technique, as ways to abstract and organize expert information about the problem.

Delbecq and Van de Ven (1971) offered the following reasons for the usually superior creativity of nominal groups: (1) Non-interacting nominal or Delphi groups do not inhibit the performance of members; (2) Non-interacting groups cannot focus on a single train of thought, as may interacting groups; (3) There is less likely to be early evaluation and the distraction of elaborate comments; (4) Round-robin procedures such as in Delphi allows risk-takers to state risky problems thus making it easier for the less secure to engage in similar disclosures; and (5) The use of personal and organizational categories encourages the exhibition of social-emotional dimensions.

Nevertheless, a combination of first, nominal group work, followed by real group interaction, seems most productive. Souder (1977) found that nominal and interacting group processes in combination worked best for achieving both statistical consensus, and high levels of integration of R & D and marketing management trainees. The nine strategic planning groups could achieve consensus statistically in nominal groups but not the required integration. They could do neither in just real groups. But the combination (of nominal and real groups) accomplished both beginning with nominal groups of members working alone, followed by real group interaction. The combination seems best for search and design as well as evaluation and choice.

Supports For Evaluation And Choice

Numerous qualitative and quantitative approaches are available to assist in evaluating and making choices.

Kepner-Tregoe's Rules. Kepner and Tregoe (1965) formalized and popularized a list of rules which decision-makers could follow to increase their orderliness in evaluation and choice. Three kinds of actions were posited that can be taken to deal with a problem. The first is interim or temporary action because the cause of the problem is as yet unclear. Without knowing the reason for increased customer complaints, the organization will order free replacements until the cause is identified. The second is corrective action based on determining the cause of the problem and eliminating it. Inspection may be improved and other quality control measures taken to keep most defective products from reaching the market. The third action is adaptive. A reevaluation may suggest that the product should be redesigned or abandoned.

To evaluate alternative actions, Kepner and Tregoe suggest listing desired outcomes and how well each alternative is likely to achieve them. "Must" objectives are outcomes that must be achieved. For instance, the battery for the heart pace-maker must be absolutely fail-safe; other outcomes may also be desired but not critical. The cost of production should not increase by more than ten percent. Weighting and combining are proposed of the extent desired outcomes are likely to be achieved. Along with the critical requirements, they direct the choice of alternatives. The adverse consequences and side effects of the first choice also must be considered before accepting it as final.

Combining Judgements. Sawyer (1966) reviewed the predictive accuracy of eight possible ways of combining predictive data about the future performance of applicants or clients. These methods of combining information to form a prediction ranged from global judgements following interviews to statistical syntheses combining collected data and interview judgements. Statistical combining of data, in some manner, generated more accurate predictions than dependence alone on judgements to combine components.

Policy-Capturing. Policy-capturing making use of the lens model (Brunswik, 1955), as we have noted in Chapter 5, has been found useful in a variety of applied situations. A set of judges indicate numerically how important each component reason for a choice is or was to them. Then they attach a numerical rating to how strongly they do or did prefer a particular choice. The beta weights of the multiple regression equation are determined yielding the optimum prediction of the strength of their choice from their ratings of each component. These beta weights are inferred as indicative of the proportionate influence of the components on the choice. If we then discover that some component is having an unintended influence, corrective action may be taken. For example, in educational institutions, policy-capturing has made it possible in this way to improve policies about student grades, student placement in special education, the hiring of new **teaching personnel**, and the selection of curricular materials. Again, the initial rating policies that exist within a board of judges have been identified to help the members of such boards to reach consensus and to express their final joint policy in a precise manner.

Strategic Assumption Making. Mitroff and Emshoff (1979) offer a rational, syllogistic, procedure for dealing with ill-structured problems. It requires focusing on the assumptions underlying each proposed course of action, prioritizing them in order of their importance and certainty, then assessing the damage each assumption does to the assumptions of the other alternatives. Resolution of apparent conflicts are then sought. The improved awareness of the assumptions underlying the chosen alternative is seen as fundamental to justifying the final choice.

Combinatory Matching. It can also be helpful to evaluation and final choice to do a complete examination of all possible objectives of a designated choice against all possible alternative ways of reaching the objective. Weights can be assigned to the extent each alternative meets each of the objectives. Then, the alternative that meets the greatest amount of the total array of objectives can be identified. Illustrative is such a decision matrix (Table 2) for the Cuban missile crisis. In an analysis of options, the Naval blockade that actually was instituted was the alternative that was judged highest in likelihood of meeting the widest assortment of the eight objectives seen to be involved in the crisis. Only the Naval blockade was judged relatively high in meeting all eight objectives (Harrison, 1981).

Table 2 about here

Such a matrix is particularly useful when a participating decision unit or organization is engaged in an analysis of its strategic options in a competitive environment and in an examination of the tactics which would be needed to bring about fruition of a designated strategy (Madrood, 1981).

<i>Alternatives</i>	<i>Objectives</i>							<i>Total point value</i>
	<i>Missiles are removed immediately</i>	<i>World power balance remains in favor of United States</i>	<i>U.S. hemispheric defenses are preserved</i>	<i>World opinion remains favorable to and United States</i>	<i>Sentiment of U.S. public remains favorable toward administration</i>	<i>Sino-Soviet relationship is not strengthened</i>	<i>U.S. relationship with Soviet Union is not worsened</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Weight (maximum value)	10	10	10	10	10	10	10	70
1. Do nothing	0	1	1	4	2	5	2	15
2. Diplomatic approach to Castro	2	4	1	2	2	5	4	20
3. Diplomatic pressures	2	2	2	4	3	5	4	22
4. Invasion	8	8	8	0	2	2	0	28
5. Air strikes	8	8	8	2	2	2	0	30
6. Blockade	4	6	8	8	10	8	6	50

Table 2: Decision Matrix

The Cuban Missile Crisis

(From Harrison, 1981, p. 312)

Relationships may be contrived by cataloging, arbitrary listing and focusing on designated objects as well as by random juxtapositions of items from different categories and by forcing challenges to accepted assumptions about the outcomes expected from specific actions (de Bono, 1970).

SPAN. The higher the correlation between the influence on the group decision and the competencies of the individual members, the better will be the group decision (Bass, 1960). But it may be difficult for members to accurately estimate the differential competencies of each other. Nevertheless, MacKinnon (1966) proposed exploiting the possibilities by the SPAN technique. Each member starts with an equal number of votes, say 100 which can be allocated directly by the member among the alternatives or given to other members deemed more knowledgeable so they can allocate them. SPAN transfers votes not on the alternatives but to those members to cast who are deemed expert about the problem so that the correlation is increased between judged member expertise and member influence on the final outcome.

The Uses of Contrived Conflict

Organized dissent can facilitate consideration of a wide range of alternatives. F. D. Roosevelt was said to have used this device repeatedly. He set up competing subordinates to argue out a final position which he could accept.

Constructive Conflict. Mason (1969) studied two approaches, the devil's advocate and dialectic argumentation. The devil's advocate presents a diametrically opposed point of view to the favored alternative under consideration. This brings to the surface the possible biases and false assumptions that provide support for the favored alternative. The devil's advocate

(Herbert & Estes, 1977) legitimatizes taking an adversary stand and providing criticism of the favorite alternative when none might be forthcoming. But it may focus too much attention on finally choosing an alternative that can withstand all possible petty criticisms. For Hegelian dialectic argumentation (Hegel, 1964), decision makers examine a situation logically from two opposing points of view. First, an alternative and its underlying assumptions is presented. Next, another plausible alternative or counter plan is considered. A debate follows. The case for each alternative must interpret all available information as supporting evidence. Out of this should come a synthesis which includes the best elements of both alternatives. The dialectic approach forces equal time and consideration for the popular and apparent alternative with opposite points of view. A creative synthesis can emerge.

Stanley (1981) has listed a number of other formalized adversary roles that promote fuller examination of problems, alternatives, and evaluations. These include the Leader of the Opposition in the British House of Commons who is paid to lead the "loyal opposition".

Efforts continue to provide legal protection to "whistle-blowing" and responsible dissent by employees in government agencies. Private organizations need also to encourage bona fide responsible dissent when sanctions against by-passing the chain of command, for example, usually stifle attempts to question organizational policies. Stanley notes that

"...just as a surgeon controls both clotting and hemorrhaging during an operation, an organization's homeostasis does require constraint of reckless, malicious, unfounded public exposure by self-serving members, while allowing for ventilating of ultra vires acts and other mis-or malfeasant acts or omissions." (p. 16)

Mason (1969) found that using a devil's advocate was helpful to management decision-makers in that it gave them a broader grasp of the planning problem with which they were confronted. R. A. Cosier (1978) went further by finding in a series of experiments on strategy planning, greater effectiveness on decision outcomes of objective, non-emotional devil's advocates in contrast to "carping critics", dialectical inquiry, and expert advice from consultants. The objective, non-emotional devil's advocate was found particularly better than other approaches according to Schwenk and Cosier (1980). In a simulated financial decision-making experiment, subjects were asked to predict price-earnings ratios for three profit centers. They were aided by information about their current P/E ratio, inventory turnover, and debt-to-equity ratio. But Schwenk & Cosier (1980) also reported that when the state of the world conforms to the assumptions underlying a plan, the expert approach was superior to using the devil's advocate. When the state of the world was opposite to the assumptions in the plan, the reverse was true. The devil's advocate was superior. When the state of the world was midway between the assumptions of the plan and counterplan, again the objective, non-emotional devil's advocate was better.

Systematic Checks On Organizational Irrationality. Katz and Kahn (1966) see that merely casting organizational problems into computer language, in itself, forces one to be clear about the variables and parameters involved, the priority with which different criteria of decision-making will be applied, and the process of inference by which decisions are to be made. Undefined terms must be eliminated. Complete stability is built in from one decision-making situation to another.

"...if the essential data and procedures for decision-making can be programmed, many of the erratic and fallible elements in organizational decisions are eliminated." (p. 295).

Numerous guides and rules are instituted to help reduce irrationality and impulsive decision-making. Formal periods of waiting or for deliberation are required before policies can be changed. Minorities may be protected by requiring more than a simple majority to decide on an issue. An assembly is required to vote on the same issue more than once for its passage. Two houses of a legislature must both approve a bill for it to become a law. Executives are given the power to veto; legislatures to override executive vetoes.

Experts are called in for consultation. However, proper identification and role requirements need to be carefully considered. Experts need to be located who are not redundant in attitudes and information with in-house personnel.

Impact of Education and Training

With typical business and professional education programs as well as specialized decision-making training programs making it increasingly likely that the modern manager will have some appreciation about what is now known about the decision-making process and ways to make it more effective, the question is whether the following summarization from March and Simon (1958) needs to be qualified.

The original reads:

"Because of the limits of human intellectual capacities in comparison with the complexities of the problems that individuals and organizations face, rational behavior calls for simplified models that capture the main features of a problem without capturing all its complexities.

...(1) Optimizing is replaced by satisficing--the requirement that satisfactory levels of the criterion variables be attained. (2) Alternatives of action and consequences of action are discovered sequentially through search processes. (3) Repertories of action programs are developed by organizations and individuals, and these serve as the alternatives of choice in recurrent situations. (4) Each specific action program deals with a restricted range of situations and a restricted range of consequences. (5) Each action program is capable of being executed in semi-independence of the others--they are only loosely coupled together ... (March & Simon, 1958, p. 169).

It is not unreasonable to assume that the limits of human intellectual capacities have been expanded by the increased availability of knowledge about the decision-process and aides to improve it. As a consequence, it would follow that: (1) Satisficing levels may be attracted upward to a displaced ideal of the optimal. (2) Alternatives may not only be generated sequentially but by contiguity of time and place, of perceived cause-and-effect, by deliberate contrast efforts, and other special tactics. (3) Managers can adopt a systematic point-of-view dealing with multiple objectives and multiple constituencies in a single decision-process. Mathematics have become available for better structured multiple criterion problems. Computers make feasible what were once impossibly lengthy calculations of interactions among multiple variables. How coupled decisions are is a variable in itself depending on the competence and motivation of the decision-makers and the information resources available to them.

Research specifically focused on how much managers with modern management educations can and do operate at levels of effectiveness beyond that posited a quarter of a century ago would seem warranted.

CHAPTER 9

UNANSWERED QUESTIONS AND UNRESOLVED ISSUES

Unanswered questions and unresolved issues in organizational decision-making will be generated from two sources: (1) the gaps, incompleteness, and missing links suggested in our preceding discussions; and (2) needs for empirical verification of a model to be presented of the organizational decision-making process. The model attempts to summarily capture much of what we have presented so far.

The ability to answer unanswered questions about the decision-making process and to resolve unresolved issues depends on one's view of the process. The optimist points to the public rather than private character of organizational decisions. Interactions between people must take place which are observable and recordable. But, a complete individual decision-making process can occur with no external manifestation. The pessimist points to the relative difficulty in conducting controlled experiments on organizational decision-making in contrast to the ease with which one can replicate or extend a finding in individual decision-making. The pessimist cites the complexity of the organizational decision process. This the optimist can counter by showing how a few simple rules can often account for a large percentage of what happens. Nevertheless, there continues to be a relative paucity of hard data about organizational decisions. A large number of intriguing hypotheses generated by March and Simon (1958) still remain untested. The Mintzberg *et al* (1976) study is difficult and expensive to replicate or extend. Thus, we often

must depend on anecdotal understandings of case outcomes when often more questions than answers remain about what happened.

The pathology of organizational decision processes remains underresearched. While controlled experimentation is unlikely, business historians and investigative journalists can provide insight for us into many of these situations by their skillful articulation and their ability to dig comprehensively into the wide range of the facets involved in complex organizational decisions. But it is difficult for the analyses to emerge free of errors and subjective biases.

Xerox decided to move its corporate headquarters to Stamford, Connecticut from Rochester, New York, the site where the firm originated and its main manufacturing center. At least six reasons for the decision circulated in the community:

1. Top management needed to be closer to Wall Streets' financial markets.
2. Top management needed to develop some space between itself and manufacturing operations to operate more as an international company with multiple marketing objectives.
3. Operations management could be free from the heavy hand of top management.
4. Top management could privately profit by moving from New York with an income tax to Connecticut without one.
5. The wives of top management of Xerox, a new company, never felt fully accepted by old established Rochester society built around older establishments.

6. Top management and their spouses wanted to be closer to the New York entertainment world.

Even if one was privy to all the discussions and arguments that went before the decision to relocate, it would be impossible to separate the business justifications from the personal rationalizations. The personal advantages might have been seen only after the idea for moving was first broached. On the other hand, personal dissatisfactions may have sparked the initiative to investigate the organizational benefits and costs of such a move. Asking the actors to recall what happened would only provide partially valid evidence. Such recall could not recapture subconscious motivations, hidden, **or blind agendas.**

The example illustrates the difficulty of trying to move from conceptualizing what is involved in an important organizational decision to obtaining an empirically valid understanding of the decision process. We are blessed with a surplus of organizational theories and theorists replete with concepts and models of organizational decision-making, but we have little hard data to provide the support for them.

March and Simon (1958) laid out **over a hundred propositions**, yet a quarter of a century later, while much reference and comment about them continues, relatively few empirical tests have been made of most of them. Similarly, the experimental results from tests of hypotheses derived from behavioral decision theory need to be replicated in organizational settings (March & Shapira, 1982).

Decision Flow. We have little understanding on how decisions flow and change as they move through organizations. The linkages between strategic decision-making at the top and operational decisions below call for more

empirical study (Mintzberg et al, 1976). This is most clearly seen in the political arena. Elections result in changes in the political leadership. The new leaders try to change old programs or to introduce new programs. Nevertheless, the cadres, bureaucracies, and civil servants who must operationalize and administer these programs remain in office. This considerably constrains implementation of programmatic changes. The new Administration cannot replace the whole operational apparatus even if it wanted to. One of its key problems becomes how to ensure that its new policies are translated into new practices. A similar unresolved issue is how decisions about organizational operations aimed to promote the organization's immediate efficiency interact with decisions about the long-term survival of the organization (Spray, 1976). This, in turn, expands into the question of why some organizations grow while other remain small.

Growth. Clearly, organizational decision-making is systematically affected by where an organization is in its development history. Small businesses have different decision processes than large corporations. But the issue is still hardly explored. As an organization grows, matures and declines, its decision processes are likely to be different. What kinds of decisions take place so that some small businesses just succeed in maintaining themselves? In contrast, what decisions lead small businesses to developing into large corporations? (Dandridge, 1979)

Decision Priorities. When should one decision be made relative to others? What decisions should be made today rather than tomorrow? Better structured interconnected problems can be dealt with by analysis of pathways and decision trees but less well structured and unconnected problems require

a different approach to establishing their priorities. The intermingling of planning and operations requires more than simple sequential ordering of decisions. The setting of decision-making priorities needs attention. Roberts & Hanline (1975) suggests building the schedule of decision-making around the judged potential gain from each decision. Probably a more complex set of judgments is needed dealing with various attributes of the set of problems to be faced. Do they emerge from narrow and wide scans? Are they acute or chronic problems? How much information is likely to be available? Is there organizational slack to permit simultaneous attack on several problems?

Methods and Models

For twenty-five hundred years, decision-making as conceived by Western philosophy was an orderly, forward-moving, **causal**, means-to-ends. Cyclical thinking was more characteristic of Oriental approaches. In just the last three decades, in considering organizational decision-making, description has come to be required before prescription, the fixed, ideal, goal has been replaced by a readjusted, displaced, objective; the logic-driven complete search has become limited; the infinite perfection of information has been rejected as infeasible; rationalization has become as important as rationality; and disorderliness, incrementalism, serendipathy, and contingency have been elevated to key aspects of the organizational decision process.

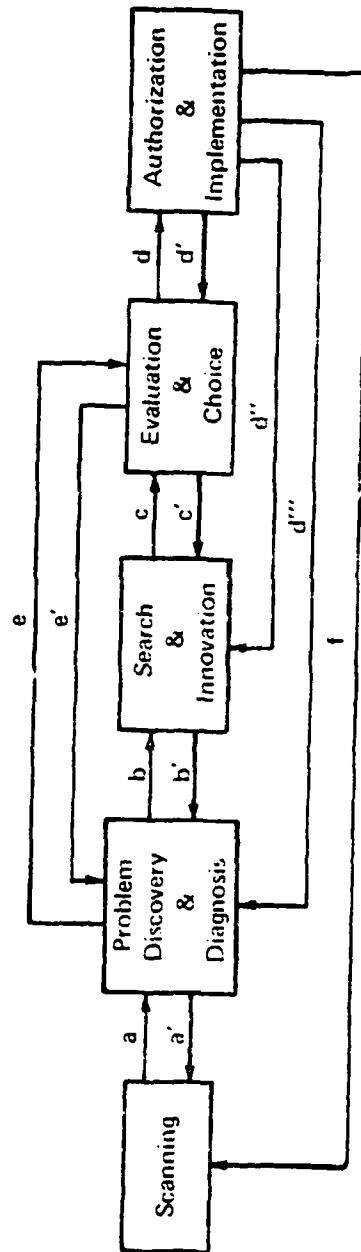
A Summary Model. Figure 8 is an attempt to model the possible causal linkages between the idealized phases of organizational decision-making. The linkages are as follows: (a) Scanning alerts decision-makers to possible

discrepancies outside or inside the organization, (a') the diagnosis lacks completeness; more detailed scanning is requested; (b) the completed diagnosis directs where to search and/or innovate; (b') the search results in a modification of the aspirations in the diagnosis; (c) the alternatives found or invented need to be evaluated so a choice can be made; (c') the choice is already made and search proceeds to justify it; (d) the choice must be authorized and implemented; (d') authorization is rejected or implementation failure forces reevaluation, redesigning (d''), or redefinition of the problem (d'''); (e) the problem diagnosis completely defines the solution; any search is preempted; (e') the problem diagnosis is reshaped to fit the choice; a choice is made on what can be done, not on solving the precipitating problems. Implementation, either a failure or a success, refocuses scanning (f).

Figure 8 about here

Links a, b, c, d, e, and f are the more commonly expected cause-effect relations but links a', b', c', d', d'', d''', and e' may appear more often than supposed. The model is a description of what is possible. It provides a basis for empirical study of what is likely to be most efficient and most effective. If one is willing to make further assumptions about the nature of the decision-process, specific deductions can be drawn. For example, if one accepts as an axiom that forward cause-effect linkages such as a, b, c, and d need to be balanced in speed and amount by parallel backward linkages such as a', b', c', d', then it follows that decision outcomes will be more effective if such balance is observed.

FIGURE 8: Potential causal linkages in organizational decisions.

CAUSAL LINKAGES

- a. Scanning detects a possible opportunity, threat, variance or disturbance.
- a'. Diagnosis calls for more detailed information.
- b. Discovery and diagnosis determines the direction and location of search.
- b'. Search and innovation produce redefinitions of the problem, changes in level of aspiration, and displacement of the ideal.
- c. Search and innovation provide what is to be evaluated and chosen.
- c'. Evaluations and choices foreclose on what will be sought. Search is conducted to justify what has already been chosen as a solution.
- d. Evaluation and choice must be authorized before being implemented.
- d'. Rejected authorization or failed implementation forces reevaluation; (d'') redesign or (d''') redefinition.
- e. Problem diagnosis determines the evaluation and choice. Search is eliminated. The solutions to the problem are given by the diagnosis.
- e'. The evaluation and choice result in modifying the diagnosis. What we want to do leads to our articulating that we have problems.
- f. Implementation experience changes scanning focus.

It seems reasonable to suggest that all of these cause-effect linkages are likely to be observed but in differing amounts and in varying significance. It is likely that effective organizational decision processes will tend to display more of some linkages than others. Effective decisions will be described by different patterns of linkages than ineffective decisions. For example, organizations that exclusively focus on search for justification, where managers must primarily be naive advocates rather than naive scientists, are likely to be in a state of decay. But organizations that demand only naive scientists to the exclusion of the naive lawyers, also do so at their own peril. It becomes a matter of how much of each causal linkage is present, not the absolute amount. We are likely to find a direct relation between how much of each is present and the organization's effectiveness. Some degree of contiguity in time or place is mandatory for easy process flow. We can take advantage of contiguity by making it easier for certain executives to be closer together in time and space. But total dependence on contiguity to drive the system, would make for organizational disaster.

We speculate that organizational decisions are likely to be most effective if characterized by stronger forward linkages (a, b, c, d) but with bursts of accompanying backward linkages such as c', b', and a' and some stronger backward linkages particularly d''' and f. Such linkage analysis may be an important guide to developing decision support systems and improving organizational decision effectiveness. We may be able to relate missing or inadequate linkages to the effectiveness of decision outcomes and satisfaction with them.

In the garbage can model of Cohen, March and Olsen (1972), applicable

to organizational anarchies, preferences are ill-defined, inconsistent, unclear, uncertain or problematic. Secondly, the means the organization uses are unclear and misunderstood by their own members. Learning and precedents are a matter of accidental, trial-and-error. Thirdly, participation in the **decision**-process is fluid; the mix of decision-makers changes capriciously.

"...such organizations can be viewed...as collections of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for issues to which there might be an answer, and decision makers looking for work." (p. 1)

Such an organizational anarchy is characterized by weakened linkages in the model of Figure 8. Thus, ill-defined preferences are conceived to imply fuzzy evaluations. Misunderstood means imply fuzzy search mechanisms. Fluid participation results in fluctuating scanning, diagnosis, search, and evaluation. This weakens all linkages. Boundaries between the problem, search and evaluation processes are also weakened to the point that much overlapping occurs.

The Kepner-Tregoe or Maier staging-trained rational organizations can be conceived in the model as maintaining strong, direct, forward linkages from problem to search to evaluation (a, b, c).

The romantic, mystic, political, rationalizing organizations can be conceived as maintaining strong backward linkages from evaluation to search to problem (c', b', a').

Some other possible but highly ineffectual linkages are not shown in Figure 8. For instance, a threat picked up in scanning might lead to bypassing diagnosis and search to achieve a much too-hasty choice.

Cultural effects should be seen. One wonders which links Cartesian-intoxicated Frenchman are likely to emphasize in contrast to the Japanese

pursuing non-Western logics?

Some Alternative Methods. The use of verbal protocols has been a major approach to studying human information processing, particularly for complex tasks (Clarkson, 1962; Newall & Simon, 1972). But it would seem preferable to use Bloom's stimulated recall method (Bloom & Broder, 1950) to study the process with less potential interference of the method with the activity under study. As the audio or videotape of a decision-making experience is played back, a second tape is running to record the participant's recall of events. This ought to stimulate more salient material as well as enhance the reliability and validity of the recall.

Perrow (1972) suggested a way to assess how much decision-making is required in a designated situation. Organizational members are asked how often they face problems for which there are no ready solutions. Unfortunately, distorted answers are expected. It would be useful to find indirect ways to ask this same question.

There are a paucity of multistage and organizational decision-making experiments completed because of the inherent difficulties found in such research. Needed is a method, probably using an interactive computer program where a few simple premises would suffice for handling the task.

Problem Discovery and Diagnosis

In the ideal, problems emerge as reactions to true gaps between the actual and desired state of affairs; they are the result of variances from expectations. But regardless of the true state of affairs, there are proactive individual decision-makers who will always find or even invent

problems like the small boy given a hammer will find things to hammer. A veteran of 30 years in the federal service quipped that one could always find problems to solve. If organizations are apart, they need to be put together. If they are together, they need to be separated. This will make for a long career as a federal executive. Change, for change's sake, is advanced as an argument for determining that a problem exists and that decisions are required about what changes to institute. Nevertheless, most managers state that they would like to be more proactive, more alert to possible problems than they actually are (Bass & Burger, 1977). How to promote such proactivity is an important unresolved issue.

If not started by a crisis, the sensed gap between current and desired states seems to wax in urgency. Then, if search and choice processes do not follow, it is likely to wane in a good many instances. We know very little about such aborted organizational problems. Some obviously don't go away and failure to attend to them leads to worsening of the situation. But there are many problems that if left unsolved, do tend to go away. How can we detect which problems will be best handled by being abandoned rather than solved?

To be kept in mind is that the current load of problems is likely to determine the extent executives are open to considering new ones. A manager facing crises does not look for additional problems; one faced with a few mild problems is likely to search for opportunities. The threshold for reacting to a problem will shift depending on the executive's work load and the number and type of decisions currently being faced (Radomsky, 1967).

While March and Shapira (1982) see the contiguity in time and place of persons, problems, and solutions as central causal factors, Perrow (1972)

finds it hard to accept the Cyert and March (1963) idea that organizational goals emerge primarily as a fortuitous process based on "disorganized file drawers of goals" each organizational constituent maintains to bring forth in negotiated trade-offs. Solutions are developed by decision-units looking for problems. Perrow suggests the determination of organizational goals is and can be much more intentional and rational. We are dealing here with empirical questions. No doubt, one can find many organizations in which Cyert and March's model apply and many in which much more deliberation and orderliness are the rule. How much spontaneity and how much deliberation is near-optimum is an unanswered question probably strongly dependent on the decision task required.

Incrementing. The individual decision maker is seen by Lindbloom (1969) to make successive limited comparisons, taking small steps from the current to the desired state of affairs. What happens in a chain of decision-makers? Under what conditions does what starts at one end of the chain as a brushfire reach the other end as a conflagration? Organizations can be the victims of "creeping error". Uncertainty is absorbed. But one can also see errors being magnified as they move through successive decision units. Presumably previous organizational history produces such processes. What are the differences in the way decisions that move up the organizational ladder are modified compared to those that move down? Presumably, downward movement is much faster, for example, than upward movement.

Comparable questions can be posed about the cascade of decisions from the center to the boundaries of the organization or from the boundary units

to the center. Here, whether the environment is stable or turbulent, uniform or heterogeneous, is likely to affect the warping of the decisions. A change in a uniform, stable environment which produces problems and tentative solutions at the organization's boundaries is likely to affect central policy decision-making more **than** a change in a turbulent, heterogeneous environment which prompts one unit at the boundary to decide to modify its procedures.

Timing. The same organizational problem can surface to reality a number of times before the threshold of awareness and reaction is reached. The threshold of awareness may be reached many times and, as indicated before, actions may be avoided until the problem goes away. Whether or not organizational problems will receive attention will depend on a variety of external and internal factors unrelated to the nature of the problem itself. For instance, whether an executive happens to read a magazine article or meet an old friend, may push him or her over the threshold to take action. Although there is usually no scarcity of problems, only a portion are likely to capture the attention of executives. Some problems will be crowded out by others. Firms can continue to engage in much foolishness until hit by a downturn in the business cycle or the appearance of severe competition when they suddenly can no longer afford the slack in their systems. The same cries of alarm will go unheeded in some firms until crisis conditions appear. Executives learn to time their cries of alarm. Some of Etzioni's (1967) suggestions for continuing wider and narrow scanning mechanisms seem appropriate here. Safire (1981) notes that after each new U. S. President is inaugurated, the White House staffs

must first focus on policies, then on operations. Early on, more power resides with those responsible for policy considerations. In time, the operations, and those in charge of operations, come to dominate. Presumably, the kinds of problems which attract the most attention early are about policies, those that attract most attention later are about operations.

Buffers or Amplifiers. Some individual executives and decision units absorb uncertainties. They muffle alarms. Problems, in general, have to be severe to be passed on from their unit. Other executives and units tend to amplify concern for any problems which have reached their attention. We could use a lot more information about the consistency of these tendencies and what contributes to them.

Surprise. One thing seems to be certain for most policy decision-makers. Surprises are going to occur. How do organizations best prepare for unforeseen contingencies?

Recategorizations. A single piece of inconsistent evidence tends to be discounted in an overall impression. This is particularly true if the single bit of evidence is highly discrepant from the rest. Yet, such a discrepancy is also the basis of problem recognition, of recategorizing of the input from benign to triggering the awareness of a problem. Threshold studies are needed examining how the same objective discrepancies are seen as conforming to current plans and expectations or are seen as variances requiring attention (Feldman, 1981). In a world with multiple objectives, decision-makers are faced with balancing among desired outcomes. One outcome could be maximized only at the expense of seriously

reducing achievement of the others. The balancing depends on the values of the decision-makers and is likely to result in differences in what they see as important discrepancies calling for action. One executive may see a slight decline in sales as traumatic; another with more interest in product quality and service may see the same objective event as of little consequence. Each executive is likely to be unaware of how his or her own values affect the weight they attach to different kinds of variances. Many values are implicit. Executives seldom consciously introspect enough to identify their own value system (Kast & Rosenzweig, 1970) and the impact of their values on their attention to variances. Probably, values are more likely to surface to consciousness and be made explicit in the choice phase and secondarily in the search phase of the decision process.

Diagnosis. Mintzberg et al (1976) were surprised by the lack of research attention paid to problem diagnosis since they regard it as the single most important phase in the decision process for it determines to a major degree the courses of action that will be taken. It seems to be a highly underresearched phase of the organizational decision-making process. One reason for the lack of attention by American research to organizational diagnosis may be that American managers seem to pay less formal attention to the diagnostic phase than, for instance, Japanese managers appear to do (Drucker, 1971).

Structuring. Much of our argumentation has centered around whether problems are well or ill-structured as given. Yet how well a problem is structured is variable in itself and is modifiable. For instance, when we try to make use of a computer to assist in dealing with a problem, the

program writing requires that we carefully increase the quantity and quality of the problem's structure. We are forced to be more explicit and more systematic. What we need to research is how readily we can accurately move problems from the category of ill-structured to the category of well-structured. We need to learn what is lost in the process as well as what is obviously gained in terms of being able to use available algorithms because of the improved problem structure. Structure is man-made simplification of reality. One can reach precise but erroneous solutions to what in reality are complex problems. Body counts are poor indicators of enemy morale and willingness to persist.

Decision-making for a closed system can pursue optimum solutions. Where the system remains open, one can only establish criteria of good decisions based on perceived improvement over past performance or by comparison with performance in similar organizations. To the degree that the system for which the decisions are being made could move realistically toward more closure (for example, by increased control of the organization's environment), decision-making could move further toward optimality. Obviously, the costs and threats might be much greater than the benefits of moving from satisficing with an open system toward optimization and closure with a less open system. Nevertheless, there may be considerable overall benefit from reductions in the openness of a system or a subsystem by vertical integration of all the units in the organization, for example, or by making long-term agreements with suppliers or buyers.

Goal Clarity. This is seen repeatedly in management surveys to be associated with organization satisfaction and effectiveness (Bass, 1981). Nevertheless, March and Shapira (1982) suggest that ambiguous preferences

permit exploration and development of more attractive goals. Establishing a single, clear, goal toward which everyone must work may produce less satisfaction when conflicts of interest are present than "creative obfuscation" and sequential attention. Again, the decision tasks may determine which direction is best to take.

Simplification. Structuring, closing the system, and clarifying goals, are all seen as simplifications by organizations of the decision process. The decision process does not search for and evaluate all possible alternatives. Multiple goals are handled sequentially. What we know about how rumors and individual perceptions and cognitions are simplified can also be examined for relevance to the organizational situation.

Search and Design

Search and innovation depend on the source of the discrepancies which alert the decision-makers to the existence of a problem. Four types of benchmarks provide the anchors against which departures signal the emergence of possible problems and the direction search or innovation should take. First are criterion checks such as territorial sales. Second are repetitive procedures such as annual performance ratings. Third are policy statements. Fourth are other decision units inside or outside the organization. Ference (1970) suggests that deviations from explicit criteria and from routines are likely to stimulate search in the immediate area of the problem and among solutions already available. But departures from policy are expected to result in more extended search and design efforts.

With reference to the impact of others in the organization or outside it, some regularities of consequence may be found. For example, one may

speculate that in the absence of clear criterion checks, the impact of other decision units on problem awareness and the instituting of search is heightened. Furthermore, decision-makers will set different weights on the various units in the organization. A Dean practicing management-by-exception may institute search and choice based on the complaints of one student whose complaint has been ignored by the allegedly offending faculty member.

Design Alternatives. Organizational design still seems to be a matter of art and personal preference. "By their organizational designs, ye shall know them." We need simple studies of how executives would like to organize those around them and how they actually do so. A set of standard cases could be developed which could be used to discriminate among executive preferences, for say, more or less hierarchy, and for more or less structure. Studies of transferred executives could determine how they actually do introduce their particular favored approaches to organizational designs as opportunities to do so are made available to them.

Overload. Increasingly, computer technology expands the load of information available to decision-makers. How do they deal with overloading? By temporarily ignoring portions? By processing the more accessible portions? By declining in receptivity as a function of fatigue? By using waiting-line tactics? By filtering to simplify? By organizing to receive generally fewer broad lumps rather than more detailed inputs? By using parallel processing channels? By withdrawing altogether? (See Miller, 1960).

Sequential or Parallel? For Simon (1955), search is sequential; each successive alternative is judged for its satisfactoriness until a threshold is reached. For Soelberg (1966), search generates parallel alternatives whose explicit comparisons against an implicit favorite await the end of search. For Soelberg, there is more rationalization and justification in the search and choice process. It is probable that both rationality and rationalizing are occurring. How much of each is an empirical question no doubt affected by the constraints and contingencies of the situation and the decision-makers.

Speed of Decision. Search is divergent; choice is convergent. Early choice shuts off possibilities of wider search and likely innovative alternatives. Trade-offs exist between rapid decision-making, cost of search, creative innovations and higher quality solutions. Can decision-makers be taught the conditions under which search should be extended and choice delayed?

Character of Evoked Alternatives. We still have only a modest amount of understanding about the character of the array of alternatives that will emerge.

Along with areas of control, the impact of the diagnosis, and the outcomes sought, the alternatives generated depend on a variety of additional exogeneous variables. March and Simon (1958) suggested a number of such variables including the objective availability of external alternatives, one's felt participation in decision-making, organizational inhibitors, task complexity, and decision-makers' competencies. Many have commented on the abstractness of Simon's bounded rationality argument that decision-makers search "locally". What is meant by this? More generally, what else

limits the search process, apart from the problem diagnosis and the intended outcomes? It is suggested that decision-makers start by focusing on those variables over which they have control (Emory & Miland, 1968). It would follow that ordinarily they next would focus on these variables over which their decision-unit, then their organization, has control. Finally, they would consider environmental conditions over which they usually have the least control.

Sources of Information. Ference (1970) suggested that information will be sought informally for ill-structured problems. Furthermore, information sources will be selected according to substantive needs, not the prescribed organizational rules, and from sources used frequently rather than infrequently. Consistent with this, Klauss & Bass (1982) were surprised to find in large scale surveys of engineering project personnel that as much as 85 percent of the employees' information came from interpersonal contact, face-to-face or telephone, rather than by written documents and memos.

Presumably, with the advent of Management Information Systems, the computer is becoming an ever-increasing source. Also, the size of the organization, the functions of the manager, and the type of decisions are obviously likely to affect which sources are selected. But the issue of information sources remains underresearched. The sources, are likely to differ on such important dimensions as their credibility, availability, saliency and comprehensiveness.

Evaluation and Choice

Research is needed on how information and the structure of the situation in which it is embedded are used to make choices (Slovic &

Lichtenstein, 1971). Again, relatively little is known about the interplay of what is required in a choice situation and the particular biases of the decision-makers. On the one hand, the decision-makers' statistical knowledge, skill, tolerance for ambiguity, motivation and familiarity with the choice situation make a difference in the choice made. On the other hand, choice will be a function of situational factors such as failure and the importance of the decision. For example, more risky choices are likely to be taken when decisions are less important. We are willing to take bigger risks when the stakes are low.

A list of questions about risk in environmental, health, and safety decision-making includes: How do we determine how safe is safe enough? How are implicit estimates of risk translated into decision-making? What are the institutional constraints associated with decision-making in the face of risk and uncertainty? How are individual perceptions of risk aggregated to social (and organizational) perceptions of risk? Are some risks unacceptable no matter what the expected benefits? (PRA, 1979-80).

Exploitation versus Exploration. Organizational decision-making often can be seen to lie on a dimension ranging from conservative exploitation to exploratory gambling. Exploitation usually yields relatively lower but more certain payoffs than does exploration which in turn yields relatively less certain but higher payoffs. Exploitation is preferred if less risk can be tolerated, but many more conditions generate exploitation rather than exploration or vice versa and would seem well worth examining. Time preferences as to when money outcomes are to be achieved have been

computed but the numbers obtained do not necessarily mirror a decision-maker's true time preferences (Weingartner, 1969).

Simulations are available for the study of exploitation versus exploration such as Exercise Koloman and Exercise Venture (Thiagarajan, K.M., 1975). MacCrimmon (1974) suggests that for quick decisions the more adventurous gambling strategy should be preferred. Presumably, those preferring exploitation have concave utility functions against increasing uncertainty; those preferring exploration have convex ones.

While utility functions seem relatively stable over time (Grayson, 1960), the interplay among executives with different shaped utility functions, seen by Swalm (1966), would be well worth further study. One interesting question is as follows: If one is in a chain-of-command, how will one's utility function be modified knowing that one's decisions are to be reviewed by higher authority? Results of the vertical interplay of decision-making units are likely to be quite different in an organization with an open, trusting climate than one which is closed and untrusting. The risk of taking risks is magnified when trust is absent. Unfortunately, direct methods of measuring individual utilities are likely to be highly distorted. (Sen, 1970; MacCrimmon, 1974). We need to develop or use indirect measurement methods of utility such as error choice, sentence completion, or even projective techniques or better yet we need to employ actual investment or purchasing behavior.

Strategic Assumptions. Promising but untested is Mitroff and Emshoff's (1979) approach to the evaluation of a designated strategy by working backwards to the data supporting it, then from the supporting data to the diagnostic assumptions. The data are conceived as minor premises; the

assumptions, as major premises; and the strategy, as the consequence of a syllogistic argument. Focus moves far back to the assumptions about the conditions, events or attributes that must be true about the problem.

Bayesian Analysis. Bayesian analysis permits one to adjust subjective probability estimates about the likelihood of an outcome on the basis of newly acquired data. Many questions about the application and applicability of Bayes' theorem remain unanswered. For what kinds of choice situations is the Bayesian approach best suited? How can we obtain accurate subjective probability assessments? What is the best way to revise prior probabilities on the basis of new information? What procedure should be followed to revise prior probabilities from a complex of information from different kinds of inquiries such as market tests, product-use tests and surveys?

How can the Bayesian approach be applied when the decision-making unit is a group? How can it be combined for a cascade of decisions involved among line executives, or specialists, and other staff personnel? (Newman, 1971).

Effects of Failure? Theories about the impact of trouble on the willingness of organizations to increase their risk seeking generally have not been supported by research findings. Both increased chances for survival and for complete failure seem to result in failing organizations increasing their risk seeking (March & Shapira, 1982). What may be needed is a theory about changes in risk taking that accompany fast growth and success as well as decline and threat of failure.

Unintended Consequences. Organizational decision-making is replete with

examples of choice solutions producing both intended and unintended consequences. March and Simon (1958) contrasted Merton's (1936), and Gouldner's (1954) models of how the demand by the organization for control not only results in intended consequences such as emphasis on reliability, use of impersonal rules and visibility of power relations, but many possible unintended consequences such as interpersonal tension and felt need for defensibility. Unknown is how much attention is paid, and how much should be paid, to unintended consequences, when making choices.

Conflict and Authorization

Relatively little research has been completed on this phase conceived by Mintzberg et al (1976) as a final acceptance or rejection resulting in the action to go forward or upward in the organization with the proposed solution. For instance, we know little about how socioemotional factors in the earlier phases of the decision-process affect acceptance or rejection. Much more attention has been paid to the implementation of decisions as a function of commitment developed.

Coalition formation studies have focused on outcomes rather than the process involved and so the latter, in particular, remains less well understood. Nevertheless, Davis, Loughlin and Komorita (1976) have been encouraged by the agreement of predictions from descriptive and normative theories about the union of weaker persons against the single stronger person in the behavioral experimental studies generated by economic and mathematical theories.

Legitimacy. What makes a decision process legitimate? Legitimacy is attached to a decision which is reached by "due process". The process

follows a course prescribed by agreed upon rules, by custom, or by law--it is "due course of process". March and Shapira (1982) offer two propositions. To be legitimate, the process is sensitive to the concerns of relevant people. The "right" people have influenced the process. (But who are the right people remains a big question).

It would seem worthwhile to fully explore and expand this important contribution to acceptance, authorization and commitment.

Constraints

How close decision-making should be to the scene of the action is a general subject of continuing inquiry. Can effective marketing policies for a foreign subsidiary be made at the international headquarters of the parent multinational firm? Can top management make effective planning decisions for worker-supervisor configurations? Self-planning decisions come closest to optimal (Bass, 1977). But when self-planning is not possible, many suggestions have been offered for offsetting the separation of planning from doing.

How to organize effective decision-making relevant to the technology of the organization remains a central research question. Much of the argument in favor of hierarchy as the "natural law of organizations" is as polemical as the argument for power equalized systems. Still needed are conceptualizations of technology that will directly suggest the kinds of organizational decision processes that will approach nearer to optimal. How and in what ways should we depart from hierarchy for various newer kinds of technologies to come closer to better decision-making? What designs will be most effective for man-computer-equipment team networks?

What designs can achieve better decision-making in retirement communities?

It seems obvious that organizational decisions will be more effective the greater the participation and influence on them of those decision-makers with more relevant information. The more information and authority to decide are correlated in a system, again the more likely the decision outcome to be effective (Bass, 1960).

Informal Organization. Although it is well known (see Dalton, 1959, for instance) that the informal channels of communication and other informal links between organizational members deviate from the formal channels of authority and control, we still have little appreciation of how the amount and direction of such deviations systematically affect the decision-making process. Presumably, conflict increases with increasing deviation (or increasing deviation reflects increasing conflict and blockage in the formal organization).

Individual Biases and Reeducation. What happens when decision-makers are made aware of their biases which fly in the face of reality? The continuing success of one-armed bandits and lotteries with high but improbable payoffs suggest that intellectual understanding about 1:10 versus 10:1 bets does not produce much change in continued preference of the majority for the long shot. Statistically astute psychologists still are victimized by the erroneous law of small members. As Slovic, Fischhoff & Lichtenstein (1977) noted, experts often do no better or even worse in making decisions in the face of uncertainty. As experts, they often suffer from overconfidence and do particularly poorly even in comparison to a random strategy implying knowing nothing about the process. Can such decision-making be

improved by attention to the socioemotional as well as the intellectual aspects of decision-making in uncertain situations? How should such reeducation be developed and evaluated?

Katz and Kahn (1966) suggest bringing together for making planning decisions the upper level managers concerned about long-range objectives and the lower level managers responsible for carrying out the actions required by the plans. Fisch (1961) proposed closing the distance by declaring that the line-staff concept is obsolete. Early in product development, for instance, a team of basic experts in R & D, marketing technology, etc. are responsible for decisions. As the product idea progresses, some basic people are dropped from the team; developmental engineers and technicians are added. In later development, the final production and service managers who will actually conduct operations join the team with the developers dropping off.

Many of the devices of self-management and other forms of industrial democracy are legislated efforts to close the distance between decision-making and decision-execution. (See Bass, 1981, pp 203-206).

Concern for theory and concentration on describing departures from optimality has probably undercut useful empirical studies of effective and ineffective organizational decision processes using the standard approaches of personnel psychology such as the critical incidents technique. We should focus more attention on this central question of what differentiates effective from ineffective decision processes. Curtis (1976), for instance, used the critical incidents technique in interviews with 45 randomly selected school superintendents. Conclusions reached were that effective rather than ineffective decisions were more likely if teams rather

than individual decision-making was employed, if adequate time was allowed, and if a plan of action emerged from the process.

Contiguity. If March and Romular (1976) are correct about the extent to which contiguity in time and place of problems, solutions, and decision-makers is important or more important to decision outcomes than hierarchical or consequential means-end analyses, then we could do much with network studies, physical layouts, and man-team-computer-linkages, to determine how much weight should be given to contiguity over "logic" in understanding decision processes.

Decision Aides and Support Systems

EDP. Electronic data processing as a decision support system is rapidly expanding in terms of its potential applications and effects on organizational life. Alter's (1976) study of 56 EDP decision support systems revealed six ways by which they provided support: (1) **retrieving** isolated data items; (2) providing a way for ad hoc analysis of data files; (3) obtaining prespecified aggregations of data in the form of standard reports; (4) estimating the consequences of proposed decisions; (5) proposing decisions; and (6) making decisions. We need to detail Alter's (1976) parallel discovery of the many unintended consequences of these support systems. He found that the users valued the EDP support systems for a variety of reasons completely different from the intended purposes of the systems. A wide range of such purposes were seen. The support systems were valued as helping to improve interpersonal communication, problem solving, individual learning, and organizational control.

The support systems were also seen to provide managers with vehicles for persuasion and organizations with a common vocabulary and discipline to facilitate negotiations among decision units.

The advent of the computer has been a great leap forward in information processing. It should make it possible for the relevant, detailed, information to be available as needed. It can provide much of the necessary scanning, signaling only when necessary for human intervention. It can draw together what is needed for improved diagnoses. It can widen and intensify the search process exponentially. It can facilitate the evaluation and choice process by improved display to promote human understanding, generation of synthetic alternatives, displays of alternative futures and so on.

Nevertheless, there remain great discrepancies between the promise of what computer technology can offer and its effectiveness in supporting organizational decision-making (Milutinovich, Lipson & Naumes, 1976). Presumably, many of the unanswered questions about organizational decision-making in the decades ahead will center on these kinds of interactions between computers, individuals, and organizations. The required, correct, information must get to the right person and place at the right time (Brink, 1971). With computer technology, information may be plentiful without being relevant. It may be extensive but inadequate. It may be detailed but not precise (Hertz, 1969). "Its seeming comprehensiveness (can be) illusory and, although it flows in without respite, it (may) not (be) timely. In short, it (may be) less a help than a hindrance to effective decision making and control." (Hertz, 1969, p. 30)

For effective decision-making, middle management usually needs more than original summaries of transactions during a given period. The

data may need to be resorted, resummarized and reformatted. One manager may need output displays quite different from those required by another manager.

Established schedules for data gathering and printouts may completely fail to serve the need for a rapid decision at a particular point in time. The executive may have to fall back on less desirable but available data bases.

Management attitude and lack of education seems to hinder the potential use of the computer in planning and forecasting. "Most managers cannot easily communicate their experience and judgment into machine readable actions." (Milutinovich, Lipson & Naumes, 1974). The challenge for both research and education is to develop human capabilities to measure up to the technological capabilities of the computer and to reshape organizations and their policies to facilitate the process.

Nominal Groups. We need to explore the conditions under which nominal groups do better than real groups and vice versa (Hoyt, 1974). Further, no one has yet invented a way to determine who in a group, either nominal or real, has the best answer since group results continue to be found better than that of the average member but not as good as that of the best member. If one could estimate in advance who was the best member and groups accepted this estimation, group results could be moved further toward optimality by differentially weighting votes of individual members according to their estimated expertise--the SPAN technique.

The effectiveness needs to be explored of nominal groups, brainstorming, synectics, etc. as part of a larger decision process. Comparisons among these aids will be useful.

MAUT. Numerous questions remain to be answered about the validity and applicability of Multiple Attribute Utility Theory. These include questions about what assessment procedures to use, the impact of missing or neglected attributes, the assignment of weights directly or indirectly, whether and where it can be applied, as well as how to go about validating the theory (Slovic, Fischhoff & Lichtenstein, 1977).

Elegance. Like Gresham's Law, simpler but less adequate analytical aids appear to forstall the use of more complex, more valid ones. Consider a common decision that finance officers are called upon to make, namely, how to evaluate equities. According to a survey by Bing (1971), despite the more elegant approaches taught in academic institutions, three-fourths of practitioners tended to concentrate on only three simple procedures: comparing price-earnings multiples with norms, comparing price times estimated future earnings, and comparing p/e multiples and growth with industry norms. Yet, a rich academic literature is available (e.g. Brealey & Myers, 1981) on the theories and techniques of finance, providing both deductive and empirical validations of more sophisticated alternatives to making effective decisions.

In the same way, DeVall, Bolas and Tang (1976) have shown that implementation by management of applied research is hindered rather than helped to the degree that the research results are supported by elegant rather than simple statistics, conceptualizations, and research designs.

One reason for the continued greater use of simpler aids is greater familiarity and experience with them. But another reason for the wide gap found between academic research and real world practice as pointed out by Bing (1971) as well as Carleton (1977) among others, is that process issues

play an important role in determining such decision-making and its effectiveness.

Even after coaching, decision makers may reject the underlying premises on which a complex aid is based. They also often see the aid as too complicated and unrealistic. Even if the aid is used, the conclusions reached with it may be rejected as too difficult to explain or justify to receive authorization. The quality of that conclusion depends on the quality of the judgments put into the analysis by the decision-makers no matter how sophisticated the analysis. Unknown is how sensitive decision aids are to errors in problem structuring. Equally unknown is how much a decision aid is worth (Slovik, Fischhoff & Lichtenstein, 1977).

A Systems View. A rich unmined area for study will accrue from Keene and Martin's (1978) conception of the decision supports as part of a larger system of decision-maker and decision support. The decision support is a model of reality to be used by the decision maker to examine various alternative futures for which different parameters, variables and assumptions are entered into the model. As these futures are displayed, the decision-maker's cognitive map of reality is modified. The decision-maker's final choice of alternative emerges from comparisons among these displayed futures. The changes in these maps during the course of interaction between decision-maker and model may be a particularly informative way to open up new understanding of the organizational decision process. But this is only one among the wealth of opportunities for empirical research on organizational decisions. Such research will contribute to better understanding of human decision-making in organizations as well as more effective utilization of organizational resources.

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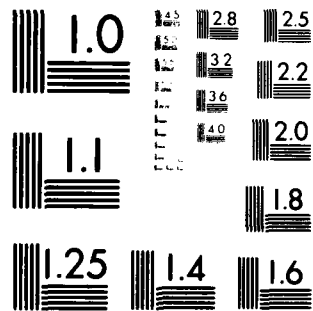
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