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ABOUT INFORMATION USE?

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*Decision-making*

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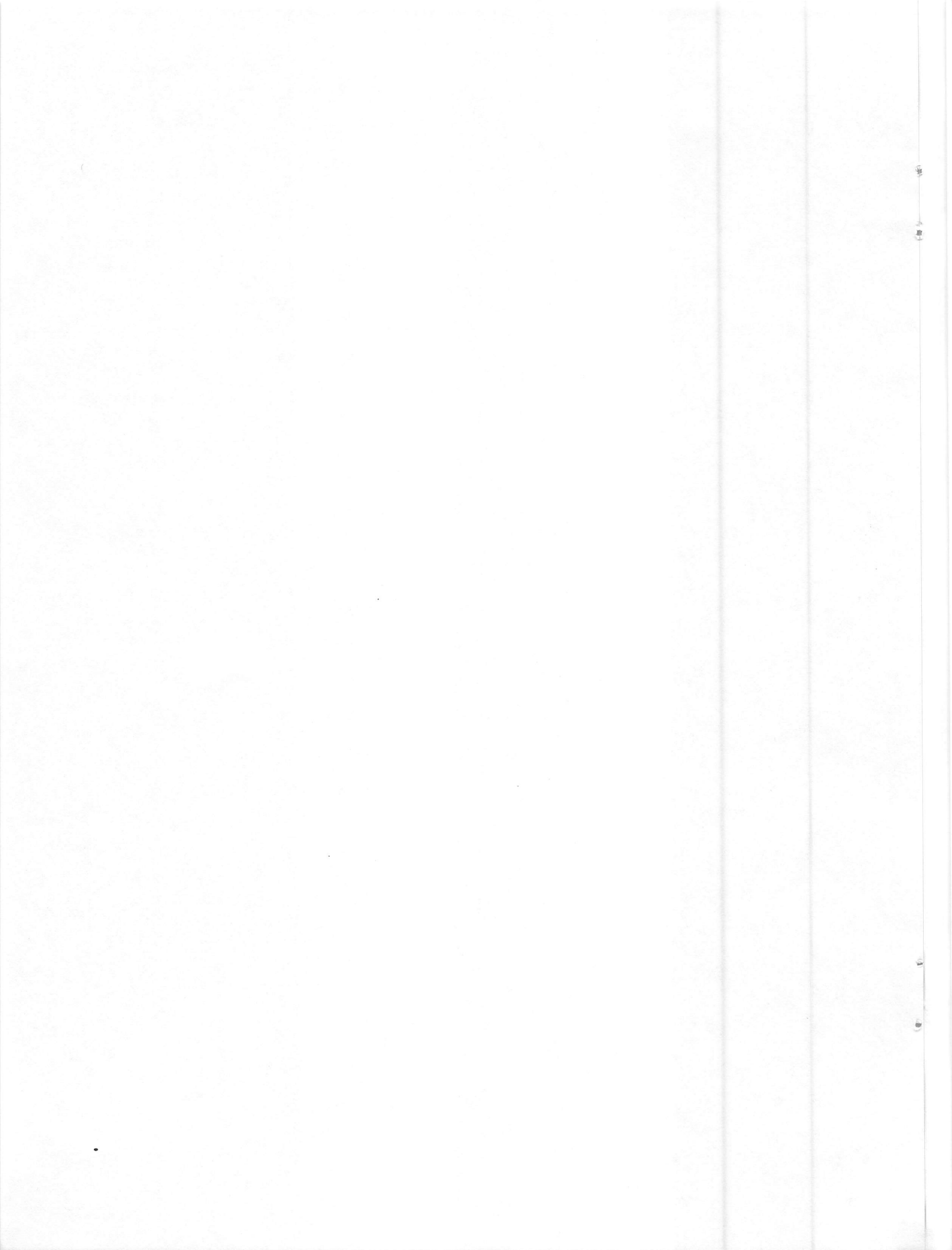
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# What Do Decision Models Tell Us About Information Use?<sup>1</sup>

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January 11, 1988

## **Introduction**

While the role of information in decision has long been the central focus of the knowledge utilization literature, there has been increasing recognition of the need to better define the context of decision in order to gain a better understanding of the use of information.<sup>2</sup> Weiss (1983:220) warns that the effort to increase our understanding of research use in policymaking is "likely to be unproductive unless competing sources of influence are taken into account." To meet this concern and to guide her analysis, Weiss introduces an ideology-interests-information framework. Recently, Sabatier (1987) presents an elaborate conceptual framework embracing many of the same basic themes. He models both analytical debates and "sovereign" decisions as being strongly influenced by the struggles of advocacy coalitions within policy subsystems. Various "dynamic" system events and relatively less likely changes in system parameters can also affect the resources and constraints of subsystem actors. For the literature on knowledge utilization, these contributions represent important conceptual advances.

Nevertheless, this work has not looked *into* the decision-information nexus. That is, these authors have placed the nexus into a cocoon and weaved a web of concepts that model pertinent outside influences. In this paper, the opposite tact is taken, and we attempt to model the relationship between decision and information. We explore the



hypothesis that different decision regimes imply different patterns of information use. This requires that we discern different types of decision and information, distinctions not often made in the knowledge utilization literature. Our findings are based on inferences from theory, and therefore must be considered as tentative hypotheses subject to further refinement and empirical testing. The focus of this paper should not be interpreted as minimizing the importance of the factors delineated by "outward-looking" attempts to situate decision and information use. In fact, that work provides a convenient point of departure, allowing this paper to focus on a relatively narrow set of issues.

To motivate our discussion, we argue that information is more than research, and then define three broad categories of information used in decision: data, research, and analysis. With these definitions in hand, we turn to the models of information use commonly discussed in the literature--engineering and enlightenment--to see if they differentiate among different decision contexts and associated patterns of information use. They prove inadequate for this purpose. Our assessment is buffeted by examining their decision complements, the rational and cognitive decisions models. However, the strategy of turning to decision models for guidance on information use opens up new possibilities. There is theoretical work in the decision-making literature that makes distinctions among different types of decisions. Three decision models--routine, incremental, and fundamental--are reviewed and then used to determine their implied demands for information. Our results suggest that, in theory, patterns of information use differ markedly within each decision context. One important implication is that if we believe that routine and incremental decisions comprise most decisions, then our findings suggest an inherent bias against the use of research in decision-making.

The rest of the paper fleshes out and then examines the implications of this approach. The decision context in policy issue areas change over time, so we explore the circumstances under which shifts in decision regimes are likely to occur. This

necessarily brings our discussion closer to an "outward-looking" stance. The first part of a two-part "mixed scanning" information strategy (scanning, not the intensive study of options) proposed by Etzioni (1967), is best associated with the information needs of decision-makers attempting to handle the transition between decision regimes rather than fitting within any particular decision regime. The paper ends with a summary of the findings listed as propositions on information use derived from the decision models, some general observations on decision accretion and enlightenment, and a final call for the knowledge utilization studies to investigate the impact of different types of decision on information use and the linkages between various types of information.

### **Information Is More Than Research**

The traditional focus of the knowledge utilization literature has been to examine the use of research in decision processes. The term "research" has typically designated a range of applied social science and evaluation studies. But research, so defined, by no means exhausts the information that is eligible for use in decision-making. By being almost exclusively concerned with the research or knowledge that is produced through scientific methods, the role of other types of information converging on policy-makers and their staffs has been ignored. It may be the case that research studies rarely come to the attention of policy-makers and senior staff, but we do know that these individuals spend vast amount of their time managing the flow of information. What else might qualify as information? In addition to research, I propose that data and analysis be included as distinctive forms of systematically produced information. Although data, research, and analysis may not meet the standards of more elegant conceptions of knowledge found in the literature, it is reasonable to assume that some combination of these types of information feed into decision processes.<sup>3</sup> Below, provisional definitions

of data, research, and analysis are proposed. It will be argued that even though these different types of information are often closely related, they are conceptually distinct.

**Data.** That data has been generally overlooked in the knowledge utilization literature as one type of information used in decision-making because of its focus on research. Nevertheless, in his early study, Caplan (1975) found it impossible to ignore the ubiquitous nature of statistics and other indicators when investigating the use of research by decision-makers. Indeed, one important function of government agencies is often to produce data. A small, but growing literature has begun to examine the role of data in policy processes (Weiss and Gruber, 1984; Rich, 1981; and de Neufville, 1975). The intent of data is to inform and influence decision-making processes. Although data is frequently used in research and analysis, it is possible to conceive of data generation and collection as a distinct activity. Data generation and collection refer to the mechanical processes of creating and storing data for use by others. Neither process includes interpretation of data.<sup>4</sup> Data generation includes the production of economic and social statistics, polls, and status reports on administrative and legislative business. Data collection, a closely related activity, involves amassing data for use by researchers or others, and is the process that creates data sets or repositories of information. The antecedent of modern social science research was simple data generation and collection for basic indicators of social conditions (Glazer, 1959). In this sense, we can think of data generation and collection as an artifact of social science research.

**Research.** There is commonly considerable overlap in the terms evaluation research, policy research, and applied social science research. *Evaluation research* refers to those studies which evaluate the performance of programs and demonstration projects with respect to particular goals, and document other pertinent impacts, especially unintended outcomes. *Policy research* involves the application and sometimes the synthesis of discipline perspectives and techniques to study various problems and policies. *Applied social science research* provides innovations

which allow theoretical concepts from disciplines to be applied in evaluations and policy research. Research may also include the initial generation of *new data or indicators*. Beyond that, however, continued production of data using the principles and techniques developed through research falls into the category of data generation and collection. Despite the differences between these various research activities, it is useful to classify all of them under the embracing term of "research," since they share several common features. Research has been defined as "a search or investigation of some fact by careful consideration or study of a subject; a course of critical or scientific study."<sup>5</sup> Research involves study of a subject in considerable depth or breadth, or both. Such study requires a substantial amount of time. Research also typically draws upon much data, but the important point is that research goes beyond data generation and collection to ponder the underlying relationships between important variables, and perhaps to introduce new perspectives on a problem or policy. Finally, while research studies are often accompanied by recommendations for action, let me suggest that research and analysis are distinct enterprises.

**Analysis.** Some writers such as Sabatier (1987:651) use the terms research and policy analysis as substitutes. But there are important differences between research and analysis destined for decision-makers.<sup>6</sup> Policy analysis is conducted under more severe time constraints. There is simply far less opportunity to spend several months conducting a thorough investigation into the policy question at hand. Second, analysis is not concerned with generating new data. Instead, analysis requires data, already available, that is relevant to the issues being considered. Analysis may not create data, but skilful manipulation of gathered data may draw new insights from the data and for thinking about the issue. Third, analysis explicitly considers alternative courses of action and suggests a favored option for the decision-maker. This often involves providing assessments about how various interests and values are affected by predicted outcomes associated with each alternative. Finally, while analysis often relies upon



particular disciplines for perspectives and analytical tools, it can be said that one objective of analysis is *not* to discuss these contributions and their underlying models. Analyses can be reasonably lengthy, contain careful argument, and use much data; but it is a limited enterprise, constrained by time and intended to produce specific recommendations. Analysis takes its sources of data and the perspectives of disciplines as given.

The categories of data, research, and analysis just outlined may seem rather crude when compared to the finer gradations of information offered by Majchrzak (1986).<sup>7</sup> It might also be suggested that other legitimate sources of information include anecdotes, gossip, hearings, and intelligence. However, in setting out a more basic three-part typology, our objective is to capture important differences among broad categories of structured information. These broad conceptualizations should agree with our casual understanding of what data, research, and analysis are in practice; it might be possible for these categories to form the basis of empirical studies. Our approach is parsimonious: there is no need to create an excessive number of categories simply to demonstrate that prevailing models of information use and their decision complements do not make distinctions amongst different types of information. Yet, these categories will later allow us to identify variations in the patterns of information use implied by three alternative decision models.

### **Why Engineering and Enlightenment Models Do Not Reveal Much About Information and Decision**

With provisional definitions of data, research, and analysis in hand, we can take up the challenge of determining what types of information are likely to be used in different decision contexts. As we shall see shortly, responding to this challenge exposes some fundamental weaknesses in the two predominant models of information utilization which have characterized, at the broadest level, the general direction that



the knowledge utilization literature has taken since the early 1970s (see Bulmer, 1987). We are referring, of course, to the decisive shift from engineering models of research utilization to the enlightenment function of research. The purpose of this section is threefold. First, it will be shown that neither of these models has much to say about the use of different types of information in different decision circumstances. Second, it will be argued that the engineering and enlightenment models of information use have complements in, respectively, the rational and cognitive decision models. Understanding these decision models helps to explain why engineering and enlightenment models do not shed much light on how information is used in decision. Third, this section introduces the reader to the notion that we can move back and forth between information and decision models; the following section endeavors to use three other familiar decision models to derive alternative hypotheses about information use.

#### *The Engineering Model and Its Rational Decision Complement*

Before the enlightenment model of research utilization became widely accepted, a very different conception of how research related to decision had much currency. Weiss (1977) once argued that the "prevailing concept of research utilization stresses application of specific research conclusions to specific decision choices. A problem exists; information or understanding is needed to generate a solution to the problem or to select amongst alternative solutions; research provides the missing knowledge; the decision-makers then reach a solution." This conception has been referred to as the engineering model of research utilization. In this section, two points will be argued. First, the engineering model of information use has, as its complement, the rational model of decision-making. It is not surprising, then, that the engineering formulation encountered criticisms during the 1970s similar to those launched against rational decision models a decade or two earlier. Second, the engineering model imported many of the weaknesses of the rational decision model, namely little specification of decision-

making context and grand assumptions about information-processing capabilities. Thus, the engineering model of information use has little to tell us about how data, research, and analysis is used in different decision contexts.

The engineering conception of research utilization has been characterized by Weiss (1978) as being either decision-driven, where research is sought by decision-makers to facilitate decision; or knowledge-driven, where research presents new ideas and opportunities for decision-makers. Whether knowledge-driven or problem-driven, the underlying premise of engineering models is that decision-makers seek, absorb, and consider social science research findings that bear upon the policy or problem in question. Little consideration was given to the capacity of decision-makers to field the incoming research nor the appropriateness of the research for the decisions at hand. This assumption--that decision-makers soak up relevant information--suggests that the engineering models have features which are surprisingly close to those more often associated with rational models of decision. Let us now briefly examine the rational perspective on decision and then put the engineering formulation in context.

The rational decision model is predicated on the notion that a decision-maker makes choices with well-specified values and objectives in mind. A problem is identified, alternative solutions are sought and ranked according to different criteria, different scenarios are considered, and the alternative maximizing the best array of values is chosen. Allison (1971:30) states that "rationality refers to consistent, value-maximizing choice within specified constraints." For our purposes, the critical feature of the rational actor decision model is the supposition that as new information becomes available, shedding light on performance of means or uncovering new relationships amongst values, it is immediately incorporated into the decision calculus. Steinbruner (1974:35) has called this the "assumption of sensitivity to pertinent information." This is where the engineering models of knowledge use interface with the rational decision model. The engineering model assumes that social science research is used by those for

whom it is relevant. Likewise, the rational decision model assumes that "pertinent information" is absorbed by the decision-maker. Viewed from this perspective, the strong critique of the engineering models of information use during the 1970s was part of a broad intellectual mainstream, one which rejected rational models of behaviour in the areas such as politics, organizations, and consumer choice.

When formulated, the engineering models of information use were primarily concerned with research and not the role of other types of information in decision. In contrast, rational models of decision have always contained a much broader conception of information. In his review of rational decision models, Steinbruner (1974) appears to define information as anything that alters the perception of decision-makers with respect to value trade-offs and interactions with the environment. Such a conception presents difficulties because information is never defined precisely, and therefore it is impossible to deduce how different types of information might be used by decision-makers. By designating one type of information to study, those interested in research utilization were taking an important step forward since those examining rational decision models rarely made such distinctions. However, this came at the expense of understanding the role of other types of information in decision processes.

A second problem with the engineering model is that it does not account for the use of information in different decision contexts. The same charge can be levelled at its "decision" alter ego. The conventional wisdom held that the rational decision model could be applied to examine decision-making behavior in any set of circumstances. The rational model was originally developed by economists in their attempt to understand individual choice. This was taken a step further and applied to organizations. Both Allison and Steinbruner have observed the tendency of writers to treat organizations and states as single purposive entities, thus making the observed actors conform to the parameters of the rational actor approach.<sup>8</sup> There are, of course, rational decision models which seek to account for collective decision. They include game theory, public

choice, and economic theories of bureaucracy and democracy. These models attempt to account for the outcome of situations when rational actors interact with each other. There is also a growing economics literature on the role of information asymmetries and costs on the outcomes of decision situations. But rarely is the scale or importance of the decision subject to variation in these models. If there is a context for decision, it is often crisis (see Allison, 1971). In short, we have little to learn from rational models about the implications of different types of decision for information use.

*The Enlightenment Model and Its Cognitive Decision Complement*

By the early 1980s, the engineering model had been clearly supplanted by the enlightenment model of research utilization. Even the most recent and sophisticated contribution to the literature (Sabatier, 1987) incorporates the enlightenment function of research and policy analysis as a centerpiece. However, despite its widespread acceptance, the enlightenment formulation shares many of the same deficiencies of its predecessor with respect to the questions at the heart of this paper. In particular, the enlightenment model lacks a well-specified model of decision and does not examine the role of other types of information. Below, I suggest that the decision complement to the enlightenment model is the cognitive model of decision-making found in Steinbruner (1974). Although the cognitive model does suggest a potentially important role for analysis, it has weaknesses similar to those found in the enlightenment model, thus reaffirming the limitations of the latter.

The enlightenment function of research emerged as an alternative hypothesis about how social science and evaluation research influenced decision in the wake of evidence and a growing consensus that research was rarely used directly in decision. Weiss (1977) argued that research was not likely to have an impact on decision-making in the short-run because its most important impact was to alter the beliefs and concepts



held by decision-makers. Terms such as "knowledge creep" and "percolation" were coined to describe the gradual, indirect process of enlightenment. For example:

The major use of social research in public policymaking may not be problem solving, however. Research use appears to be a much more diffuse and circuitous process. Evidence suggests that government officials use research less to arrive at solutions than to orient themselves to problems. They use research to help them think about issues and define the problematics of a situation, to gain new ideas and new perspectives. They use research to help formulate problems and to set the agenda for future policy actions. And much of this use is not deliberate, direct, and targeted, but a result of long-term percolation of social science concepts, theories, and findings into the climate of informed opinion....This kind of diffuse, undirected seepage of social research into the policy sphere can gradually change the whole focus of debate over policy issues. (1977:533-535)

At the risk of pointing out the obvious, the enlightenment model (like the engineering models) only considered research and did not embrace other types of information often used by decision-makers.

The enlightenment model, as developed by Weiss, has a complementary model of decision. Weiss (1980) argues that "many policy actions, even those of fateful order, are not "decided" in brisk and clear-cut style."

No problem (or opportunity) is identified as an explicit issue, no identifiable set of authorized decision makers meets, no list of options is generated, no assessment is made of relative advantages and disadvantages, no crisp choice is made. Yet the onrushing flow of events shape an accommodation--and a pattern of behavior--that has widespread ramifications. It may in time be ratified by conscious policy action, but in the crucial formative stages, it just seems to happen. Without conscious deliberation, the policy *accretes*. That decisions often take shape gradually, without the formality of agenda, deliberation, and choice, helps to explain the lack of direct utilization of research and analysis. (1980:382)

Weiss refers to this amorphous process as *decision accretion*. But this conception of decision does not give us much to work with. Nowhere in these early renderings of the enlightenment model does Weiss attempt to account for possibly important variations in information use associated with "policy actions" of different orders of magnitude and significance. We are simply assured that research will always have indirect effects on all decisions. A more formal rendering of the relationship between information and decision provided by the enlightenment model can be found in Steinbruner's cognitive model of decision. This model, with its origins in cognitive psychology, allows us to go



somewhat beyond the enlightenment model for insights on information use, but also points to a serious shortcoming of this overall approach.

In his work on cognitive processes and decision, Steinbruner (1974:95) states that "the critical propositions of cognitive theory concern themselves with the structure of beliefs; that is, with the way in which the relationships between beliefs are organized and with the manner in which information is processed in reference to existing beliefs." Beliefs determine what values and information form the basis of deliberation, what cognitive aides are brought to bear (historical analogies, ideology, aspirations, wishful thinking, etc.), and the confidence with which the final decision is made. These processes permit decision-makers to act rather than freeze, but cognitive inference mechanisms may cause decision-makers to ignore or distort information and values, resulting in poor calculations and decisions. Steinbruner and others have examined decision-making at the apex of organizations. They focus on how groups and organizations can exacerbate or mitigate the normal tendency of individuals to filter information, especially under conditions of high stress.<sup>9</sup> In part, the cognitive model attributes the non-use of information as a logical response to information overload. But the cognitive decision approach also argues strongly that the screening and use of information is determined by the belief structures of decision-makers. The argument holds that data and research findings would only influence decision-makers if they "fit" into receptive information channels consistent with their beliefs. This, of course, is where Weiss' enlightenment model comes in; over time, the belief structures of decision-makers can be altered, permitting different arguments and evidence to be heard, thereby eventually leading to different policy outcomes.

A review of Steinbruner's work suggests a set of circumstances under which decision-makers would be receptive to analysis as defined earlier in this paper, one not envisioned by Weiss. Steinbruner contemplates the situation of decision-makers at the apex of an organization who must field vast amounts of information, work under severe

time constraints, and deal with uncertainty. Steinbruner (1974:128-129) provides this description of the *uncommitted thinker*:<sup>10</sup>

In public-sector organizations, many high officials come to their jobs through political channels, and at any rate they are often reasonably unfamiliar with the organization and its business when they assume office. As a consequence, their beliefs are not stabilized by the weight of past experience. They are particularly vulnerable to uncertainty; and, for many of the problems which face them, they quite literally do not know what to think. Such officials naturally come to depend upon the problem structuring done by their personal staff, the organizations which they head, and/or outside experts. At any rate, the information channels to which they attend provide structured, generalized arguments, and coping with these--for a wide variety of problems--is their daily business.

Steinbruner's uncommitted decision-maker "will tend to at different times to adopt different belief patterns for the same decision problem" because "his own experience does not commit him to a particular belief pattern." In some circumstances, a decision-maker may not have a set of deterministic beliefs for the decisions under consideration, especially when value-conflict arises. Value-conflict may be mitigated through value separation or avoidance of the conflict. However, the decision-maker may accept and perhaps move to resolve the value conflict. This implies a need for policies that could be adopted to address conflicts and meet the claims of particular values over time (George 1980, 28-32). In turn, this suggests a potential short-term role for analysis in assisting and persuading decision-makers about beliefs and policies they might adopt or modify when confronted with value-conflicts.

While the above proposition may provide some promising avenues for future research, Steinbruner's work also helps to make explicit a troublesome feature of both the enlightenment and cognitive models when attempting to model how information is used in decision. Consider these remarks by Steinbruner:

Careful experiment has shown that the mind at all levels of experience, even the simplest, is exceedingly active in processing information. There is no situation so simple, so structured, so certain, that the mind operates in it simply as a recording device. At higher orders of complexity, when the reality constraint is weakened, the internal inference-mechanisms of the mind are likely to become even more important. (1980:110)

Cognitive processes are thus *ubiquitous* in decision-making; beliefs will influence the processing of information and the consideration of values regardless of the nature

of the decision. This means that the domain of the enlightenment and cognitive models extend to all types of decision: large or small; routine or exceptional. Neither model discerns different decision contexts, although Steinbruner suggests that we look for use of analysis when decision-makers experience value-conflict. Otherwise, the models do not offer insights about how different types of information might influence decision. The enlightenment hypothesis may give researchers hope, telling them that social science research can influence the beliefs of decision-makers, but it does not tell us how information alters these beliefs in the present.

*Conclusion: Beyond Engineering and Enlightenment*

This part of the paper has argued that the two predominant models found in the knowledge utilization literature have little to say about how data, research, and analysis are used in different decision contexts. This part of the paper has also demonstrated that the engineering and enlightenment models of information use have counterparts in the rational and cognitive models of decision, respectively. We can take the notion that decision models help to improve our understanding of information use models one step further. For those familiar with the literature on decision-making, a moment's reflection should lead to the conclusion that the rational and cognitive models hardly exhaust the models commonly trotted out to capture how decision processes work. In the next part of the paper, we turn our attention to three well-known decision models and develop propositions about patterns of information use. With both the engineering and enlightenment models found wanting, much more is demanded of this approach: it must produce operational models of information use if there are to be any at all.

### **Three Decision Models and Implications for Information Use**

Turning to alternative decision models as possible sources of new models of information use is based on two premises: first, that we can indeed discern decisions by policy-makers, and second, that not all decisions are the same. In addition to rational and cognitive models of decision, four other perspectives can be found in the literature on decision-making: organizational process and cybernetic models (Cyert and March, 1963; Allison, 1972; Steinbruner, 1974; Nelson and Winter, 1982); incremental models (Lindblom, 1958; Wildavsky, 1963); mixed scanning and non-incremental models (Etzioni, 1968; Schulman, 197x); and garbage can models (Cohen, March, and Olsen, 1972). The last tradition emphasizes the random nature of decision processes and does not model particular types of decision nor types of information that might be used. From our perspective, then, garbage can models suffer from the same deficiencies as rational and cognitive models. This leaves us with the other three perspectives. They suggest that we consider the implications of routine, incremental, and fundamental decision for patterns in the use of data, research, and analysis.

Before delving into each decision model, it will be useful to outline how some of the underlying parameters of the models change with respect to the number of actors involved in decision and the extent to which the consensus on prevailing policy in an area is disturbed. The concept of routine decision suggests that a consensus has been established by decisions-makers or "advocacy coalitions" on the nature of policy and associated programs. This suggests that once a consensus is worked out, authority for policy implementation is delegated to one or a very few decision-makers. Incremental decision also implies the existence of a "bargain" agreed to by decision-makers, a policy base that essentially remains intact over time. But selective issues emerge and demand resolution. A somewhat wider circle of decision-makers with interests in those issues then become involved in these limited policy discussions. When fundamental decision



**Chart 1**

**How Consensus on the Policy Base and Number of Actors Change  
for Different Decision Regimes**

	<b>Decision Regime</b>		
	<b>Routine</b>	<b>Incremental</b>	<b>Fundamental</b>
<b>Status of Consensus on the Policy Base</b>	intact	policy base largely intact but marginal issues arise	core principles of policy base open to scrutiny
<b>Number of Actors Involved in Decision Process</b>	a few actors given responsibility to implement policy by policy makers	a few policy makers with a stake in the marginal issue	all policy makers potentially affected or concerned about a significant change



is in the offing, all aspects of prevailing policy regime are open to discussion, and the relatively larger potential for impact suggests that a larger number of decision-makers are bound to get involved in the decision-making process. Thus, as we move from routine to fundamental decision, we can expect that prevailing policy is increasingly called into question, and that there is deepening interest displayed by a widening circle of decision-makers (see Chart 1). This is consistent with Sabatier's (1987) contention that "it is primarily perceived threats to people's core values or interests that motivate them to expend scarce resources in policy debates."

We will now consider, in turn, the features of routine, incremental, and fundamental decision models and their implications for information use, and conclude by comparing the different demands for data, research, and analysis. As a caveat, we should note these decision models were not necessarily developed with this objective in mind, so our inferences should be considered suggestive rather than definitive. For example, it becomes readily apparent that the mixed scanning model of decision is not really a model of fundamental decision, but rather a two-part information strategy, and therefore we have to make our own inferences about the demand for information under those circumstances. Nevertheless, different patterns of information use can be discerned. As a result, we can derive a more elegant explanation for the observed lack of research in decision-making.

### *Routine Decision: Monitoring and Adjustment*

One important perspective in the literature on decision-making focuses on the routine decisions made in organizations. Its intellectual underpinnings evolved from the work of March and Simon (1958) on the implications of bounded rationality and satisficing for decision-making within organizations. These concepts were elaborated in the model of firm behavior in Cyert and March (1963). In turn, the Organizational

Process model developed by Allison (1971), the cybernetic paradigm described by Steinbruner (1974), and the more recent work of Nelson and Winter (1982) fall squarely in this tradition. These writers each cast organizational and decision-making processes as consisting of, and tending towards, routine. Their formulations suggest that if a routine decision-making system is working smoothly, its information requirements will be limited to the data necessary for monitoring performance and triggering automatic program adjustments. If minor quirks appear, analysis would help determine what modifications could be made to the decision-making system. Under these circumstances, there would not seem to be a ready role for research with its more profound critiques and insights about the system.

Routines are the standard operating procedures, programs, and repertoires developed for the reliable performance and coordination of tasks within organizations.

As Allison explains:

Organizations must be capable of performing actions in which the behavior of hundreds of individuals is precisely coordinated. Assured performance requires sets of rehearsed SOPs for producing specific actions....Each cluster comprises a "program" (in the language of drama and computers) that the organization has available for dealing with a situation. The list of programs relevant to a type of activity...constitutes an organizational repertoire. When properly triggered, organizations execute programs; programs cannot be substantially changed in a particular situation. The more complex the action and the greater the number of individuals involved, the more important are programs and repertoires as determinants of organizational behavior. (1971: 83)

Some readers, however, may believe that routine precludes decision. But decisions must establish SOPs, trigger particular programs, and identify and solve problems that were not anticipated by existing organizational routines.

Routine decisions presuppose some agreement on a policy and program. Cyert and March (1963:117) call this a "quasi-resolution of conflict", the result of negotiations among the members of a decision-making coalition within an organization. Similarly, Nelson and Winter (1982:107) suggest that we view "routine as truce." A broader view of decision processes would extend this perspective outside a particular organization. In other words, *a routine decision regime evolves because of agreement*

*inside and outside an organization about its programs and mandate.* For our purposes, such agreement is best conceived as a policy consensus amongst decision-makers. This consensus means that administrative responsibility for programs consistent with the agreed upon policy is delegated to a particular decision-maker. The focus of our analysis is on these decision-makers that have responsibility for routine decision.

Routine decision systems consist of repertoires of programs that anticipate and respond to different problems. Such a system has been described as a cybernetic process of critical variables and associated aspiration levels. Critical variables are indicators of program performance and environmental conditions. Routine decision-makers have responsibility for monitoring these critical variables. If the variables reach, or fail to reach, certain aspiration levels, then other programs from the organizational repertoire are triggered to improve performance or adjust to new environmental conditions. When something is unanticipated, the system "fails" and a limited search for a new program is initiated. Search is an important concept for all of writers in this tradition. Search first occurs near the identified "problem", and if this routine procedure is not fruitful, then search moves to the nearest alternative. This response to failure is based on the assumption of satisficing (as opposed to optimizing). It can be thought of as "grooved thinking," as a tendency to remain close to established organizational routines (Steinbruner, 125-128). What does not receive explicit treatment by these writers is what occurs in the wake of major failure, when search cannot quickly produce the necessary adjustments to the existing repertoire of programs. In this situation the consensus and coalition that allowed the development of the routine decision regime might collapse. Both minor and major failures require

decisions to be made by the responsible decision-maker, although the more significant the failure, the more likely other decision-makers will intervene.

Routine decision models suggest an interesting model of information use. If the system is operating smoothly, information is needed to monitor the environment and the performance of programs. All that is required is feedback on designated critical variables and notice when aspiration levels have been reached. According to Steinbruner:

The cybernetic thesis then is that the decision mechanisms screen out information which the established set of responses are not programmed to accept....Since the response sequences adjust to a very narrow range of information, most incoming information will be shunted aside, having no effect....The cybernetic decision maker is sensitive to information only if it enters through an established highly focused feedback channel, and hence many factors which do in fact affect the outcomes have no effect in his decision process. (1974:67)

The hierarchy of decision routines reflects a closed, predetermined system of logic and information. This prompts Allison (1971:87) to note that "leaders rely for the most part on information provided by, estimates generated by, and alternatives specified by organizational programs." Information that expands the variables considered by an organization, that does not fit into existing channels, is bound to be ignored or perhaps even discouraged. Information, in the form of research and analysis, might serve to undermine the established consensus that nurtures routine decision. *Under normal circumstances, then, routine decision does not encourage research and analysis, but does seek data on critical variables.*

If data suggests that prevailing programs are not adequate, and significant failure has *not* occurred, then decision-makers must find a program to improve performance or adapt to new environmental conditions. Decision-makers might need analysis to help ascertain (1) if a different program from the organizational repertoire should be adopted; (2) if the existing program or an alternative should be modified; and (3) if the original aspiration levels or expectations were appropriate. *Analysis would inform decision-makers about possible program adjustments (switches or modifications) by assessing the "fit" between program, environment, and*



*expectations.* The value of analysis would increase if the data obtained by monitoring critical variables was equivocal and did not provide the "clear" signals that would enable routine decisions to be made with confidence. One would not expect the analysis to go much beyond the data; it would not challenge the underlying values and agreements inherent in the programs. We will discuss the role of information after significant failure in routine decision to a later section, for it raises the possibility of *shifts* in decision regimes.

### *Incremental Decision: Successive Limited Comparisons*

Incrementalism, a second perspective on decision-making emerged as a critique and alternative to rational models. The roots of this tradition can be traced back to Popper (1944) and his concept of piecemeal social engineering, but is based principally on the work of Braybrooke and Lindblom (1963) and Wildavsky (1964). These latter authors argue that decision-makers are rarely interested in redesigning policies from top to bottom, and instead tend to make marginal changes to prevailing policies. Unlike other perspectives reviewed in this paper, the incrementalists have produced a well-specified information strategy tailored to their view of how decisions are typically and perhaps should be made. Their work suggests that decision-makers require summary data on the policy or program "base" as a point of departure and that incremental policy issues are best evaluated using the method of successive limited comparisons.

One of the prime objective of the incrementalists was to develop a more realistic model of decision that conformed observed patterns of decision-making that fell far short of the rational ideal. They claim that most political conflict and decisions occur at the margin of established policies and programs. Braybrooke and Lindblom (1963:73) tell us that in "incremental politics, political parties and leaders compete for votes by agreeing upon fundamentals and offering only incrementally different policies in



each policy area in which they are to compete." In his study of the budgetary process, Wildavsky (1979:217) supplies an important reason for this behavior: "Clinging to last year's agreements is enormously economical of critical resources (particularly time and good interpersonal relations), which would be seriously depleted if all or most past agreements were reexamined yearly." Thus, there are incentives for decision-makers not to undertake profound policy reviews, thus leaving the "policy base" as the point of departure for policy debates. Moreover, incremental deviations from the status quo are more likely to be found acceptable by decision-makers because outcomes are easier to predict; more is known about current practice than radical proposals.

How do issues arise? Braybrooke and Lindblom (1963:17) suggest that political decision-making is "better described as moving away from known social ills than moving toward a known and relatively stable goal." Incremental decisions tend to be reactive and remedial in nature. In this vein, limited policy changes are also attractive because social problems are rarely solved; decision-makers realize they will inevitably confront the same problems in the future. Thus, decision-makers have incentives to consider problems successively and in isolation from other problems, so that they can produce temporary solutions and move on to the next problem. When decision-makers do return to problems, objectives and the issues are often modified as a result of the interim experience. Lindblom characterizes the expression of concern over aspects of policy issues as being fragmented. Decision-makers can only consider limited aspects of problems and policy proposals affecting their own interests. But other values and important perspectives on the issues are sure to be represented, since other attentive actors will rally and seek to be heard if their interests are overlooked and affected adversely. In summary, Braybrooke and Lindblom (1963:141) describe decision-making as being "incremental, remedial, serial, reconstructive, and fragmented."

According to Lindblom (1958:309), "incremental analysis rests on incremental attitudes and politics." The model of incremental decision-making sets well-defined

parameters for how and what information is used by decision-makers. The analytic complement to incremental decision-making is the "method of successive limited comparisons" or "non-comprehensive analysis." This involves the comparison and evaluation of increments only, consideration of a restricted number of policy alternatives, and consideration of a restricted number of consequences for any given possible alternative. By doing so the cost of analysis is reduced significantly, especially in comparison to comprehensive analysis. But Lindblom suggests that more is at stake:

It is a matter of common observation that in Western democracies public administrators and policy analysts in general do largely limit their analyses to incremental or marginal differences in policies that are chosen to differ only incrementally. They do not do so, however, solely because they desperately need some way to simplify their problems; they also do so in order to be relevant. Democracies change their policies almost entirely through incremental adjustments. (1959:84)

Thus, those who produce information must respond to the needs of particular decision-makers and to what is possible in the broader decision environment. The crucial point is that all of this analytic activity is concerned with increments and takes as given the status quo, whether a budgetary base or a given policy.<sup>11</sup> Analysts are not likely to be rewarded for conducting investigations of programs and elements of policy that are considered to be part of the "base," since Wildavsky (1979:17) tells us that "it will not normally be subjected to intensive scrutiny." Thus, in an incremental world, interested decision-makers will seek summary data on the base and incremental analysis in the form of successive limited comparisons.

According to Lindblom, the prognosis for research use in incremental decision is quite dismal. Thirty years ago, Lindblom believed there was a poor match between incremental decision-making and social science theory:

For all the richness of economic theory, we realize that it embraces a limited number of variables and contains propositions about a limited number of possible situations. Much of our analysis carries us far beyond theory, and for some of our analysis theory is largely irrelevant....To avoid quibbling over words, let me say that we often work out problems, organize our thoughts, find answers to questions, and come to conclusions without the aid of theory; and for that matter in most of the problem areas of the social sciences, no theory exists. (1958:299-300)

Twenty years later, Lindblom and Cohen (1979) returned to these issues; the language had changed, but the views remained intact. They argued that decision-makers rely on ordinary knowledge rather than professional social inquiry when making decisions. Ordinary knowledge is based on experience and rules of thumb, whereas professional social inquiry is knowledge generated by social science research methods and theory. This leads us to conclude that research is the type of information least likely to influence incremental decision-making, since it draws upon theory, and such theory tends not to make a contribution to the method of successive limited comparisons.

*Fundamental Decision: Increased Demands for Prediction and Suasion*

A third perspective found in the decision-making literature is concerned with larger, non-incremental decisions. Perhaps the best known theoretical work on this subject is that of Etzioni (1967) who proposed a "mixed scanning" model of decision-making to account for "fundamental decisions." However, Etzioni's model, cannot be considered a decision model, and is more properly viewed as a two-part information strategy that anticipates fundamental decision. Since Etzioni actually has little to say about fundamental decision, and only the second part of the mixed scanning strategy is of direct relevance to fundamental decision, we deduce important characteristics of fundamental decision from the Braybrooke and Lindblom critique of the rational-comprehensive-synoptic approach to decisions and then discuss the implications for information use. We conclude that decision-makers would be more receptive to the full range of data, research, and analysis for fundamental decision than other types of decision because outcomes are more difficult to predict and more decision-makers need to be persuaded of the merits of a new policy.

Etzioni (1967) attempts to stake out middleground between the incrementalists' decision model and their devastating critique of the rational-comprehensive-synoptic

ideal of decision. Predicated on the observation that society witnesses more than just incremental decisions, he seeks to account for the larger, non-incremental decisions often made by decision-makers. These he calls fundamental decisions, which, for our purposes, are best thought of as significant departures from approaches previously taken in policy areas. Etzioni links fundamental decision to incremental decisions. His core idea is that incremental decisions either anticipate or elaborate fundamental decisions, which are more likely to occur, according to Etzioni, in response to significant changes in the environment or when the cumulative effect of incremental decisions is not perceived to be appropriate by those wielding power. How does mixed scanning related to these ideas?

Mixed-scanning does not describe how fundamental decisions are made, but instead sets out "a particular procedure for the collection of data" in anticipation of fundamental decisions. This data serves as intelligence for fundamental decisions, to identify problems or alternatives to solve problems. Etzioni (1986:8) tells us that the "term scanning is used to refer to search, collection, processing, and evaluation of information as well as to the drawing of conclusions, all elements in the service of decision making." As a response to the incrementalist critique of the rational ideal, mixed scanning is a strategy for striking a balance between acquiring general and specific information necessary to prepare for fundamental decisions, a strategy that recognizes the scarce resources of decision-makers. *As a first approximation, mixed scanning is an information strategy for fundamental decision.* The simple mixed scanning strategy is comprised of two procedures. The first has the objective of getting the "big picture" and is, in effect, a broad survey of the field of action. This scanning procedure is truncated once the right problems or alternatives are identified. The second consists of "zooming in," to use Etzioni's terminology, and facilitating a much more detailed examination of the problems and alternatives under



consideration. We will refer to these two procedures falling under the rubric of mixed scanning, respectively, as "scanning" and "intensive study."

Unfortunately, Etzioni does not provide a detailed model of fundamental decision nor a more detailed rendering of the role that information would have in that process. His objectives were to establish a link between incremental and fundamental decisions and to introduce the concept of mixed scanning. For our purposes, his work must be elaborated to make the concept of fundamental decision more operational, especially in terms of its information requirements. On the other hand, our object is not to develop a new theory of fundamental decision. However, we can fall back on the Braybrooke and Lindblom (1963) critique of the rational-comprehensive-synoptic decision model as a caricature of fundamental decision, while holding to our position that non-incremental decisions do happen. With respect to information use, Etzioni's mixed scanning concept must be modified and pulled apart. It is more appropriate to associate intensive study, and not the scanning procedure, with fundamental decision. Scanning may, or may not, lead to fundamental decision and does not appear to be connected with the more intensive collection of information for fundamental decision. The role of scanning is best left to our later discussion of shifts in decision regimes.

That fundamental decisions are departures from incremental decision-making suggests two avenues to explore. First, the costs of calculation and prediction are much higher for fundamental decisions. The economizing rationale that motivates Etzioni's mixed scanning strategy takes seriously the Braybrooke and Lindblom argument about the limited resources and cognitive capabilities of decision-makers, and alerts us to the proposition that a significant investment in intelligence is often required for fundamental decisions. Fundamental decisions involve higher degrees of uncertainty and complexity. If a fundamental decision is not simply a whim or an act of faith by those wielding power, then far more resources must be devoted to anticipating possible outcomes. Second, more power and information is necessary to obtain support to make

and implement a fundamental decision. With enough power, any coalition of decision-makers can attempt any decision, but here we consider circumstances where power is more dispersed. Larger decisions influence more people and therefore relatively more decision-makers will be involved in the decision process. As a result, if the distribution of power is held constant, a fundamental policy proposal requires more evidence about its merits to be offered to other decision-makers if their support is to be forthcoming. In short, fundamental decision demands more information for planning and suasion.

What are the implications for various types of information? One would expect that decision-makers would likely draw on a fuller range of data, research, and analysis for fundamental decision than for routine or incremental decision. If we suggest that an intensive study strategy for fundamental decision has similarities to the method of successive limited comparisons, but is writ larger and deeper, then several hypotheses about the use of specific types of information can be developed. Even though scanning procedures eliminate most possibilities, the analysis of alternatives for fundamental decision promises to be a more profound endeavor since decision-makers are assessing a substantially different policy approach. The prevailing policy base will be less useful as a guide for action. More is expected of analysis under these circumstances: a greater range of variables, linkages, and contingencies must be considered for a fundamental decision than would be the case for an incremental decision. Research might inform analysis since its often delves into the underlying relationships that might be affected by fundamental decision. With enough lead time, research might be commissioned in anticipation of a fundamental decision. Given the demands placed on analysis, it would be reasonable to expect that decision-makers would seek more data on variables thought to be relevant, going beyond summary data on the prevailing policy base. In short, this suggests that fundamental decision would be far more receptive to information from all three categories than either routine or incremental decision.

*Different Decision Models Imply Different Patterns of Information Use*

We have reviewed three models of decision and derived different patterns of information use. Our inferences suggest the following patterns: routine decision needs data on critical variables and analysis to recommend switching or modifying programs when the system runs smoothly; incremental decision needs data that summarizes the status of the policy base, and analysis that compares limited additions to base programs or alternatives that do not differ significantly from current practice; and fundamental decision needs relatively more data and perhaps research to feed into a more profound form of analysis.<sup>12</sup> These findings are summarized in Chart 2. They suggest that if we are interested in how information is used in decision, we should not limit our studies to tracking research use; we should also examine the use of data and analysis. Moreover, we should also account for the nature of decision.<sup>13</sup> By way of conclusion, we are now in a position to offer a theoretical explanation for the observed lack of research use by decision-makers. If research is not likely to be used by decision-makers in routine and incremental decision, if research is more likely to be commissioned or reviewed in anticipation of fundamental decision, and if most decisions are routine and incremental in nature, then we have identified an inherent bias against the use of research.

**Shifts in Decision Regimes: Scanning in Perspective**

The attention that a community of decision-makers accords to particular issue areas is certain to evolve over time. We have avoided, until now, a discussion of the role of information in the context of shifts in decision regime. A regime shift is defined as a change in the prevailing approach to decision-making in a policy issue area. We have already broached one type of event that might lead to a regime shift: when significant failure is detected under routine decision. We also introduced an information strategy,

## Chart 2

### Patterns of Information Use Implied by Different Decision Models

		<b>Decision Regime</b>		
		Routine	Incremental	Fundamental
<b>Information Patterns Implied by Decision Models</b>	Analysis	determines when programs should be switched or modified	involves the method of successive limited comparisons	involves a relatively more comprehensive and profound version of successive limited comparisons
	Data	helps monitor critical variables and indicate when aspiration levels are reached	helps summarize the policy base and feeds into analysis	requires more data on each variable and more variables are considered
	Research			research is reviewed or commissioned to identify and predict relationships between underlying variables



the scanning procedure, that did not fit either incremental or fundamental decision. In this part of the paper, we first identify several different categories of regime shifts consistent with our previous formulations of routine, incremental, and fundamental decision. This provides linkages between decision regimes and creates a backdrop for discussion of appropriate information strategies when regime shifts occur. Although we hypothesize that, in some circumstances, information use patterns change simply to meet the logic of the new decision regime; we also hypothesize that "scanning" has a special niche for decision-makers contemplating fundamental decision.

### *Some Generic Types of Decision Regime Shifts*

Using any of the three decision models as a starting point, we can model regime shifts as proceeding from a prevailing decision regime to either of the two remaining regimes. Here we explore briefly some plausible motivating factors for regime shifts in very general terms, since our objective is to determine what the demand of decision-makers for information might be as decision regimes shift. The motivating factors are similar to the external (system) event variables that Sabatier (1987) describes: changes in socio-economic conditions, changes in the systemic governing coalition, and policy decisions and impacts from other subsystems. Here we review regime shifts stimulated by significant failure under routine decision, by decision-makers dissatisfied with incremental decision, by the playing out of fundamental or incremental decision, and by the ability of decision-makers to leave "old" policy areas and explore "new" ones.

**Breaks in Routine Decision Regimes.** What happens when "not reaching an aspiration level" indicates that significant program failure under a routine decision regime? What happens when search routines fail to find viable alternatives to rectify a problem? In these situations, the consensus and coalition among decision-makers that permitted the routine decision regime to exist are threatened. If the failure is

relatively minor, when the issue comes to the attention of decision-makers it is likely to be treated under an incremental decision regime. Since the premises of the policy and program were not subverted, decision-makers would consider options to supplement or modify the existing consensus. If the failure is perceived to be major, decision-makers are more likely to treat the matter as one requiring fundamental decision; the approach to the policy in question has to be rethought and a new consensus forged.

**Transcending Incremental Decision.** When does incremental decision give way to fundamental decision? Dahl and Lindblom (1953:82) have argued that "when small increments will clearly not achieve desired goals, the consequences of large increments not fully known, and existing reality is clearly undesirable, incrementalism may have to give way to calculated risk." One possibility occurs when the very nature of a problem, previously handled adequately by incremental decision and problem-solving methods, appears to have worsened. Another possibility might have more to do with political stalemate over a problem than with the seriousness of the problem itself. In other words, decision-makers may move towards a fundamental decision either to break a stalemate or to try a bolder solution to a problem.

**Fundamental Decision Completed.** Following a fundamental decision, many smaller, related decisions must be made. This should fall either under an incremental or routine decision regime. A complete consensus about the fundamental decision may not exist, but it is not likely to be reversed at that time. Moving from fundamental decision to incremental or routine decision means that bargains have been struck, that negotiations have succeeded.<sup>14</sup> Thus, information either helps decision-makers tackle decisions within a decision regime or help to escalate deliberation to another level. In other words, when we move from fundamental to incremental to routine decision, information use is dictated by the new level of decision.

**Decision-Makers Refocus Attention.** To this point, the tacit assumption has been that regime shifts evolve according to the logic of the decision regime already in

place. However, a policy area dominated by a stable decision regime, either routine or incremental, may undergo a regime shift because problems in other policy areas are resolved or left behind.<sup>15</sup> Whether or not decision-makers believe the action provides a temporary or long-term solution does not matter; energy previously focused on one policy area is available for another. Decision-makers look for new policy challenges; they return to policy areas with renewed determination to advocate different solutions and they may be willing to threaten the prevailing consensus associated with routine and incremental decision.

In some cases, the implications of shifts in decision regime for information use are not terribly interesting; they immediately move into the logic of the subsequent decision regime and are covered by our previous discussions of decision models. These cases include when routine decision moves into incremental decision following minor, but significant failure; when fundamental decision reverts to incremental or routine decision; and when incremental decision settles down to routine decision. We now examine the more interesting cases, when a routine decision regime encounters major failure and when decision-makers are dissatisfied with progress under an incremental decision regime, and consider an information strategy appropriate in these contexts.

### *The Scanning Procedure in Proper Context*

It is against the backdrop of impending or potential changes in policy areas dominated by routine and incremental decision that scanning can be fully understood. We argued earlier that the scanning procedure could not be described as part of the strategy for acquiring information to be used in fundamental decision; that function more appropriately fell under "intensive study." On the other hand, we argue here that the scanning procedure should not be viewed as only providing information to fuel shifts from incremental to fundamental decision regimes. Scanning is an information

strategy that may also be adopted in the wake of major failure under routine decision. The scanning procedure, then, is a strategy for recognizing problems or opportunities that may require fundamental decisions. Scanning reviews information and identifies possibilities for action with the ultimate objective being to redirect and focus decision-making resources on a limited set of "fundamental" alternatives. How can the concept of scanning be translated into demands for different types of information?

Etzioni introduced the concept of scanning in direct response to argument that decision-makers could not review every possible contingency and course of action as a prelude to decision. Such an exercise would take too much time, demand far too many resources, and the decision might never get made. Scanning, therefore, is not meant to be complete; it seeks to economize on time and resources. But neither is it completely superficial, for its *raison d'etre* is to assess relatively large amounts of information and to identify new possibilities for action. In response to major failure in routine decision or efforts to transcend the alternatives provided by incremental decision, we suggest the following demands for information: trend data on a wide number of variables covering a number of years would be sought to identify emerging problems or opportunities as candidates for action; decision-makers would be more interested in and receptive to the ideas, concepts, and techniques contained in recent research studies that might feed into an important component of a new policy approach; and analysis would recommend only the most promising possibilities for fundamental decision. Only once decision-makers determine which alternatives are to be seriously considered does intensive study begin with the review of pertinent data, research, and analysis with greater focus and more detail.



## **Information in Decision: Reprise and Concluding Observations**

This intent of this paper was to develop concepts and propositions to stimulate and guide empirical research into the role of information in decision. We argued that in order to understand the potential use of research by decision-makers, we must have greater appreciation of the ways in which research interacts and competes with other types of structured information. We also hypothesized that information use changes in different decision contexts. However, both the engineering and enlightenment models proved inadequate for this task, so we derived patterns of information use from routine, incremental, and fundamental models of decision. We now summarize the propositions on information use that emerged from our review of the decision models:

1. (a) Under a routine decision regime, the decision-maker will seek data which monitors critical variables and analysis which recommends switching or modifying programs. (p.19-20)

(b) When minor, but significant failure is detected in a routine decision regime, decision-makers move into an incremental decision regime to modify the consensus underlying the approach in that policy area. (pp.29)

(c) When major failure is detected in a routine decision regime, decision-makers use scanning to search for feasible alternatives as a basis for fundamental decision that will forge a new consensus and coalition in that policy area and rectify the failure. (p.29)

2. (a) Under an incremental decision regime, decision-makers will seek data which summarizes the base of programs and analysis which makes successive limited comparisons of alternatives that differ little from the status quo. (p.22-23)

(b) When an incremental decision-making does not produce a satisfactory outcome for decision-makers, those wielding power may attempt to transcend the situation and use scanning procedures to select a few alternatives in anticipation of fundamental decision. (p.29)

3. Under a fundamental decision regime, decision-makers will initiate intensive study and analysis of very few alternatives, seeking data that covers a broad range of variables and research that examines some of the underlying relationships. (p.26-27)

4. Following fundamental decisions, or when bargaining obtains in incremental decision regimes, decision-makers facilitate the remaining, lesser arrangements and monitor outcomes consistent with information patterns of the incremental and routine decision regimes, respectively. (pp.29-30)

5. When decision-makers are free to tackle new policy challenges, a scanning procedure is used to determine which policy areas might be best to activate and to sift through arguments and evidence, old and new, associated with the most promising policy areas. (pp.30-31)

One important implication is that research is not likely to be used by decision-makers operating under routine and incremental decision regimes. If research is most likely reviewed in anticipation of fundamental decision, and most decision processes are routine and incremental in nature, then we have identified an inherent bias against the use of research. What this does not say, however, is that decision-makers or their organizations do not sponsor or conduct research. Rather, it suggests that when involved in routine and incremental decision, they are not likely to be receptive to research which investigates relationships and introduces new ideas that challenge the prevailing consensus on the policy base.

Besides providing a theoretical explanation for the observed lack of research utilization, our review of decision models suggests an alternative interpretation of the "unanticipated insight" of Weiss and Bucuvalas (1980:274) about the "disparity between analytical models of decision-making that dominate the academic and professional literature and the perceptions of decision-making by participants in the process." The insight concerns the observation that the authors could not identify discrete decisions while respondents were unwilling to say that they made decisions. This observation led to the concept of "decision accretion" described by Weiss (1980). But the vast majority of "decision-makers" in the sample were managers, administrators, and staff--only six per cent were classified as policy-makers. Can our propositions shed any light on this? Based on limited evidence, it might be appropriate to hypothesize a routine decision regime since most of those interviewed were bureaucrats. Following our earlier review of the model, we would not expect that many *policy* decisions would be made if things were running relatively smoothly. Instead, we would probably look for many "routine" decisions that might not seem like decisions at all, let alone policy decisions; decisions about whether to switch or modify programs. The "indeterminacy of decision" that Weiss and Bucuvalas identify may not signal the failure of decision models to account

for behavior; instead, it may serve as a good example of the tinkering that might occur under routine decision.

The flip side of decision accretion is the enlightenment function. We found that the enlightenment model was not particularly helpful in developing our propositions about information use. Does this constitute a rejection of enlightenment as a model of information use, and in particular, research use? The answer is no. First, an important criticism of the enlightenment model rested on argument that it had to be happening at all times since belief structures are always changing. That our propositions are geared to determining the use of information in decision at a point in time does not deny that research may be enlightening decision-makers over longer time periods. Second, the propositions concerning research are similar to aspects of the enlightenment model. The hypothesized roles of research in scanning (new ideas, concepts, and techniques) and intensive study (feeding into in-depth analysis) are consistent with the idea that decision-makers value research for ideas which challenge the status quo (see Weiss and Bucuvalas, 1980) and that research has indirect impacts on decision. This having been said, our propositions do point to the possibility that we might be able to identify more direct use of research on specific occasions.

My final remarks concern future research. The purpose of this paper was to use theory to develop propositions about information use. They should be put to the test in empirical studies. The most difficult challenge would be to gain access to the paper flow of decision-makers and to match the various types of decision and information with reality. Sabatier (1987:683) has recently set out a framework and research agenda that he hopes will "lead to a significant improvement in our understanding of the role of relatively technical information in policy-oriented learning and, thence, in policy change over periods of a decade or more." Any attempt to track policy change over the course of a decade, with the objective of understanding the role of information in this process, should identify and control for the different decision regimes which dominate

a policy area or subsystem over time. It should also attempt to document the interaction between various types of information. Other factors, of course, will strongly influence information use. Sabatier emphasizes the resources of subsystem actors and coalitions as well as several dynamic system events. Other candidates that should be included are agenda-setting processes (Kingdon, 1984) and organization structure (Desveaux, 1987). Nevertheless, the nature of decision--its relative size, the extent to which it represents a departure from past practice, and the number of decision-makers involved--is a potentially important determinant of the type information sought by decision-makers and should be dealt with in future studies.



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<sup>1</sup> The author would like to thank Judith de Neufville, Lee Friedman, Arnold Meltsner, Emery Roe, and Walter Wong for their comments on different versions of this paper.

<sup>2</sup> There is, already, considerable agreement in the knowledge utilization literature that the context of decision is important for understanding research utilization. Decision context might be defined to include the characteristics of a policy or problem at hand, and the personalities, structures, and processes associated with the pertinent decision arenas. Knott and Wildavsky (1980:550) note that "the apparent existence of knowledge in one setting does not mean that it can be easily transferred somewhere else." Weiss (1983:223) tells us that "an understanding of political decision making is essential to an understanding of the place of research." Bardach (1984:127) argues that the usefulness of social science research findings are context-dependent and this helps to explain their "shallow penetration" in decision processes. Webber (1986:287) urges those studying research utilization to "consider the decision-making context and the way decision makers define their jobs."

<sup>3</sup> Common sense tell us that such information is transmitted to most busy policy-makers through a range of written, visual, and oral media; but, for those conducting information use studies, it is perhaps best to conceive of data, research, and analysis as appearing in written forms with some correspondence to oral presentations.

<sup>4</sup> See Knott and Wildavsky (1980) for a discussion of the more elegant distinctions that have been made between "data", "information", and "knowledge" in the literature. However, it is not clear that these distinctions are useful for those interested in conducting empirical studies.

<sup>5</sup> From the *The American Heritage Dictionary, 2nd College Edition*.

<sup>6</sup> Weiss and Bucuvalas (1980:264) make this distinction. They note that "internal policy analysis, which we did not study, is probably better suited (in style, timing, and definition of parameters) to influencing the single decision than is outside social science research."

<sup>7</sup> Majchrzak (1986) offers a typology of information content with nine categories and a typology of information sources with eight categories.

<sup>8</sup> See Allison (1971:36-38) and Steinbruner (1974:36-40).

<sup>9</sup> See George (1980), Chapters 4 and 5, and Janis (1972).

<sup>10</sup> Complementing the uncommitted thinker is the *theoretical thinker*, an extreme version of decision-maker implied by the enlightenment model: strongly held beliefs and not exposed to the reality principle.

<sup>11</sup> See Wildavsky (1979) and Good (1980) for examples of how the precepts of incrementalism are applied to budgetary politics and policy.

<sup>12</sup> Some features associated with particular decision regimes exist in most, if not all, decision contexts. Simon's concept of *satisficing*, ordinarily associated with routine decision models, can certainly be operational for incremental and fundamental decisions. There is no reason why *mutual partisan adjustment*, a complex concept instrumental in Lindblom's formulation of incremental decision, and *sequential problem-solving*, a concept found in the work of both Simon and Lindblom, cannot be factors driving fundamental decisions. Even the process of incremental decision-making should not be confused with *incremental outcomes* of decision; adjustments in routine decision processes and fundamental decisions which fizzle could produce incremental changes. In short, observing phenomena consistent with any of these concepts would not be evidence that a particular decision regime was in force.

<sup>13</sup> Weiss (1983) has recognized the implications of organizational routines for research use. But the findings summarized in Chart 2 reveal the limitations of the approach taken by Weiss. Only one type of information was examined, research; likewise, only one type of decision was reviewed. Thus, the article by Weiss would fit within the bottom-left cell.

<sup>14</sup> See Desveaux (1984) for a discussion of the appropriateness of incremental decision-making for correcting error in the wake of comprehensive decisions.

15 Arrow (1974) describes organizations and decision-makers as having active, monitored, and passive issue areas. The discussion is also consistent with the concept of sequential problem-solving advanced by Cyert and March (1963) and with more recent formulations of garbage can decision processes by March and Olsen (1976).

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