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BUREAUCRACY, GOAL SEEKING, AND FOREIGN
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THE OHIO STATE UNIVERSITY, PH.D., 1979
BUREAUCRACY, GOAL SEEKING, AND FOREIGN POLICY

DISSERTATION

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INTRODUCTION

This dissertation is motivated by an answer. The dissertation itself is an exploration of the implications of the answer. Understanding the answer, and not incidentally, understanding the motivation for the dissertation, requires knowledge of the question. The question is: What do we need to know to explain the foreign policy behavior of governments?

The answer to that question, if fully stated, would require a separate dissertation. In rough outline, however, the answer to that question proceeds along these lines:

What do we need to know to explain the foreign policy behavior of governments? Part of the answer involves what is meant by explanation. Following the analyses of Harre (1970) and Harre and Madden (1975), an explanation of a phenomenon will be taken to involve showing it to be the consequence of the operation of an underlying generative mechanism. An explanation based upon the underlying mechanism is termed a "generative explanation". Knowing the structure and operation of the mechanism are the bases for explaining why the phenomenon the mechanism generates occurs. With this generative view of explanation, the original question becomes: What do we need to know about the structure and operation of the generative mechanism which underlies foreign policy behavior?

One important bit of knowledge about the structure and operation of the mechanism are the capabilities exhibited by the mechanism. Knowing how the mechanism works, its capabilities, and its limitations are the bases for understanding the performance of the mechanism. There is a fundamental distinction between competence and performance. Explaining how the mechanism performs in various settings is based upon the competencies and capabilities of the mechanism. Under this view, a description of the mechanism and its dynamics is a
theory\(^1\) of foreign policy.

Thus the answer which motivates the dissertation is that we need to know the capabilities of the mechanism which generates foreign policy in order to explain the foreign policy behavior of governments.

On this view, the capabilities of the mechanism are fundamental in explaining the performance of the mechanism. Just as the capacity of humans influences individual decision making (Simon, 1955), so too the capacities of governments influence their performance. To understand how the mechanism can perform the tasks it does as well as its performance failures requires knowing its capabilities.

Adopting a generative posture with respect to explanation implies the explanation of foreign policy behavior is based upon the identification and description of the underlying generative mechanism. Because the basis for explanation is a description of the mechanism,

\(^1\)"Theory" is used as a descriptive term in this dissertation. The important issue is not whether something is or is not a theory, but whether it can be used to understand the world. As a result, a minimal definition is used to determine "theoryhood": A theory is a set of sentences, asserted to be true, and closed under deduction. The claim that theories are linguistic, whether the language is English, mathematics, or French, is uncontroversial. To assert those sentences to be true implies the theorist is prepared to believe what he says. Closure under deduction requires that sentences implied by the theory carry the assertion of truth.

Given this definition, there is very little that could not be considered a theory under some circumstances. The issue then is whether something is a good theory, whether it illuminates our experience. That issue seems much more fruitful than whether something is a theory or not.
explanations of the foreign policy behavior of governments dominated by the personality of its leaders, and without a well established bureaucracy, Uganda under Amin for example, would differ substantially from explanations of the foreign policy of the United States with its large "permanent government" (Allision and Szanton, 1976). The explanations would differ because the processes underlying the formulation of foreign policy differ.

In order to maintain a consistent basis for predicating the capabilities of governments, the focus of the dissertation is on governments with well established and influential foreign policy bureaucracies. The result is the evidence used to support a number of the claims in the dissertation is drawn from foreign policy formulation in "bureaucratic governments".

This generative view of what is involved in explaining the foreign policy behavior of governments suggests two questions:

1. What is the mechanism which is at the basis of the foreign policy behavior of bureaucratic governments?

2. What capabilities does the mechanism have?

A description of the mechanism is a theory of governmental policy making. Chapter 1 examines a number of theories of governmental policy making. The theory of Cyert and March (1963) is identified as the most promising.

Of the many capabilities which could be predicated of the mechanism, two stand out as fundamental. The first is a capacity for
goal seeking. The second is a capacity to adapt or learn from experience. Both concepts, however, have an uncertain philosophical status. Commonly held methodological unjunctions are that individuals have goals, groups do not, and individuals learn, groups cannot. Chapter 2 is a philosophical analysis of the concept of goal seeking and of goal seeking capabilities. Chapter 3 is a philosophical analysis of adaptation and adaptive capabilities.

Chapter 4 is an integration of the previous three chapters and addresses three questions:

1. Is the theory of Cyert and March descriptive of governments?
2. Do governments, under the theory of Cyert and March, have a capacity for goal seeking?
3. Do governments, under the theory of Cyert and March, have a capacity for adaptation?

Chapter 5 puts Chapter 4 on a more formal basis by developing a formal description of a system with capacities for goal seeking and adaptation.

Chapter 6 looks beyond the formal and theoretical emphasis of the dissertation and re-examines the motivating answer in light of the previous five chapters.
1. THEORIES OF GOVERNMENT DECISION MAKING

1.1 Introduction

The concern of this chapter is with theories of governmental decision making. Theories are central to the posture adopted in the Introduction that to explain foreign policy behavior is to show it to be the result of an underlying generative mechanism. Theories are descriptions of those mechanisms. Moreover, the capabilities of governments cannot be addressed without a description of the mechanism, for it is the mechanism upon which capabilities are predicated. To ask why it is or how it is possible that governments behave as they do is to ask for a theory of governmental policy making.

This Chapter is not a simple enumeration of theories of decision making in bureaucratic governments. Nor does the chapter put each theory to an empirical test. Instead, a prior question is addressed: Is the theory a plausible, coherent, internally consistent account of decision making in bureaucratic governments. Under the generative view of explanation sketched in the Introduction, the first mark of an adequate theory is plausibility in light of current knowledge. Theories do not, in general, attain adequacy through empirical predictions;
plausible theories are put to empirical test.¹

The theories examined below are evaluated with respect to plausibility (Is the theory inconsistent with what we believe to be true?), comprehensiveness (Does the theory provide a coherent account of policy making in bureaucratic governments?), and internal consistency (Are the statements of the theory mutually compatible?). The purpose of this analysis is to identify an acceptable theory of decision making in bureaucratic governments. Before it is possible to consider the capabilities of governments, a description of the generative mechanism is required. A theory of governmental decision making provides such a description.

1.2 Theories of Decision Making

Theories of governmental decision making can be divided into four groups on the basis of two attributes: optimizing or non-optimizing and

¹This is essentially a realist position (Harre, 1970; Popper, 1972) and in many ways reflects scientific practice. It is rare to find a scientific paper which proposes an implausible theory and then refutes it. Of course, theories which at one point are implausible, i.e., inconsistent with established beliefs, can later become accepted (Lakatos, 1970). The point here is only that implausible theories start at a disadvantage, and to survive they must show their worth by forcing modifications in our beliefs about the world. For a classic opposing statement, see Friedman (1953).
integrated or non-integrated.\textsuperscript{1} An optimizing theory of decision making represents the choice process in utility maximizing terms. Choice is based on the selection of the optimal alternative given a well specified set of goals and alternatives.\textsuperscript{2} Allison's (1971) rational actor model or Steinbruner's (1974) analytic decision maker are perhaps the most well known characterizations of this position.\textsuperscript{3} Non-optimizing theories of decision making relax the optimizing assumptions; they characterize the choice process as "satisficing" (Simon, 1955) or "disjointed incrementalism" (Braybrooke and Lindbloom, 1963) rather than optimizing. These theories are based on non-exhaustive alternative sets, imperfect information, and non-optimizing choice processes. Theorists who assume non-optimial decision processes include March and Simon (1958), Cyert and March (1963), Allison's (1971) organizational process and bureaucratic politics models and Steinbruner's (1974) cybernetic and cognitive decision makers.

\textsuperscript{1}These two attributes do not represent fundamental distinctions. They are, however, useful in classifying different approaches to governmental decision making.

\textsuperscript{2}The optimizing -- non-optimizing distinction could have been termed rational -- non-rational. Unfortunately, confusion exists as to the proper extension of the term "rational". Whatever the specific rationality assumptions, the essential point is that it is an explicitly maximizing or optimization process.

\textsuperscript{3}Contrary to Allison's assumption of a \textit{unitary} rational actor, the optimizing -- non-optimizing distinction refers only to the choice process. It is independent of the unit of aggregation. For a more positive statement of the optimizing position, see Riker and Ordeshook (1973).
The second distinguishing attribute of theories of governmental decision making is whether the theory is "integrated". An integrated theory is one which is capable of making assertions about the organizational decision process. Non-integrated theories focus on the individual decision process in an organizational context. For a non-integrated theorist, the organization is the background against which individual decisions are made. For the integrated theorist, the collective output is the concern.

The mark of an integrated theory is its ability to characterize the behavior of the organization as opposed to the behavior of individuals in an organization. Simply put, integrated theories tell us what the organization will do and how they will do it. It bridges the gap between individual behavior and organizational action.¹

Integration can be achieved in a variety of ways. Theories which treat the organization as a collective actor provide an account of the

¹Two comments are of relevance in the distinction between integrated and non-integrated theories. First, the distinction is similar to the ability to predict, though only on the surface. It is not simply the case that integrated theories predict the organizational output while non-integrated theories do not. The crucial distinction is not prediction per se, but whether the theory provides a "control structure" (Newell, 1973) which relates individual behavior to the organizational output. The issue is one of the completeness with which the process has been represented. This may be quite independent of any simple notion of prediction. Second, the distinction need not rest upon a denial of methodological individualism (Brodbeck, 1958) or an acceptance of holism (Durkheim, 1938). It is not necessarily the case that to be integrated a theory must embrace the emergence and social facts of the holist. It is a question of completeness -- not whether the resultant can be analyzed in terms of the behavior of individuals.
behavior of the organization, albeit at the expense of being able to address issues pertaining to the behavior of individuals. Integration can be achieved, however, without denying the "existence" of individuals. Unitary representations of organizations are not the only way to bridge the individual-collective gap. A theory which could specify how individuals collectively produce organizational actions would be an integrated theory. Such a theory might also specify the conditions under which the collectively defined decision process changes, e.g., from normal bureaucratic SOP's to personalized small group problem solving, as a function of the situation. The mark of an integrated theory is not the manner in which it accounts for organizational action, but that it in fact provides an account of organized action.

Integrated theories include those which fall under Allison's (1971) unitary actor model, but they need not be exclusively unitary in their conception of the organization. March and Simon (1958), Cyert and March (1963), Cohen and March (1974), and Cohen, March, and Olsen (1972) all focus on the organizational output without treating the collective as a unitary entity. Non-integrated theories of decision making include Allison's (1971) "bureaucratic politics" model, Allison and Halperin (1972), Halperin (1974), Halperin and Kanter (1973), and Steinbruner's (1974) cybernetic and cognitive decision makers.

Using these two attributes of theories of organizational decision
making it is possible to construct four different types of theories: integrated optimizing, non-integrated optimizing, integrated non-optimizing, and non-integrated non-optimizing. Each of these types of theories will be evaluated by examining some examples of each type. Where possible, applications in foreign policy decision making will be used.

1.2.1 Integrated Optimizing Theories

Wagner's (1974) analysis of Israeli decision making prior to the 1967 Middle East war is an application of an integrated optimizing theory of governmental decision making. His account is clearly an application of an optimizing theory of choice. He identifies the alternative courses of action open to the Israelis during May of 1967 and enumerates the possible outcomes associated with each alternative. Using a method similar to the von Neumann and Morgenstern utility experiment1 he identifies a utility function over the outcomes, estimates the probability a given alternative will produce a particular outcome, and finally, calculates the expected utility of each course of action.

Wagner's theory is also integrated. His concern is with the collective choice context. Although his utility and probability estimates were based upon interviews with the Israeli decision makers,  

1Luce and Raiffa (1957:21 - 23) provide a sketch of the procedure. For the original formulation, see von Neumann and Morgenstern (1947).
he aggregates these responses to form collective estimates of the utility and probability of the various outcomes.

Theories of the integrated optimizing type have been subjected to numerous criticisms. These criticisms fall into roughly three categories:

- Limits on human information processing make optimizing a highly improbable choice process (Simon, 1955; Steinbruner, 1974).

- An optimizing view of organizational decision making distorts the decision process (Simon, 1976; Cyert and March, 1963; Allison, 1971).

- The collective integration of these theories is arbitrary (Allison, 1971; Cyert and March, 1963).

Simon (1955) argues that for any complex choice situation, the necessary computations implied by optimizing theories are beyond human capacities. Alternatives and outcomes must be enumerated, utility values must be assigned to each outcome, the outcomes attached to each alternative must be known with certainty or else definite probabilities must be associated with them, and finally, each outcome must be compared with the others in order to determine the optimal choice. The force of Simon's argument is that theories which posit an optimizing decision process are highly unlikely in light of limited human capacities. He goes on to formulate a theory of choice which he argues is within the

---

1Simon is not opposed to the results obtained by the application of optimizing theories of choice. His goal is to formulate a theory which may well approximate the results of optimizing theories, but does not violate basic human capabilities. See Simon (1955).
capacity of humans. The exact nature of that theory will be discussed under the non-optimizing theories of decision making.

A second group of criticisms, not unrelated to the first, is the distorted view of the task facing the organization presented by integrated optimizing theories. In organizational decision making, alternative courses of action do not present themselves ready-made, and outcomes do not automatically attach themselves to alternatives. But theories of this type often assume alternatives, outcomes, and utility assignments as givens. To the extent these factors are not given to the organization as a piece, the task facing the organization as viewed by an integrated optimizing theory is distorted (Cyert and March, 1963; March and Simon, 1958).

The distortions imposed by theories of this type do not stop with the assumption of alternatives and outcomes. Much of the literature in foreign policy points to the need for consensus within the organization (Neustadt, 1976; Hilsman, 1971; Hoopes, 1973; Halperin, 1974; Schilling, 1961; Art, 1968). By viewing the choice situation as involving selecting the alternative which maximizes payoff, the apparent consensus-driven quality of the process is lost.

Had Simon and other critics of optimizing theories not gone beyond criticism by proposing a rival theory which -- at least on their account -- performs at least as well as the theories they criticize, Friedman's (1953) defense of the unreality of theoretical assumptions could be used against them. Because they substitute more "realistic" assumptions for the "unrealistic" assumptions, Friedman's defense is defused.
A final criticism of the integrated optimizing theories questions the method by which these theories produce their integration. Often integration methods are highly arbitrary. Wagner (1974) "averages" probability estimates and preference orders in order to develop estimates for the collective. Others (e.g., Schelling, 1960) simply posit collective preference relations and utility functions. As Cyert and March (1963) and Allison (1971) point out, theories of this type seem not to be about organizational decision making at all. Allison (1971: 247) refers to these theories as presenting "somewhat dismembered" accounts of organizational choice, and Cyert and March (1963: 8) note that it is "implausible that a theory of organizations can ignore the fact that it [the organization] is one."

Integrated optimizing theories fail on three counts. The assumption of optimization is a highly unlikely candidate in light of human capacities; it distorts the task of decision making; and the integration is highly arbitrary. In a curious passage, Wagner (1974: 117) admits as much:

This analysis demonstrates the case of decision makers who are not maximizing utility in the common individual sense but in the collective choice context, to optimize specific collective objectives.

If the individual decision makers do not maximize utility, it is a strange twist of Arrow's result (Arrow, 1963) that they can, in the collective context, be paradigmatic optimizers.
1.2.2 Non-Integrated Optimizing Theories

A second type of theory of governmental decision making is the non-integrated optimizing theory. Optimizing theories posit utility maximization as the basis of choice. Non-integrated theories examine the behavior of the individual\(^1\) in the organizational context. Anthony Downs' *Inside Bureaucracy* (1967) is the specific theory to be examined. No application of this style of theorizing could be found in the literature on foreign policy decision making.\(^2\)

It is difficult to give an adequate summary of Downs' theory. The book is wide ranging in its concerns and ambitious in its intents. For the immediate purposes it is sufficient to note

- his assumption of optimizing bureaucratic officials;
- the non-integrated approach of the theory;
- the consequences of this view of organizations.

Downs explicitly assumes the individual bureaucrat bases choice on a utility maximizing decision process. While he assumes an optimizing

---

\(^1\)What counts as in "individual" is very much theory dependent. Much of Allison's (1971) organizational process model takes the organization as the "individual".

\(^2\)While no direct applications exist, an analyst using this theoretical approach would produce something very much like that produced in the bureaucratic politics literature (Allison, 1971; Neustadt, 1970; Art, 1968). The primary difference would be in the details of the individual choice process. In particular, the optimizing character of individual decision making would be emphasized. Other candidates are Axelrod (1976) and Bonham and Shapiro (1976). But their works focus on individual decision making at the exclusion of the organization. See the review essay by Kinder and Weiss (1978).
decision process, Downs' position does reflect the influence of critics of the synoptic optimizing view of choice (Simon, 1955; March and Simon, 1958; Braybrooke and Lindblom, 1963). Downs acknowledges that information and alternatives are the product of search motivated by unsatisfactory performance, but maintains choice is based upon utility maximization. In essence, Downs takes a position very similar to Riker and Ordeshook (1973) when they argue Simon's (1955) satisficing model of individual choice is not inconsistent with an optimizing view of rationality. It is their position that satisficing is no more than optimization over an attenuated alternative set. Even with this marginal adjustment, Downs' representation of individual choice retains an essential optimizing character.

The primary objection to this and other marginal modifications of the synoptic optimizing ideal is its view of choice as an optimization task. On the view of the critics (Simon, 1955, 1976; March and Simon, 1958; Cyert and March, 1963; Cohen, March, and Olsen, 1972), choice is not so much an optimization problem as it is the selection of an acceptable alternative using criteria that rarely result in optimal choices.

A second important aspect of Downs' theory of organizational decision making is its non-integrated approach. An integrated theory is

1 Whether this interpretation of satisficing is adequate is questionable. The issue will be raised in more detail below. Thorson (1976) raises a similar question.
one which makes "positive" assertions about organizational behavior. These assertions are positive in the sense that they address the question of what the organizational output will be in specific circumstances. Non-integrated theories approach organizational behavior through actions of the individual participants. Although the theory may make assertions about how the individuals will behave, the organizational output can only be characterized as a function of individual behavior. The theory provides few, if any, guides for anticipating the final resultant of the behavior of the individuals.

Unlike the distinction between optimizing and non-optimizing, integration or non-integration is not a position which theorists directly address. The issue of optimization is one which has been raised in the literature and is one which theorists must by the nature of its centrality take a clear stand. Integration is not an issue of this sort. Thus Downs cannot be expected to directly address the issue. His position on the issue must be determined from a reading of his theory.

Downs' theory is non-integrated as a result of what is not stated in the theory. He devotes considerable effort in specifying the basis of the behavior of individual officials: their motives, goals, biases, characteristic behavior types, search processes, and the choice procedures. What is missing from the discussion is how all these individual actions and attributes finally result in organizational
output.

This is not to say that Downs ignores organizational behavior. However, his assertions about the behavior of organizations are at a high level of abstraction:

- Small bureaus tend to be more flexible and innovation minded than larger one (p.274);

- The longer a bureau has been in existence, the more likely it is to have an ideology, and the more elaborate that ideology is likely to be (p. 278);

- Bureaus will tend to give inadequate attention to possible actions involving large changes in the status quo (p. 272).

All of this may be true; that is not at issue. What is at issue is whether a theory based upon generalities such as these can provide a structure within which the consequences of individual action on organizational output are well specified.

It is precisely this inability of non-integrated theories of organizational behavior to provide a complete\(^1\) representation of organizations which is the critical weakness. In many ways non-integrated theories fall to the same criticisms of some integrated theories: They are not really theories of organizations. Wagner's (1974) analysis of governmental decision making ignored the fact that the government was an organization by imposing an integrated optimizing view of the collective. Downs' theory also fails as a theory of

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\(^1\)"Complete" does not mean exhaustive, but adequate in the sense it can account for the collective output in specific circumstances.
organizations: It is more a theory of individual behavior in an organizational context than a theory of organizations.

Non-integrated optimizing theories fail on two counts. The optimizing view of choice is unacceptable and the lack of integration undermines the ability to account for the collective outcome. Even though Wagner and Downs view choice as an optimization problem, Wagner asserts individuals, who do not maximize individual utility, maximize collective utility while Downs asserts individuals maximize individual utility but not necessarily collective utility. Whatever the differences, neither presents a wholly adequate theory of governmental decision making.

1.2.3 Non-Optimizing Non-Integrated Theories

The third type of theory, non-optimizing non-integrated, has a high degree of visibility in the foreign policy literature. "Bureaucratic politics" is the name often given to the literature which approaches foreign policy decision making from this perspective. "Practitioners" of the bureaucratic politics approach include Allison (1971), Halperin (1974), Art (1968), Neustadt (1970), and Steinbruner (1974).

Of the many studies using this approach, Allison (1971), Allison and Halperin (1972), and Steinbruner (1974) stand out as theoretical statements. While the three theoretical statements are not identical,
they do share many characteristics. The three statements share two central arguments. The first is a denial of the optimizing view of choice. They argue that to characterize the choice situation as an optimization problem is to distort both the task of making a decision and human information processing capacities. The second is that the final resultant or outcome "does not presuppose governmental intention" (Allison, 1971: 175). Organizational output is not directed but is instead the by-product of the "pulling and hauling" within the government. Thus at the same time these theorists deny Wagner's (1974) contention that governmental policy maximizes a collective utility function and Downs' (1967) contention that individual decision makers are utility maximizers.

Given the preceding discussion of integrated and non-integrated optimizing theories of organizational decision making, there are two critical questions to be asked about the non-integrated non-optimizing theories of bureaucratic politics:

- What representation of choice do they put in the place of an optimizing representation?

- In what sense can these theorists account for organizational output?

The answers to these questions will form the bases for the evaluation of

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these theories.

1.2.3.1 The Representation of Choice

Given the care with which these theories examine and criticize assumptions of optimizing synoptic decision making, it is surprising that two of the three theoretical statements do not replace the discredited optimizing representation with an alternative. Allison (1971) makes no mention of the basis upon which the individuals make choices; in fact it is not clear from his discussion that individuals make choices. They seem impelled by external factors to behave in certain ways. Using a game metaphor in his exposition, Allison (1971: 166 - 168) speaks of four factors which "determine" each player's stand:

- parochial priorities and perceptions;
- goals and interests;
- stakes and stands;
- deadlines and faces of issues.

It might be expected that the second factor, goals and interests, would illuminate the individual choice process. But that is not the case. This factor lists types of goals (e.g., national security, organizational, domestic, and personal interests) and says nothing about the relationship between goals and choice.

Allison and Halperin (1972: 43) are somewhat more explicit about individual choice -- though none too helpful in identifying the process
by which choices are made:¹

Players choose in terms of no consistent set of strategic objectives, but rather according to various conceptions of national security, organizational, domestic, and personal interests. Players make governmental decisions not by a single rational choice, but by pulling and hauling. (This by no means implies that individual players are not acting rationally, given their interests.)

The third major theoretical statement in the bureaucratic politics literature is by Steinbruner (1974). Unlike Allison and Halperin, Steinbruner is careful to distinguish individual choice from organizational choice. In the development of his three paradigms of decision (analytic, cybernetic, and cognitive) Steinbruner separately considers each as the basis for individual and organizational choice.

In developing his three paradigms, Steinbruner focuses on how each treats "complex decision problems". For Steinbruner (1974: 15 - 18) these involve a trade-off between two or more inconsistent goals, and situations with uncertainty about alternatives, outcomes, and the dynamics of the environment. How each of the paradigms copes with the trade-off or value integration problem and uncertainty serves to

¹It may be the case that Allison and Halperin are concerned strictly with the collective outcome, not with individual choices. There are two responses to that position. First, it is not obvious the collective outcome can be understood without an account of individual choice. Second, if the first objection is dismissed, then their theory must stand on its ability to provide a positive answer to the second critical question posed above: In what sense can these theories account for organizational output? That query will be examined in detail below. Moreover, if the individual choice process is of no concern, it is unclear in what way the theory has implications different from those of Downs (1967).
distinguish one paradigm from the other.¹

The first of Steinbruner's three paradigms is the analytic. This paradigm is essentially the standard optimizing view of choice. In developing this paradigm Steinbruner recognizes limits on human information processing pointed out by critics of the optimizing viewpoint. Rather than require the decision maker to exhaustively anticipate the long-range consequences of his actions, to explicitly compute trade-offs or indifference contours between inconsistent values, or to have complete and perfect information of the environment he requires only that some consideration of consequences, some indication of cost/benefit analysis with respect to competing values, and some sensitivity to new information be exhibited by the decision maker. Steinbruner terms these the assumptions of "alternative outcomes", "limited value integration", and "sensitivity to pertinent information".

¹Although the three paradigms cope with complexity in distinguishably different ways, Steinbruner is never clear about the competitive status of the paradigms. From his discussion it seems the analytic paradigm is refuted by both the cybernetic and cognitive paradigms. But he never clearly states the nature of the relationship between the cybernetic and cognitive paradigms. He argues that his cognitive paradigm is a modification of the cybernetic, and yet he never uses the cognitive paradigm to refute the cybernetic paradigm. The two float through the case study portion of his book in an ambiguous relationship. Regardless of his expressed desire to avoid refutation or choice when unwarranted by the situation (p. xi) some clarity on his issue seems necessary. Exacerbating this ambiguity is the title of his book: The Cybernetic Theory of Decision. (The title may be the fault of the publisher. Pre-publication citations indicate the title as: The Mind and Milieu of the Policy Maker.) Similar confusions exist in Allison's (1971) Essence of Decision where the organizational and bureaucratic politics models exist in an unspecified partnership despite the fact they are in many ways incompatible.
Following critics of synoptic decision making, e.g., Simon (1955), Steinbruner criticizes the analytic paradigm on the grounds of limited human information processing capacities. He argues the computations, estimations, and information requirements of the paradigm are unreasonable in light of known limits on human capacities. But much of the force of Steinbruner's criticism is dissipated by his modifications of the comprehensive optimizing view of choice. Had he criticized the analytic paradigm as modified (e.g., limited integrations, limited calculation of outcomes) his case against analytic theories of choice would have been much stronger. As it is, its status as an acceptable theory of choice is ambiguous.

A second liability of Steinbruner's analysis -- one which counts heavily against him in the present context -- involves his specification of the details of the choice process. His paradigms are neither theories or descriptions of the choice process. Instead of specifying how an analytic decision maker makes decisions, he specifies evidence which would count in favor of the proposition that a particular decision maker was following the analytic paradigm. For example, in discussing the implications of his assumption of limited value integration, Steinbruner (1974: 31) states:

In concrete terms it [the assumption of limited value integration] means that evidence of an analytic decision process in operation must include some indication that cost/benefit assessments, however informal, are attached to available options and that these include some estimate of the effects for both values. In the mind of the decision maker, in other words, the competing claims of the values directly and immediately
presented in an output trade-off relationship are weighed against each other, and some deliberate balance is produced.

This is not a theory of decision making. The gulf between a theory and stating "some deliberate balance is produced" in the mind of the decision maker is one that Steinbruner does not bridge. A theory of decision making calls for a statement of the process by which decisions are reached. Of course, parts of the process may require empirical estimation, but an acceptable theory must provide a clue as to what a filled-out empirically-estimated version of the theory would look like. Steinbruner gives no such indication.

Steinbruner's second paradigm of decision making is termed "cybernetic". As might be expected, this paradigm uses the central cybernetic concept of a servomechanism interacting with an environment and is based upon the works of Ashby (1960, 1970) and Wiener (1961). Contrary to the assumptions of the analytic paradigm, a cybernetic decision maker makes no calculation of the effects of outcomes,
undertakes no value integration, and in fact seems not to make decisions.  

Steinbruner's cybernetic decision makers seem to behave rather than decide. One of his central examples of a cybernetic decision maker is Ashby's (1960) "homeostat", a device which when faced with a situation of an "essential variable" out of range, randomly emits behaviors. However humans do go about making choices, the self-image Steinbruner creates of a random response generator in the cybernetic paradigm does not comport with what humans generally believe about others, let alone

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1 Steinbruner's discussion of value integration under the cybernetic paradigm is not clear. Prefacing his examination of Ashby (1960) and Simon (1955) with the comment that there is ambiguity "in the paradigm" (as though it existed as an autonomous entity), he goes on to note that Simon presents a "limited challenge" to the analytic assumption of integration and that Ashby denies the existence of anything resembling goals or values. Admitting that Ashby is "too extreme to be strictly tenable", he states values are only minimally articulated by a cybernetic decision maker. He then proceeds on to other topics, leaving the resolution of the matter very much in doubt. Were there really a "cybernetic paradigm", Steinbruner's lack of synthesis might be excusable. But to invent such an entity and then fail to resolve what he apparently takes to be a central assumption is quite extraordinary. Steinbruner's discussion of the issue of value integration may be found on pages 62 through 65 of Steinbruner (1974).

2 Steinbruner is particularly insistent about the non-purposive viewpoint of the paradigm. In footnotes on pages 53 and 63 as well as the text on pages 53 and 64, he takes pains to point out that the cybernetic paradigm adopts the viewpoint of the system. The implication is that appeals to the consequences of the behavior in assessing goals or values are illegitimate. If the decision maker has no conception of goals, values, or consequences, then such terms are inappropriate when used to describe the decision maker. Says Steinbruner (1974: 64): "The essential problem for the cybernetic decision maker is not to achieve some result in the external world, not even an acceptable as opposed to an optimal result ... the essential criterion is simply survival."
themselves.

The closest Steinbruner comes to a statement of how cybernetic decision are made is this:

The decision maker is assumed to have a small set of "responses" and decision rules which determine the course of action to take once he has received information to which he is sensitive. That is, decision rules associate a given action with a given range of "values" for the critical variables in focus. The "responses" are action sequences, of the character of a recipe, established by prior experience. They are programs which accept and adjust to very specific kinds of information. (Steinbruner, 174: 66 - 67)

Steinbruner's third paradigm, the "cognitive paradigm", is developed differently from either the analytic or cybernetic paradigms. Rather than attempt to articulate a full paradigm, he examines some theories and findings of cognitive psychology (Festinger, 1957; Heider, 1946; Osgood and Tannenbaum, 1955) under the general heading "cognitive processes". He then asserts (p. 139): "the cybernetic paradigm needs to be supplemented with cognitive theory when complex policy problems are under analysis." What Steinbruner terms the cognitive paradigm refers to "the assumptions of cybernetics amended by cognitive theory" (Steinbruner, 1974: 139). The close relationship between the cybernetic and cognitive paradigms makes comparison particularly useful. The cognitive paradigm can best be understood by examining how Steinbruner uses cognitive psychology to amend the assumptions of value integration and uncertainty avoidance of the cybernetic paradigm.

Cybernetic decision makers have few of the capabilities normally associated with humans:
- Cybernetic decision makers respond to the environment in preprogrammed, reinforcement determined ways.

- Their behavior is more a result of 'internal wiring patterns' than anything resembling purposive intentional action.

- They ignore uncertainty about the environment and the effects of actions.

- They do not consider goals or values when selecting alternatives.

By introducing modifications motivated by cognitive psychology, Steinbruner gives the cognitive decision makers some attributes of humans. Cognitive decision makers have beliefs, goals, and some capacity to think.

In a survey of cognitive psychology, Steinbruner finds five general principles about humans:

- They make inferences and interpretations based upon their perceptions and memory;

- The inference mechanisms are constrained by consistency principles;

- The human mind is in contact, however tenously, with reality;

- The beliefs generated by inferences are kept simple;

- Beliefs exhibit a great deal of stability in the face of contrary evidence.

These five principles form the basis for Steinbruner's analysis of how paradigmatic cognitive decision makers confront the problems of value integration and choice under uncertainty.

The cybernetic paradigm posited that decision makers will avoid the issue of value integration by ignoring goals. Behavior is a programmed
response to information. The cognitive paradigm modifies this by assuming the decision maker is aware of his goals; but goals and the outcomes which affect their achievement are subject to constraints of consistency and simplicity. Cognitive decision makers will, argues Steinbruner, attempt to deny the existence of value trade-off situations by treating each value separately. Says Steinbruner (1974: 108):

The two values of a complex problem will not be related to one another in the mind of the decision maker, but divided and pursued separately, as if they were independent considerations. He terms this the "assumption of value seperation".

The second issue, uncertainty about the environment, is treated similarly. Cybernetic decision makers ignore uncertainty because they cannot recognize it. Cognitive decision makers can recognize uncertainty, but constraints imposed by the principles of consistency and simplicity tend towards the imposition of certainty. Cognitive decision makers create certainty by imposing structure on the environment. This process, which Steinbruner terms the "subjective resolution of complexity", produces the illusion of certainty in an uncertain environment. Coupled with this subjective resolution of complexity is the "assumption of a single outcome calculation":

Under complexity, the mind in this view, does not match the uncertain structure of the environment in which events might take a number of alternative courses. Rather, it imposes an image and works to preserve that image. A single course of events is projected; evidence for alternative outcomes is manipulated to preserve expectations. (Steinbruner, 1974: 123)

These are the central positions of the cognitive paradigm.
Compared with the cybernetic paradigm, the decision process is more human in character. But is it a more acceptable theory of decision making? While it contains more that is recognizably human, the cognitive paradigm is no more acceptable as an articulated theory of decision making. The paradigm itself is little more than a list of assertions based on cognitive psychology. Steinbruner's extended discussion of the subjective resolution of uncertainty includes the mechanisms of reinforcement, selective perception, images and arguments from analogy, wishful thinking, and inferences of impossibility. The discussion contains many insights into ways in which certainty may be imposed upon an uncertain environment; but none of the possible mechanisms provides an adequate theory of how decision makers impose certainty. The difference between suggesting how a decision maker might impose certainty and how he will impose certainty is profound. Steinbruner provides nothing to move from a discussion of the possible to a statement of the actual.

Although Allison (1971), Allison and Halperin (1972), and Steinbruner (1974) object to the assumptions of the optimizing view of choice, none proposes a coherent substitute theory. Steinbruner is the more successful, but his paradigms do not go beyond analogies.
1.2.3.2 Accounting for Organizational Output

The second question posed above was: In what sense can these theories account for organizational output? None of the accounts provide explanations of organizational behavior. At best, Allison (1971), Allison and Halperin (1972), and Steinbruner (1974) can describe the character of the process by which individual actions are aggregated to form organizational output. They cannot go beyond description and anticipate the organizational output.

Allison (1971: 162) says governmental action is best viewed as a political resultant. Action is a resultant in the sense that "what happens is not chosen as a solution to a problem but rather results from compromise, conflict, and confusion of officials with diverse interests and unequal influence." Action is a political resultant because the activity from which the resultant emerges is a political one based upon bargaining, influence, and power. Beyond this, Allison has little to say about what sorts of resultants are produced by the political process. The bulk of his presentation is devoted to differentiating the individuals who participate in the process in terms of stakes, influence and power ("Chiefs and Indians"), stands and interests ("Where you stand depends upon where you sit" and "The face of the issue differs seat to seat."), and the basic character of the process (the "pace", "structure", "laws", and "reward" of the game). Beyond stating that preferences, advantages, and disadvantages associated with players make
a difference in the resultant, Allison remains silent on the details of the political process.

Allison and Halperin (1972) provide little which amends or extends Allison's description of the political process. Under their analysis, a player's success depends upon the player's bargaining advantages, skill, and will. From the interaction of these players comes the political resultant: the decision. Unfortunately, Allison and Halperin cannot
provide anything more specific.¹

Steinbruner's (1974) accounts of organizational decision making are no more acceptable than his accounts of individual decision making. Given his focus on individual decision making in the development of his paradigms, to account for the aggregate behavior of individuals,

¹While none of the theorists provide a detailed analysis of the political process from which governmental action results, the accounts are unanimous on its parochial character. In its most extreme form, the proposition is: "Most [foreign policy] decisions are responses to domestic pressures, and the actions of other nations often figure merely as devices for argument" (Halperin, 1974: 101 - 102). More circumscribed are Halperin and Kanter (1973: 3): "Change in the international environment is only one of several stimuli to which participants in the foreign policy process are responding (possibly among the weakest and least important)"; and Allison and Halperin (1972: 57): "The influence of one nation's actions on another result from the actions' impact on the stands, or on the power of players in decision or action games in the other nation."

Although they can produce examples of parochial, bureaucratic-motivated decisions to support the proposition, it is dubious that the proposition is generally true of foreign policy decision making. Art (1973) provides counter-examples in American foreign policy where the proposition does not hold, and suggests, as does Hermann (1978), that bureaucratic politics will only be exhibited in certain types of issue areas, particularly resource allocation issues.

There is a tendency in the bureaucratic politics literature to focus upon weapons development and procurement policies as though they were representative of all foreign policy issues. Halperin and Kanter (1973) begin their reader with talk of foreign policy decision making, but by page four, they have, quite without mention, transformed "foreign policy" into "national security policy". Weapons development and budgeting decisions may in the short run be insensitive to actions of other governments, and internal bureaucratic motivations may predominate. But to assert that all foreign policy issues are largely bureaucratic in nature is unsupportable. Given this narrow evidentiary support for one of their basic propositions, it is not clear that bureaucratic politics, even if it exhibited strong internal coherence, would be an acceptable theory of governmental decision making.
Steinbruner would need a coherent theory of individual behavior; and a set of rules to specify the final organizational output as a function of the behavior of the individuals. Since he does not fulfill the first requirement, it is not surprising that he does not fulfill the second. Steinbruner provides general characterizations of possible organizational syndromes, e.g., "grooved thinking" or "uncommitted thinking", but little else. He does not sort through the possibilities and identify the expected process. Even if he did identify the process in specific situations, "grooved thinking" provides little to anticipate organizational output.

The non-optimizing non-integrated theories of Allison (1971), Allison and Halperin (1972), and Steinbruner (1974) fail as acceptable theories of governmental decision making on two counts. First, they do not provide a coherent account of the non-optimizing choice process. Second, they cannot account for organizational output. At best they treat individuals within an organizational setting, but the organization remains only a context.

1.2.4 Non-Optimizing Integrated Theories

The final type of theory of organizational decision making, non-optimizing integrated, attempts to account for organizational output with a non-optimizing view of choice. Theories of this type are similar to the theories of bureaucratic politics in that they do not treat choice as an optimization problem. But in contrast to theories of
bureaucratic politics, these theories focus upon organizational output. The organization does not simply supply a context for individual choice. Examples of non-optimizing integrated theories of organizational decision making are Cyert and March (1963), Cohen, March, and Olsen (1972), and to an extent, Allison's (1971) model II or organizational process model. Cyert and March's *A Behavioral Theory of the Firm* will be examined in detail as a statement of a non-optimizing integrated theory. Allison (1971) provides the best application of this type of theory in a foreign policy context; it does, however, have a number of weaknesses which will be discussed below.

In their theory, Cyert and March (1963: 115 - 116) take three concepts as central in accounting for organizational behavior: organizational goals, organizational expectations, and organizational choice. Linking these three concepts are four relational concepts (Cyert and March, 1963: 116 - 125): quasi resolution of conflict, uncertainty avoidance, problemistic search, and organizational learning. Taken together they form Cyert and March's theory of organizational decision making.

Cyert and March view organizational goals as a set of independent constraints. This view of organizational goals differs from the collective preference order imposed by optimizing theories of the organizational, e.g., Wagner (1974). The goals of an organization do not consist of explicit preferences over states of the environment but
are statements of constraints of the form: Do not let "X" happen, or Achieve "X".\(^1\) Under this formulation, organizations do not attempt to maximize anything, for the goals are not in the form: Maximize "X", but are instead largely aspiration-level goals: Achieve "X".\(^2\)

In order to avoid the problems associated with attributing goals and beliefs to collectives like organizations, Cyert and March argue that organizations can be viewed as a coalition of individuals who impose goals on the organization. The goals or constraints are a product of bargaining within the coalition.

This bargaining process produces some form of consensus on organizational goals. This consensus is achieved through side payments. Although the concepts of coalition, bargaining, and side payments have been used in the context of optimizing theories of choice (Luce and Raiffa, 1957), the process as outlined by Cyert and March differs from the optimizing theories in a number of respects. First, the side payments are not fixed and transferable (see Luce and Raiffa, 1957: 180). Side payments are not simply incidental payments to coalition members in order to secure agreement but form a central part of the goal

\(^1\)Simon (1964) presents a similar analysis of organizational goals.

\(^2\)It is unclear whether external foreign policy goals of governments are of this aspiration level form. Estimates of profit or market share are well established within business firms as indicators of performance. Goals with such clear aspiration levels seem missing in the foreign policy arena. This aspect of Cyert and March's theory of organizational decision making will be examined in more detail below.
specification process. Cyert and March (1963: 30) argue that a significant number of these side payments, particularly in governments, are of the form of policy commitments. Thus the making of side payments influences organizational goals in addition to providing inducements to individuals to accept the goals themselves.

The second major departure from an optimizing view of the bargaining process is the nature of the agreement on organizational goals after side payments have been made. Contrary to optimizing theories of similar processes, side payments do not result in a joint preference ordering. The result of the bargaining process is only a loose consensus on organizational goals. Because the goals which invoke conflicting interests are stated vaguely or in what Cyert and March call "nonoperational form", the consensus can be fragile.

The result of this bargaining process is a set of constraints, often imperfectly rationalized, on what counts as an acceptable situation. There is no guarantee the side payments will not conflict with existing constraints or the vague nonoperational form of many of the conflict evoking issues will be consistent with existing goals.

The standard optimizing theories of organizational choice assume organizational expectations are used to evaluate alternatives by their ability to maximize goals or utility. Although Cyert and March, contrary to Steinbruner's (1974) cybernetic theory of decision, assume organizational expectations, they do not assume complete and perfect
information, exhaustive search, or detailed estimations of expected outcomes. In the place of these assumptions of comprehensiveness, Cyert and March assume search for information and alternatives to be motivated by a problem and limited in scope; the anticipation of consequences to be simple in nature and focused on feasibility rather than upon comparative optimality; and information and expectations to be biased and incomplete.

The result is an image of decision making with the following characteristics:

- Search procedures are quiescent until stimulated by a recognized failure.
- Once invoked, search is neither random nor comprehensive, but focused on alternatives similar to existing policies.
- Identified alternatives are evaluated primarily on grounds of feasibility.

Cyert and March's account of organizational choice is similar to Simon's (1955) satisficing theory of choice. The central core of Simon's satisficing procedure is that the first acceptable alternative discovered is accepted. Four principles describe Cyert and March's (1963: 113) view of organizational choice:

- Acceptable alternatives are those which meet all the goals of the organization.¹

¹This principle does not imply an acceptable alternative is optimal. The goals salient in a particular decision situation will be a subset of organizational goals. In addition, because organizational goals are set by bargaining with policy sidepayments, the goals themselves are open to change, modification, and compromise.
- Alternatives are examined sequentially.
- Regularized procedures and a policy of reacting to feedback are used to avoid uncertainty.
- Standard operating procedures and rules of thumb are used to make and implement choices.

Because organizational choice must be consistent with all the relevant goals of the organization, choice is based upon consensus. Were it not for the side payments, consensus based choice would probably be impossible in all but the most simple of circumstances. Agreement is reached because compromises have been made on other goals and policies.

The sequential consideration of alternatives is a strategy which minimizes the necessary calculation of expected outcomes and consequences. Once an acceptable alternative has been discovered it becomes the organizational choice. Choosing the first acceptable alternative minimizes decision making effort while at the same time ensuring the choice will at least be consistent with the operative goals.

Feedback-react decision procedures are used to avoid uncertainty. The strategy is to avoid actions which depend upon uncertain responses by the environment. By focusing upon short-term actions the need to anticipate consequences is lessened.

The fourth characteristic of organizational choice, the use of standard operating procedures and rules of thumb, serves two purposes. First, rules of thumb and standard operating procedures simplify the
decision making process. The second purpose of standardization is intra-organizational predictability. Standard procedures, according to Cyert and March, are primarily devices for ensuring that actions of various subunits will be consistent with organizational objectives.

The central core of the theory of organizational decision making of Cyert and March is provided by these three concepts. Organizational goals place constraints upon what counts as an acceptable solution to a problem. Organizational expectations allow policies or alternatives to be evaluated. Organizational choice involves the selection of an alternative from the universe of possible alternatives. Cyert and March link these three concepts with what they term "relational concepts". These concepts expand and link the three major concepts into a theory of organizational decision making. For the purposes of this Chapter, however, the three main concepts provide a sufficient basis to evaluate the theory.

As a theory of organizational decision making, Cyert and March's theory has the attributes of a non-optimizing integrated theory. The choice process does not impose global optimizing assumptions, and is based in large part on Simon's (1955) theory of choice. It is an integrated theory of organizational behavior rather than a theory of behavior in an organizational setting. Cyert and March speak of organizational goals, organizational expectations, and organizational choice.
1.3 Conclusions and Agenda

The attributes of non-optimizing and integrated give the theory advantages over the theories of Wagner (1974), Downs (1967), Allison (1971), and Steinbruner (1974). The theory avoids the criticisms directed at the optimizing assumptions of Wagner and Downs. It does not overstate the information processing requirements to make a decision, nor does it distort the task of decision making. Because the theory is integrated, it has advantages over the non-integrated theories of Downs, Allison, and Steinbruner (1974). These theories cannot account for organizational output because they do not treat the organization as a decision making system, but instead focus upon decisions within an organizational setting. Cyert and March do focus on organizational decision making. Their goal was to develop an aggregate theory of the organization which would allow organizational choice to be explained.

Of the theories examined, the theory of Cyert and March is the most coherent. The theory is an attempt to account for organizational behavior qua organizational behavior and not simply as the resultant of individual behavior in an organized setting. The theory is also sensitive to the information processing capacities of individuals and organizations. The account of choice within the theory does not assume capacities which governments and other organizations do not possess.

Even though the theory has advantages over the theories of Wagner, Downs, Allison, and Steinbruner there are a number of outstanding issues
which provide the agenda for the next three chapters of the dissertation. One of the central assumptions of the theory is that organizational behavior is goal directed. There is little question that individual behavior can be described as directed toward a goal (Taylor, 1964; von Wright, 1971). Whether groups and organizations can be properly described as goal directed is not. It is widely held (March, 1962; Sprout and Sprout, 1965) that only people have goals -- governments and organizations do not. One of the outstanding issues is the status of goal seeking in the theory of Cyert and March:

- What does it mean to predicate goal seeking of governments?

- What capacities must governments have in order that their behavior be goal directed?

A second outstanding issue has to do with learning and adaptation. Cyert and March assert that organizations learn from experience. The status of organizational learning is similar to organizational goal seeking. People learn; it is unclear in what sense organizations can be said to learn. Learning requires processing capacities which go beyond simple decision making or goal seeking. The consequences of actions must be observed, the lessons learned, and the changes made.

- What sense can be made of the assertion that governments have a capacity to adapt their behavior as a function of experience?

- What capabilities are required for learning and adaptation?

- Can governments reasonably be expected to possess the required capabilities?

The third outstanding issue is less fundamental and philosophical,
but it is nonetheless critical. Cyert and March's theory is a theory of the business firm.

- Is the theory applicable to the foreign policy process of governments?

These are the issues which provide the agenda for the next three Chapters of this dissertation. Chapter 2 is a philosophical analysis of the concept of goal seeking. The first issue addressed is what it means to predicate goal seeking of an entity. The result is a philosophically adequate analysis of the meaning of the goal seeking predicate. The second major issue examined in the Chapter is conditional: What capacities and capabilities must an entity have if it is to be described as goal seeking?

The issue of learning and adaptation is examined in the third Chapter. Because there is less agreement on the meaning of adaptation than there is on the meaning of goal seeking, the style of the analysis differs from that used in analyzing goal seeking. Rather than attempt to determine what is meant by the predicate, the Chapter 'legislates' a coherent sense of the term. The result, however, is the same: an analysis of what it means to describe something as adaptive. The second issue addressed in the Chapter is the same sort of capability issue addressed in reference to goal seeking: What capacities must an entity have if it is to be described as adaptive?

The fourth Chapter returns to the theory of Cyert and March and addresses three issues:
- Is the theory applicable to governments?

- Do governments, as described by the theory, have goal seeking capacities?

- Do governments, as described by the theory, have adaptive capabilities?
2. AN ANALYSIS OF GOAL SEEKING

The theories of decision making examined in Chapter 1 all used the concept of goal seeking as an individual or collective activity in explaining behavior. Moreover, the concept of goal seeking is not limited to scholarly analysis. Judging from journalistic analyses and our everyday accounts of the world, goals, motives, and objectives play a central role in our understanding of events. In some sense, goals and motives are a preferred basis for the explanation of human behavior. Why did Egypt agree to negotiate with Israel at Camp David? Why does Ian Smith refuse to negotiate with the guerrillas? Why did Jimmy Carter veto the public works bill? While it is possible to answer these questions without appealing to goals, objectives, and motives, at some point these questions almost demand some analysis which uses the concept of a goal.

However natural explanation based upon goals may be, the philosophical foundation and justification for using goals in explanations is not well established. Some accounts of explanation (Braithwaite, 1953; Hempel, 1965) view teleological explanation, that is, explanation in terms of goals, as an inferior form of explanation and at best an elliptical version of a causal explanation. Others, Taylor (1964) for example, argue that for certain phenomena the only appropriate explanation is teleological. In addition to an uncertain
philosophical foundation the attribution of goals to collectives is viewed by many as either problematic or without foundation (March, 1962; Sprout and Sprout, 1965).

The result is a conflict. Explanation based on goals, motives, and interests appears to be a natural way to explain certain sorts of behavior. But however natural goals may be, they have no well established foundation. This Chapter presents a philosophical analysis of what it means to predicate goal seeking capabilities of an entity.

2.1 The Centrality of Goals

Whatever the differences among proposals for a definition of foreign policy, one clear commonality emerges. Foreign policy is a goal directed activity.

American foreign policies comprise the totality of purposes and commitments by which the United States, through its constitutionally designated authorities, seeks by means of influence, power, and sometimes violence to deal with foreign states and problems in the international environment. (Seabury, 1965: 7)

Foreign policy is the system of activities evolved by communities for changing the behavior of other states and for adjusting their own activities to the international environment. (Modelski, 1962: 6-7)

[Foreign policy] is conceived to be a course of action that duly constituted officials of a national society pursue in order to preserve or alter a situation in the international system in such a way that is consistent with a goal or goals decided upon by them or their predecessors. (Rosenau, 1968b: 222)

Foreign policy consists of those discrete official actions of the authoritative decision makers of a nation's government, or their agents, which are intended by decision makers to influence the behavior of international actors external to their own polity. (Hermann, 1972: 72)

Foreign policy is that set of actions by governments (and other actors) directed toward affecting the allocation of values in two or more nation-states. (O'Leary, 1976: 320)
The common attribute shared by these diverse definitions is that foreign policy is action directed at achieving some end. This consensus on the goal directed quality of foreign policy is striking when viewed against the serious lack of agreement on a number of basic issues in the field of foreign policy.¹

The notion that foreign policy is designed to achieve certain ends is central to understanding it. Without this conception foreign policy becomes "pure" behavior without purpose or intent. If foreign policy were this pure behavior, the only path to comprehension would be through Humean causality. But because what we mean by foreign policy is not pure behavior, goals, intentions, and the ends of foreign policy behavior are the bases for understanding, for they are part of what is meant by foreign policy.

There is, of course, nothing to prevent someone from defining what would normally be denoted as foreign policy in terms of pure behavior. Such a strategy would, however, result in a study of something other

¹There are those who might dissent from the view that foreign policy is goal directed. The works of Allison (1971) and Halperin (1974) suggest that foreign policy behavior need not always be directed at anything, but instead may be a non-intended resultant of a political bargaining process. But even those who doubt foreign policy can be viewed as coherent goal directed action take the position that foreign policy ought to be coherent attempts to achieve some end. Allison and Szanton (1976) examine several recent U.S.foreign policy failures and suggest several solutions to what they see as the cause of those failures. If foreign policy were not goal directed, there would be no basis for judging success or failure. Since Allison and Szanton do speak of foreign policy failures, at some level, their conception of foreign policy must involve goal directedness.
than foreign policy, as it is commonly understood. The commonality of
the five definitions of foreign policy is in no way necessary; it need
not be defined in that way. But, if "foreign policy" is to retain its
established meaning, then it must involve goals, intents, and ends.

Although goals and ends are part of what "foreign policy" means,
and explanations of foreign policy must deal with those goals and ends,
it does not follow in any obvious way that the only legitimate
explanation must be teleological. If goals can be Humean causes (Ayer,
1964), or if they can be themselves explained by Humean causes, then the
explanation of foreign policy need not differ from standard accounts of
scientific explanation (Hempel, 1965). There are of course those who
argue that Humean causality distorts the intentional goal directed
quality of action and that explanation must in those instances be
teleological (Taylor, 1964; von Wright, 1971; Moon, 1975). Regardless
of whether goals can serve as Humean causes, as long as foreign policy
is seen as artifact, any attempt to explain foreign policy behavior must
confront goals, ends, and means.

2.2 The Problem with Goals

However central goal seeking may be to our understanding of foreign
policy, there are a number of fundamental outstanding issues which
attend the use of goal seeking or its cognates. The first thing at
issue is the meaning of the predicate "goal seeking". There are at
least six major accounts of the meaning of the predicate in the
philosophical literature. The six differ not only in their conception of what counts as goal seeking, but also in the capacities implied by the predicate. Moreover, the accounts imply different approaches to the explanation of goal seeking behavior.

The use of the predicate in scientific explanations is also at issue. For some, e.g., Braithwaite (1953), teleological explanations are second-rate and replaceable by acceptable causal explanations. Taylor (1964) and von Wright (1971) take a contrary position when they argue that teleological and causal explanations are incompatible, and for certain phenomena, only teleological explanations are adequate. Finally, Harre (1970) rejects the grounds of the causal -- teleological dispute by arguing the standard deductive nomological account of explanation (Hempel, 1965) is without foundation. On Harre's analysis, there is no fundamental difference between teleological and causal under his reformulation of criteria for scientific explanations.

A third issue attending the use of goal seeking is the status of attributing goals to collectives like governments and organizations. The standard position in the methodology of social science is that such attributions are without foundation: individuals have goals, groups do not. (Sprout and Sprout, 1965; Buchanan and Tullock, 1962; Riker and

The major accounts are those of Braithwaite (1953), Sommerhoff (1950), Rosenblueth, Wiener, and Bigelow (1943), Taylor (1964), and Woodfield (1976). Nagel (1953) and Rudner (1966) provide accounts which are variations on Sommerhoff; Wright (1972) is a critical reformulation of Taylor.
Ordeshook, 1972). Axelrod (1976) and March (1962) take the position that it is possible to speak of the goals of collectives, though it must be done with care.

The attribution of goals is the basis for the fourth issue. Are goals to be posited by the analyst, inferred from behavior, or based upon public statements (Hermann, 1978)? The first strategy is the approach adopted by traditional analysts of foreign policy (Morgenthau, 1960). This strategy has been criticized (Rosenau, 1968b; Snyder, Bruck, and Sapin, 1962) as imprecise and without objective criteria. The attribution of goals based upon behavior, as in revealed preference theory, is a well established strategy (Riker and Ordeshook, 1972). Evidence from bureaucratic decision making (Allison, 1971; Cyert and March, 1963) suggests that foreign policy is rarely rational in that particular sense of the term, with the result that no coherent preference relation or utility function can be defined over actual choices. Reliance upon public statements is also problematic. As Hermann (1978) and Holsti (1976) note, it depends upon candor by officials and a well established linkage between official pronouncements and actual behavior.

While each of these four issues are important in their own right, in the context of the essential goal directed nature of foreign policy the resolution of these issues is of critical importance. Different analyses of goal seeking assert different capabilities and limits. What
the predicate "goal seeking" is taken to mean must influence what is denoted by "foreign policy". If there is no coherence to the predicate there can be no coherence of the study of foreign policy. If teleological explanations are inadequate scientific explanations and if goals cannot be reduced to Humean causes then there can be no scientific study of foreign policy if Hempelian criteria for explanation are used. As long as "foreign policy" is understood in terms of goal directed behavior these issues are fundamental.

Of all the philosophical issues involved the most important has to do with the meaning of goal seeking. Before the question of the status of teleological explanation, before the question of whether goals are causes, before the issue of predicating goal seeking of collectives, comes the meaning of goal seeking. To say the foreign policy of the US government is to lower the balance of payments deficit or to make the world safe for democracy is to say something about the capacities of governments. Governments can have a foreign policy only if they can be goal seeking. And whether governments or anything else is goal seeking depends upon what we mean by the term.

2.3 Accounts of Goal Seeking

Philosophical accounts of goal seeking can be divided into two groups on the basis of the domain of the predicate. One approach predicates goal seeking of behavior. This "externalist" approach analyzes the meaning of goal seeking in terms of the attributes
possessed by behavior: a bit of behavior is goal seeking only if it has certain characteristics. These characteristics constitute the meaning of goal seeking. The second approach predicates goal seeking of the system. For this approach, the question is not whether some bit of behavior has the characteristics of goal seeking but whether the entity exhibiting the behavior has the characteristics. For the "internalist" approach the meaning of goal seeking depends upon the characteristics of the entity, not on the character of the behavior of the entity.

Woodfield (1976: 103) characterizes the externalist approach as involving the analysis of "G is the goal of S's behavior" and the internalist approach as involving the analysis of "S has goal G". According to Woodfield (1976: 105) the fundamental difference between internalist and externalist accounts is not simply one of style, but of how goals and goal seeking fit into explanations. For the internalist, goals have etiological force, that is, they are the explanation of why a particular behavior occurs. For the externalist, goals have no etiological force and thus do not explain behavior; instead they are more like "interpretations" which illuminate. On their analysis, goals can be eliminated from explanations in much the same way that instrumentalists claim theoretical concepts can be eliminated from
theories (Maxwell, 1962). Thus to choose an approach to defining the meaning of goal seeking is to choose how goals and goal seeking are involved in the explanation of behavior.

2.3.1.1 Externalist Accounts of Goal Seeking

2.3.1.1.1 Braithwaite's "Plasticity"

The first externalist account to be considered is that of Richard Braithwaite (1953), first presented in 1946 to the Aristotelian Society. Following Russell (1945), who Braithwaite gives credit for coining the term "goal directed", he takes the distinguishing characteristic of goal directedness to be a "persistence towards the goal under varying circumstances" (Braithwaite, 1953: 329). This persistence is reflected in the 'plasticity' of behavior in the face of obstacles; the same goal can be achieved under different circumstances often by different behaviors. For Braithwaite, the analysis of goal directedness or goal seeking reduces to an analysis of plasticity.

One of the motivations for Braithwaite's analysis of teleology was to resolve the backward causation paradox of teleology. The standard critique held that teleology involved a future state of affairs (the goal) causing behavior in the present. One of Braithwaite's first steps

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1Taylor (1964), who presents an externalist analysis of goal seeking, would strongly dissent from this characterization. For Taylor, certain phenomena can only be explained by teleological laws. Whether Taylor agrees with the attribution of "externalist", his philosophical analysis of goal seeking, to be examined below, does not present goals as having etiological force.
in providing an analysis of goal seeking that did not invoke backward causation was to affirm the "usual determination principles of science" through the concept of a "causal chain". Causal chains provide a "respectable" present to future linkage between the explanandum and the goal through a set of nomically linked events. Under this analysis, a goal does not cause the behavior which realizes it; a goal is achieved precisely because it is the terminus of some causal chain. With this concept of causal chain, plasticity becomes a property of causal chains. On a naive level, plasticity exists because there is more than one circumstance which results in causal chains which terminate at the goal.

But clearly there is more to goal seeking than this. Braithwaite fleshes out his analysis by invoking a system b, an initial state of the system c, and a set of field conditions f. With this construction and the standard assumptions of determinacy, Braithwaite envisions each event in the causal chain c being nomically determined by the initial state of the system together with the causally relevant field conditions during the time period under study. Says Braithwaite (1953: 330): "Then, for a given system b with initial state e, c is a one-valued function of f; i.e. for given b and e, the causal chain c is uniquely determined by f -- the set of field conditions."

This construction, being only a description of a state determined system, has nothing per se to do with teleology. But Braithwaite goes on, asking us to imagine a property of a causal chain such that the
chain ends in event G without containing any other occurrence of G. He calls these chains G-attaining, and the class of all chains having this property the G-attaining class \( G \). Based upon this construction each element of \( G \) is a causal chain in which the only occurrence of G is as the last element of the chain. \( G \) is the set of goal attaining causal chains for goal G.

Braithwaite defines "variancy" as the number of different field conditions such that every causal chain of the system for an initial state is G-attaining. Recall that the field conditions uniquely determine a causal chain given an initial state. Thus variancy is a measure of the number of different field conditions which, given some initial state, determine G-attaining causal chains.

Plasticity, which Braithwaite takes to be the criterion of goal seeking, asserts the system exhibits persistence toward the goal under varying circumstances. Because variancy has to do with the number of field conditions under which the system can exhibit G-attaining causal chains given an initial state, plasticity and hence goal seeking must have something to do with variancy. Braithwaite identifies three cases for analysis. The first case is where variancy is zero, i.e., there are no field conditions such that when started in state e, the system exhibits G-attaining behavior. The second case is where the variancy is one. The third case is where variancy is greater than one.

In the first case, there is no possible way for a particular goal
be achieved, while in the second there is only one possible way. Braithwaite argues that systems having a variancy of zero or one for a particular initial state cannot exhibit goal seeking behavior because plasticity cannot be exhibited. Plasticity requires the goal to be achieved under various circumstances. In these two cases the variancy (the number of circumstances which produce G-attaining causal chains) is less than two. Clearly, "various circumstances" implies two or more; therefore goal seeking can be exhibited only in those cases where variancy is greater than one.

Notice this analysis does not preclude there being only one possible G-attaining causal chain. For a system to exhibit behavior directed at some goal, Braithwaite's analysis requires only that more than one condition exists under which a single G-attaining causal chain is exhibited. For Braithwaite, plasticity means "the goal can be achieved under a variety of circumstances, not that it can be achieved by a variety of means." (p. 331 - 332)

The central failing in Braithwaite's analysis of goal seeking is that an entity exhibits goal seeking only when it is goal achieving (Scheffler, 1959). Behavior is goal seeking only if plasticity is greater than one; but because plasticity is defined in terms of G-attaining causal chains, there can be no attribution of goal seeking
without goal achievement.¹

It should not be too surprising that Braithwaite's account of goal seeking is flawed given the low regard he evidences for teleological explanations (Braithwaite, 1953: 237):

A teleological explanation is to be regarded as a very poor sort of explanation indeed, to be discarded as soon as the real ... causes have been discovered.

2.3.1.2 Sommerhoff's "Directive Correlation"

The second externalist account of goal seeking is that of Gerd Sommerhoff, first stated in 1950 and restated with minor modifications in 1969 and 1974. Sommerhoff's intention is to develop an "objective teleology" devoid of any vitalistic connotations and consistent with the ordinary assumptions of causality. This effort, says Sommerhoff (1969: 147 - 148), will "require the purest form of behaviourism" with the system "as no more than a 'black box' which reacts to its environment in certain observable ways" [original emphasis].

Sommerhoff illustrates his account with the following situation: Imagine a black box with a red button on it sitting on a table. A few feet away from the box is a red ball. You push the button and shortly thereafter, a white ball rolls from the box and strikes the red ball.

The position of the red ball at the moment of firing t₁ is

¹There are other, more technical problems with Braithwaite's analysis having to do with the relation among field conditions, causal chains, and the assumption of determinism and with the composition of events which make up causal chains. For a detailed discussion of these points, see Woodfield (1976).
designated $E_{t_1}$, the value of the environmental variable. Its position at the moment the button was pushed to is $C_{V_{t_0}}$, the "conetic variable". The angle of the path of the red ball is $R_{t_1}$, the response of the black box. The event describing the collision of the two balls at $t_2$ is the "focal condition" $F_{C_{t_2}}$.

Sommerhoff argues that if the black box is a self-aiming and firing mechanism, then the four variables must stand in a particular relationship. The first relationship is a causal dependency between $C_{V_{t_0}}$ and $E_{t_1}$. In this example there is no room to question this dependency since, *ex hypothesi*, the ball is stationary. If the box is truly self-aiming, then $R_{t_1}$ must be dependent upon $C_{V_{t_0}}$, i.e., the angle of the path of the moving ball must depend upon the position of the target at the moment of sighting. Finally, $R_{t_1}$ and $E_{t_1}$ must jointly determine $F_{C_{t_2}}$. This asserts the collision of the two balls depends upon the position of the stationary ball and the angle of the path of the moving ball. Sommerhoff illustrates these dependencies with the diagram pictured in Figure 2-1.

Sommerhoff proposes an analysis of goal seeking behavior based upon this "lens diagram" and the concept of "directive correlation". By directive correlation, Sommerhoff means that $E_{t_1}$ and $R_{t_1}$ are correlated and jointly determine the FC in the sense that given $E_{t_1}$ the response of the black box $R_{t_1}$ is appropriate for the attainment of FC.

Sommerhoff argues three criteria must be met if the predicate goal
Figure 2-1: Sommerhoff's Lens Diagram

seeking is to apply to the behavior of the box. The first is that $E_{t1}$ and $R_{t1}$ jointly determine $FC_{t2}$. It would seem natural to describe $FC$ as the goal event. But Sommerhoff, being sensitive to the distinction between goal seeking and goal attainment, argues that $FC$ need only be a necessary condition for the realization of the goal event. For example, it is possible the moving ball will not travel with sufficient force to reach the stationary ball. Under the assumption that the collision of the two balls is the goal, Sommerhoff would argue that as long as the moving ball traveled at the correct angle, $E$ and $R$ are directly correlated.

The second criterion Sommerhoff invokes concerns the relationship between $E$ and $R$. For the behavior of the box to be considered goal directed, Sommerhoff argues that $E$ must be independent of $R$ at $t1$. Sommerhoff uses this principle, which he terms "orthogonality", to
exclude examples such as falling rocks and swinging pendulums from consideration as goal seeking. For something to count as goal seeking and to satisfy the orthogonality principle, Sommerhoff argues it must be possible to imagine arbitrary combinations of E's and R's as initial states at t0. In the case of a pendulum this is not the case because known physical laws link the displacement (E) with the force of acceleration (R). Sommerhoff argues there is no incompatibility between the concept of directive correlation and orthogonality even though directive correlation is a relationship between E and R, while orthogonality is the lack of a relationship between E and R. His orthogonality principles asserts only that E does not determine R at the same instant. Over-time dependencies are not ruled out and in fact are necessary for directive correlation.

Sommerhoff's third criterion is a counterfactual condition. It asserts that had the circumstances, i.e., CV, been different R would have taken on a value such that given E the two would be directly correlated to FC. A condition such as this seems necessary, for it would seem a mistake to describe the behavior of the black box as goal directed if it could only strike the stationary ball in one position.

The essential concept behind Sommerhoff's directive correlation is that the system "observes" the conetic variable CV at t0; causal laws connect CV with E so that \( E_{t+1} \) is caused by \( CV_{t+0} \); R, the action by the system, is based on the observation of CV at t0; together E and R result
Sommerhoff's account of goal seeking exhibits three central failings. The first has to do with the counterfactual condition. This condition requires that had the circumstances been different, the response would have shown modification appropriate to bring about FC. Although any account of goal seeking must contain some sort of counterfactual condition, Sommerhoff's condition is too strong. Under Sommerhoff's account there can be no mistakes; if behavior is goal directed it must always show the required modifications. In foreign policy or individual behavior mistakes and miscalculations occur because CV is misperceived as in the U.S. failure to anticipate Pearl Harbor (Wohlstetter, 1962) or because the response is miscalculated as in the Skybolt crisis (Neustadt, 1970).

In discussing this counterfactual condition, Sommerhoff recognizes there may exist circumstances such that no possible behavior could bring about FC and adds the qualification: "All within obvious limits, of course." But with that qualification, Sommerhoff undermines his whole enterprise. Many things are true "within obvious limits". Arsenic is perfectly harmless as long as it is not ingested, and Sommerhoff gives no clues as to what the limits are, which limits are obvious, or how they might be established.

Even if Sommerhoff is allowed to gloss over "obvious limits"
fundamental problems remain in his analysis. One problem is the supposed relationship among the focal condition FC, the events that bring it about R and E, and the goal. Under Sommerhoff's analysis, FC is not the goal itself, but an event necessary for the goal to be achieved. By making this distinction between FC and the goal, Sommerhoff argues his analysis is not subject to the problem of goal failure. This solution, however, creates a number of problems. Many things may be necessary for a particular state of affairs, but that state of affairs may have nothing to do with the goal. Conversely, many things would be considered goals if the only relationship were one of necessity. In the first instance, in order that the United States fail in preventing a Communist government in South Vietnam, it was necessary that the U.S. become involved in the conflict. In the second case, all of history can conceivably be directed toward a goal: In order to oppose Communist aggression in Vietnam it was necessary that the U.S. had armed forces; in order to have armed forces it was necessary to purchase weapons; in order to purchase weapons it was necessary to have money ....

By distinguishing between the goal and FC Sommerhoff has created two problems where before there was one. The first problem is the relationship between FC and the goal. The second problem has to do with achieving FC. Sommerhoff has traded the problem of goal failure for the problem of FC failure. He is required to assert that given E, R is
appropriate for producing FC.

The final objection to Sommerhoff's account of goal seeking as directive correlation concerns orthogonality. This principle bears the weight in distinguishing goal seeking from physical equilibrium. In essence it provides -- or at least is supposed to provide -- independent evidence for the assertion of goal seeking.

In discussing this principle, Sommerhoff (1969: 165) argues the concept of goal directed implies the relationship among R and E, and FC "must not be implied by the axioms of the system." Elsewhere (Sommerhoff, 1969: 78) he characterizes the force of orthogonality as requiring the correlation between "concurrent values of R and E must be a contingent one." By "contingent", Sommerhoff does not mean to invoke the logical/conceptual distinction used by von Wright (1971). He uses it in a non-classical sense to mean there exist no causal laws linking R and E at all points in time. This seems the sense of his claim that the relationship between R and E, and FC must not be a consequence of the axioms of the system.

The consequence of this requirement is that given sufficient knowledge of how the system operates we are precluded from describing its behavior as goal directed. For example if I treat a thermostat as a "black box" of unknown contents, I can under Sommerhoff's account, describe it as goal seeking. Under that description I have no knowledge which would imply the relationship between the thermostat setting and
the temperature of the room was anything but contingent in Sommerhoff's sense of the term. But as soon as I knew how a thermostat worked, the physical characteristics of bi-metal strips, the relationship would no longer be "contingent" but necessary.

The result is that under Sommerhoff's account foreign policy behavior is goal directed only as long as nothing is known about the process by which it is produced. Knowledge of the structure and operation of the decision making process precludes the attribution of goal seeking to foreign policy behavior.

The paradoxical aspect of this is that what would probably be the best independent evidence for asserting some system exhibits goal directed behavior, knowledge of the internal structure and processes of the system, makes it impossible, under Sommerhoff's criterion to call the system goal directed. This paradox is all the more surprising in light of Sommerhoff's avowed objective of rendering goal seeking analytically and philosophically respectable. The result is a situation similar to Braithwaite's comments on teleology: teleological explanations are second-rate when compared to explanations based upon the real causes of behavior.

2.3.1.3 Variations on Sommerhoff

Ernest Nagel (1953; 1956; 1961) presents an analysis of goal seeking based in large part upon a reinterpretation of Sommerhoff's directed correlation. Nagel's concept of "directive organization" uses
a "keeping paradigm" rather than Sommerhoff's "aiming paradigm" to use Woodfield's (1976) distinction. Regardless, the two accounts of goal seeking share a strong formal similarity. In terms of the implications they draw from the concept of goal seeking, both Sommerhoff and Nagel require orthogonality and some degree of success in goal achievement. Nagel seems less worried about the possibility of goal failure than does Sommerhoff, probably because his primary applications are on the order of regulation of body temperature and the like where failure is less of a problem. As a result, he does not make the distinction between would would be called FC and the goal in Sommerhoff's terminology. Notwithstanding the differences, the same general criticisms made against Sommerhoff's directive correlation hold equally against Nagel's directive organization.

Richard Rudner (1966) formulates an account of teleology and goal seeking which is also related to Sommerhoff's directive correlation. Rudner's account relies heavily upon Nagel’s directive organization conception of goal seeking. The distinctive aspect of Rudner's account is that where Braithwaite, Sommerhoff, and Nagel studiously avoided any mentalistic terms like "preference" and "desire", Rudner characterizes goal seeking systems as those systems that display a preference for the goal G. With this sort of beginning the task is to provide an acceptable analysis of preference. If Rudner's account were successful it would provide the grounds for predicating goal seeking in addition to
identifying the goal of the system. The three previous accounts never explicitly describe the process of goal identification in their attempt to establish their criteria for predicating goal seeking.

Rudner's solution to the analysis of preferredness is summarized as follows: "The system tends, or displays a greater tendency, to move toward some one state (or some class of states), out of all its possible states -- or, to stay in such a state if this has already been achieved" (Rudner, 1966: 96). This tendency talk can, I think, be ignored; it seems little more than an attempt to avoid serious problems involved with goal failure. This account of goal seeking requires the system to achieve its goals. But goal achievement ought not be a criterion, let alone the only criterion, for goal seeking. Furthermore, this analysis fails to provide evidence independent of the behavior of the system for the predication of goal seeking. In fact, there is no independent evidence at all. The argument might be made that some concept like preference as defined by Rudner might be useful in the identification of the goals of a system that has already been adjudged goal seeking -- but as the grounds for determining whether a system exhibits goal directed behavior, it is simply inadequate.

2.3.1.4 Wiener's "Negative Feedback"

The development of cybernetics by Norbert Wiener and others provided a new set of issues surrounding the concept of teleology and goal seeking. Since then, the development of "mind-like" artifacts in
artificial intelligence has demonstrated that mechanical devices can be constructed which appear to exhibit goal directed behavior. To many this achievement implied cybernetics had dissolved any serious issues attending the use of teleological concepts. Individuals of this persuasion viewed Wiener's (1961) *Cybernetics* as a consistent and adequate account of teleology which required only a reinterpretation to encompass various domains. This seems particularly true of Deutsch (1966) and the proponents of general systems theory (Buckley, 1968). As a result it is not surprising the most cited philosophical account of teleology is Rosenblueth, Wiener, and Bigelow (1943). This observation is not intended to imply that no thought has been given to the subject by proponents of cybernetics since 1943, but in the recognition that most authors are more interested in showing how negative feedback can be used to explain the behavior of some phenomenon than in providing a philosophical analysis of negative feedback. To be sure, philosophers have critically examined cybernetic concepts (Taylor, 1950; Wimsatt, 1971; Woodfield, 1976) and discussions of teleology since 1943 have been concerned with the implications of non-living purposefulness (Braithwaite, Sommerhoff, Nagel, and Rudner for example), but the positive statement of the philosophical basis of a cybernetic analysis of teleology remains Rosenblueth, Wiener, and Bigelow.

As with any externalist theory of goal seeking, Rosenblueth, et al. assume a behavioristic point of view. Rosenblueth and Wiener (1950:
235), a reply to Taylor's (1950) criticism of the 1943 paper, go so far as to argue:

If the term purpose is to have any significance in science, it must be recognizable from the nature of the act, not from the study of or from any speculation on the structure of the acting object.

By purposeful, which curiously they view as the opposite of random, Rosenblueth, et al. (1943: 18) mean:

the act or behavior may be interpreted as directed to the attainment of a goal -- i.e., to a final condition in which the behaving object reaches a definite correlation in time or in space with respect to another object or event.

After introducing the concept of negative feedback, which they characterize as error signals from the goal to the behaving object, they conclude based upon an argument distinguished primarily by its inconsistent use of terms: "All purposeful behavior may be considered to require negative feed-back" (p.19).

All of this results in four major problems:

- missing goal objects
- goal failure
- the equivalence of teleological and negative feedback
- the adequacy of a behavioristic analysis of feedback

Both Taylor (1950) and Scheffler (1959) argue there is no reason to suppose a goal must exist as Rosenblueth, Wiener, and Bigelow imply by their assertion that negative feedback requires error signals from the goal. The philosophers stone, the holy grail, the fountain of youth, and a living unicorn are all goals which individuals have sought but
which do not exist to send error signals.

Second, the characterization of a goal as involving a "definite correlation in space or time with respect to another object or event" requires goal achievement. As has been argued previously, there is no reason to suppose action must be successful in order to be goal directed.

Third, because they equate teleology with negative feedback, they are forced to take the position (and they do so quite readily) that a snake striking a frog or a frog striking a fly are examples of non-teleological behavior. These actions do not involve negative feedback; they take place so quickly there is no time for error correction via negative feedback once the action has been initiated. Presumably the only teleological thing about these two examples is the sighting of the prey.

Even without this reductio, there are other grounds for questioning the equivalence between negative feedback and teleology. Sommerhoff (1969) and Conant and Ashby (1971) argue goal seeking need not require negative feedback. Conant and Ashby distinguish between error controlled (negative feedback) systems and cause controlled systems. A cause controlled system does not react to error signals as does a system based upon negative feedback, but instead anticipates errors before they occur. This anticipation is based upon the effects of disturbances on the system as determined through a causal image of the impact of such
disturbances on the goal. They cite as an example of a cause controlled system the regulation of body temperature. Shivering and the constriction of muscles in the skin are not triggered by a fall in body temperature, but by a change in skin temperature. Body temperature remains constant not because certain biological mechanisms have raised it, but because these mechanisms prevent it from falling in the first place.

The fourth objection to the analysis concerns the adequacy of a behavioristic analysis of feedback. Their point of view requires them to assert negative feedback can be analyzed strictly in terms of the input-output behavior of the entity. But there is a basic flaw in this position. Rosenblueth, Wiener, and Bigelow speak of the sensory receptors and the effectors as being involved in feedback. Yet without some internal linkage between receptors and effectors, it would be meaningless to speak of feedback. Since it is impossible to conceive of this linkage and at the same time "omit the specific structure and the intrinsic organization of the object" (Rosenblueth, Wiener, and Bigelow, 1943: 18) feedback cannot be analyzed strictly in terms of an input-output view.1

1Wimsatt (1970) provides a different argument for the impossibility of a behavioristic analysis of both positive and negative feedback. His argument, which relies upon several results in the theory of finite state automata, is too complex to discuss here.
2.3.1.5 Taylor's "Necessity"

The final externalist account of goal seeking to be examined is that of Charles Taylor in his *The Explanation of Behavior*. It may be somewhat surprising to find Taylor, the arch foe of behaviorism in psychology, to be included in a group with Sommerhoff and Wiener with their strict behaviorism. As the analysis proceeds it will become clear that Taylor indeed takes an essentially behavioristic position with respect to his analysis of teleology.

Unlike the other accounts considered, Taylor is not so concerned with providing an account of teleology or goal seeking, as with teleological explanations. Because of this, Taylor provides what Woodfield (1976) terms a "second-order" account of teleology. While we cannot look to Taylor to provide a direct account of the meaning of goal seeking, he does argue that teleological explanations only apply to teleological systems. As a result, an account of what counts as a teleological system is contained in his analysis.

For Taylor, behavior is directed toward some goal or end if "it occurs because it is the type of event which brings about this end" (Taylor, 1964: 9). As Wright (1972) points out, the "because" in this characterization has etiological force; it would be inadmissible to rephrase the characterization as: An event is directed toward some end if it is the type of event which brings about this end. A piece of behavior is directed toward some goal only if the system exhibits the
behavior because it is required for the goal. The "occurring because" phrase requires the goal or end to be the goal of the system, and not simply a consequence of the behavior.

In setting this limit on what counts as goal directed behavior, Taylor seems to presuppose the system can be predicated with having a goal. Given Taylor's concern with teleological explanation rather than teleological systems, this assumption is understandable. As Woodfield (1976) suggests, by analyzing what it is for behavior to count as teleological, Taylor may provide an implicit definition of what it means for G to be a goal. Woodfield (1976: 76) suggests: "Taylor may hold the view that to say that an end-state is a goal just is to say that the system does things for the sake of achieving it." Following on this suggestion, the appropriate course would be to examine what Taylor means by "S does B for the sake of G."

Wright's (1972: 207) characterization of Taylor's analysis of "S does B for the sake of G" is:

- B is necessary (required) for G to obtain;
- B's being necessary for G is sufficient for B to occur.

Wright objects to this analysis on the basis of the sufficiency of "B's being necessary for G" resulting in the occurrence of B as well as the necessity of B for G. Wright argues these are too strong and that the weaker "tends to" provides a more acceptable analysis. Wright (1972: 211) reformulates Taylor's schema as:
- B tends to bring about G;
- B occurs because (i.e. is brought about by the fact that) it tends to bring about G.

This modification results in a "consequence etiology" rather than Taylor's original "requirement etiology", i.e., S does B for the sake of G because of the consequences of B rather than the original, S does B for the sake of G because B is required for G. Wright's reformulation of Taylor will be used in the remainder of the analysis if only because the weaker consequence form is easier to work with. Since Wright's reformulation is weaker than the original any criticisms against it will 'work' against the stronger version.

The differences between Taylor and Wright are subtle. Underlying both formulations is the notion that S will do whatever is appropriate for G under the circumstances. Where the two analyses differ is on their analysis of the relationship between appropriateness and behavior. For Taylor, the fact some bit of behavior is appropriate for G under the circumstances is the reason why it was exhibited. But as Wright points out, behavior may be exhibited for reasons other than that it is appropriate for G. He asks us to imagine a predator resting during a search for food, licking its paw with claws outstretched. A low flying bird happens to fly into the paw, killing itself. Under Taylor's account, because B was appropriate, i.e., necessary for G under the circumstances, B occurred. Wright objects, arguing that even though the predator's behavior was appropriate the paw was raised with outstretched
claws for reasons other than that it was appropriate for G.

Under Wright's reformulation the fact some behavior results in a goal tells us only that under the circumstances B was appropriate for G. It does not tell us why B occurred. For Wright, B's occur because they are appropriate for G's, and "the fact that the goal is sometimes achieved by accident is irrelevant to the claim that it is, sometimes, brought about by doing B" (Wright, 1972: 211).

While this difference is subtle, Taylor explains behavior because it is necessary and Wright explains behavior because of its consequences, the two analyses can be distinguished by the problem cases they must deny. For Taylor, any situation where B is appropriate for G but B is not done for the sake of G results in the accidental success problem where the behavior is incorrectly characterized as done for the sake of some G. But Wright has cases which would cause problems for his account: instances where B is done for the sake of G but B is inappropriate for G. In this case, also analyzed by Minton (1975), Wright will mistakenly deny B is directed toward G.

Wright, like all the externalists, requires the assertion "B results in G" to be decidable on the basis of an examination of the causal structure of the environment. As Wright (1972: 215) says: "Behavior is appropriate vis-a-vis the achievement of G only if it moves things in the right direction: only if it tends to get the job done."

A ceteris paribus clause will not dissolve this problematic case.
The driving force of this problem case is not that certain factors interfered with B bringing about G, but that under any circumstances -- given some background theories of the dynamics of the environment -- B will not achieve G.

This problem case is not an instance of Scheffler's (1959) goal failure, which could be handled by an appropriate *ceteris paribus* clause, but one of goal impossibility. But what sort of circumstances would support the joint assertion of "B is done for the sake of G" and "B is inappropriate for G"? The two assertions would be true of a case where an individual believed B would result in G, but in point of fact, B had nothing at all to do with G. For example, Wright would be unable to characterize a present-day alchemist's attempts to turn lead into gold as a goal directed activity because modern theories of matter do not support the assertion that heat and incantations will "get the job done".

Woodfield (1976) criticizes both Taylor and Wright on very different grounds. His argument is essentially that because they provide no criteria for the application of teleological explanations, they are forced to view falling rocks and similar phenomena as teleological systems with the goal being to obey the particular physical law in question. For rocks, the goal is to obey the law of gravity.

Goal attributions probably ought not be ruled out simply because they are applicable to "non-teleological" entities. The best objection
is the lack of independent evidence for goal attribution. Given the form of Woodfield's analysis, it is clear the only evidence for attributing the goal of obeying the law of gravity to rocks is that in fact the law of gravity describes their behavior; falling gets the job done. This is hardly the sort of evidence upon which goal attributions should be based. Yet, argues Woodfield, Taylor and Wright have provided nothing in their account of teleological explanation which would prohibit rocks from being considered directed toward the goal of obeying the law of gravity.

Thus Taylor's account fails because it would assert goal seeking when in fact there was none, Wright's fails because it would deny goal seeking when in fact it was present, and both fail because they fail to provide independent evidence.

2.3.1.6 Summary

The central failings of the externalist accounts of goal seeking result from their essentially behavioristic approach. Braithwaite, Sommerhoff, Nagel, Rudner, Wiener, Taylor, and Wright all presume the goal directedness of behavior can be determined by the nature of the behavior without considering its source. In making this presumption, each, though in very different ways, is required to take the position that behavior directed at some goal G will result in G. Some do include a ceteris paribus clause, notably Sommerhoff, Taylor, and Wright, designed to guard the account against obstacles in the environment,
which if they had not been present, would have allowed G to be achieved. But what they cannot do is include a *ceteris paribus* clause which would assert that had the environment been different, obstacles or no, the goal would have been achieved. There is no way any of the externalist accounts could describe the alchemist as goal directed and remain consistent; were they to do so would result in anything being considered goal seeking.

2.3.2 Internalist Accounts of Goal Seeking

Woodfield (1976:201) provides the essence of an internalist account by arguing "no behavior of a system can be goal directed unless it was the result of the system's being in a certain internal state" and that only those systems capable of goal directed behavior are those capable of being in the relevant state -- the state of having a goal.

There are very few contemporary internalist accounts of goal seeking. The reason for this is simple. Historically, internalist accounts invoked such concepts as vital forces, entiliches, and other such bits of mysticism. In essence, Braithwaite and Wiener initiated the externalist program as an attempt to provide a respectable version of teleology. It is only recently that attention has turned to the possibility of a non-vitalist internalist account of teleology. In fact, the only full statement of a non-vitalist account of teleology is by Woodfield (1976).
2.3.2.1 Woodfield's "Mentalistic Core"

For Woodfield, teleology, goal seeking, and the concept of a goal are based on a "mentalistic core" involving belief and desire. On this mentalistic basis Woodfield takes "S does B for the sake of G" to mean "S desires G" and "S believes B leads to G". He argues this basic mentalistic analysis of goal seeking is applied to non-human S's by analogy. A large portion of his analysis is directed toward identifying the "truth conditions" which support the analogy to non-human cases.

Of course, Woodfield's analysis of "B for the sake of G" is considerably more complex than the simple desire-belief conjunction. In order to deflect obvious counterexamples he adds clauses assuring the belief is sustained during the action and that S believed the time was ripe, much in the manner of von Wright's (1971) analysis of intentional action. Since none of the objections raised against Woodfield's account depend upon these qualifications of the simple desire-belief conjunction the simpler and more direct unqualified statement of the account will be used.

While there seem to be potential problems in applying Woodfield's internalist account of goal seeking to the case of non-human systems -- in what sense does a thermostat have a desire and a belief -- the counterexamples against the externalist accounts cause no problem. Goal failure, missing goal objects, goal impossibility, and accidental goal achievement are irrelevant to Woodfield's account. He does not require
the behavior directed toward some goal have anything to do with achieving the goal; all that Woodfield requires is the system believe B was appropriate for G under the circumstances.

The serious objections to Woodfield's account do not follow from the potential difficulties in applying the desire-belief concept in specific cases. The real objections to Woodfield's account of goal seeking involve his argument for a mentalistic core concept of teleology and the limits he draws around the extension of the mentalistic core to non-human systems.

Woodfield argues goal seeking and teleology depend upon a mentalistic core for their meaning. When machines, animals, and other non-human entities are termed goal seeking, he argues the meaning of those predications rests upon an analogy to the mentalistic core. The problem with this formulation is not so much the fact beliefs and desires are attributed to non-humans, but the grounds upon which the analogy is drawn. Woodfield never provides the "truth conditions", those properties which must be claimed to be true of the system if it is to have beliefs and desires, to support the analogy. This is not to say they do not exist, but until they have been stated, we ought be wary of explanations based upon the analogy.

Even though Woodfield never clearly states the truth conditions which delimit applications of the analogy, he believes that any successful statement of the truth conditions for the mentalistic core
will exclude certain systems which have served as paradigmatic cases of
non-human goal seeking. In particular, he denies servomechanisms and
homeostatic regulatory systems are teleological. These mechanisms, he
argues, are not sufficiently complex to support the attribution of
goals, beliefs, and desires.

Any account of goal seeking which rested upon an analogy to human
intentional action and denied that servomechanisms and homeostatic
regulatory systems were goal seeking would naturally be open to
challenge. Rather than attempt to specify a set of truth conditions
which provides the justification for the analogy and at the same time
admits servomechanisms and thermostats to the class of goal seeking
systems, an alternative internalist analysis of goal seeking will be
provided. This account will attempt to provide a coherent analysis of
goal seeking that avoids the mentalistic core and allows servomechanisms
and other simple mechanisms to be considered goal seeking.

2.3.2.2 An Alternative Internalist Account

The account of goal seeking is composed of two parts. The first is
an analysis of "S does B for the sake of G" which avoids the mentalistic
core. The second part of the account sets limits on what counts as an
appropriate S in the analysandum. The general constraints are that the
analysis should be independent of the environment, i.e., internalist,
and should not invoke mentalistic concepts like desire and belief. But
avoiding the concepts of desire and belief should not require they be
ruled inapplicable to human goal seeking. The object is to devise an account that is not inconsistent with attributing desires and beliefs to human S's.

Before proceeding with the account, there is an important observation to be made about the nature of the limits placed on the predication of goal seeking. Woodfield and Sommerhoff were particularly concerned that the accounts they gave of goal seeking excluded equilibrium systems and falling rocks. Rather than exclude certain systems from the class of goal seeking systems, the account to follow will establish a set of minimally necessary capabilities which must be asserted of the system if it is to considered goal seeking. Thus the question is not whether a rock, servomechanism, individual, or government is goal seeking, but what must be asserted true of it if it is to be described as goal seeking. These conditions or capabilities will provide the basis for evidence of goal seeking independent of the fact that the behavior of the system has certain attributes. The issue is not whether rocks or governments are goal seeking, but what must be asserted true of them if goal seeking is predicated of them.

The initial unqualified analysis of "S does B for the sake of G" is that it implies "S terminates B in G-situations, ceteris paribus". The motivation for this interpretation can be simply illustrated by the case of an animal searching for food. The hungry animal S will terminate
stalking behavior $B$ when it finds food $G$.\textsuperscript{1} It is important to realize satisfaction of this termination of $B$ by $S$ at $G$ does not license the predication of goal seeking to $S$, nor does it identify $G$. What it does is to provide a partial analysis of what is meant by "$B$ for the sake of $G$". Thus the fact a rock can be described as terminating its falling behavior when it reaches the ground does not by itself predicate goals to rocks. Were goal seeking to be predicated of rocks, the minimally necessary conditions for goal seeking would also have to be asserted true. Those conditions will be discussed below.

To check the immediate plausibility of the analysis, consider whether it is reasonable to assert "$S$ does $B$ for the sake of $G$" and "$S$ does not terminate $B$ at $G$". Using the predator example, would it be reasonable to assert the animal was searching for something to eat, but after finding food ignored the prey and continued searching? I think not. We would probably say the goal had been misspecified. The goal might have been finding a particular sort of food or perhaps the stalking behavior was done for sport with no intention of consumption. Presumably once the goal has been achieved, attempts to achieve it

\textsuperscript{1}E.S. Russell (1945) included a similar termination statement in his five general characteristics of goal directed activity.
 cease.¹

Under this analysis is a submerged counterfactual of the form: "If G were to be satisfied, S would terminate B, ceteris paribus". It is this counterfactual which provides the necessary degree of independence from the particular nature of the environment faced by S. There is no implied requirement that G be achieved by a particular B, but if G were achieved, B would stop. Nor is there a requirement that B have anything to do with the achievement of G from an objective point of view. The alchemist's attempt to turn lead into gold would stop were he to achieve the transmutation. This of course does not imply that if the alchemist were to turn lead into gold, he would no longer do so. But his behavior would no longer be "attempting to turn lead into gold" but rather "producing gold from lead".

The cautious conditionals in the preceding few paragraphs do not assert "If B terminates, G has been achieved". Behavior may stop for reasons other than the satisfaction of G. There are three general situations when S will terminate B for reasons other than the satisfaction of G:

- extinction of G;
- change in G;

¹This predator example illustrates the point that both the behavior and the goal can bear different descriptions: stalking may be done for food or for sport. Part of attributing goal seeking involves finding appropriate descriptions of B and G.
- change in B.

Extinction covers those instances where repeated attempts to achieve G have been frustrated and S simply gives up. B may also terminate in those cases where a different, more important goal supercedes the current goal. Under this circumstance the behavior of S would cease being directed toward G and a new B would be directed toward the new G. The final instance of B-termination without G-attainment involves changing B but maintaining a constant G. If S fails to attain G by a particular B, S may initiate a new course of action.¹

It must be noted that these three cases of B-termination without G-attainment need not necessarily be exhibited by any goal seeking S. Goal change requires S to be capable of seeking more than one goal; goal extinction can be exhibited only by S's capable of seeking more than one goal; B change requires S to have a repertoire of more than one B and an ability to use different B's to achieve the same G. For very simple goal seeking systems, these capabilities may not be present.

In general, the term "behavior" is vague in most accounts of goal seeking. Woodfield (1976) notes that teleological explanations can be used to explain single actions or whole sets of actions. In addition, as Becker (1975) has noted, any characterization of behavior will be relative to some level of description. Consider the example of a rat

¹Change in B is a way of expressing the plasticity condition which served as the basis for Braithwaite's (1953) analysis of goal seeking.
running a maze. How is the behavior of the rat to be described? Is the rat running the maze, taking a series of single steps, executing a series of limb movements, or searching for the food?

Generally there is no unique description, but given the analysis of goal seeking as "B is terminated at G" the level at which B and G are described are not independent. For example, if the rat is described as having a series of goals corresponding to various positions in the route toward the food, then B cannot take the value "running the maze". These two levels conflict because B is to be terminated by the rat at G, but the rat continues to run, never terminating B and the various G's. Similarly, if G is to reach the food and B is characterized as taking a step, the only way to achieve closure under these descriptions is to posit behavior change after each step.

B is described at a level appropriate for G when B has the characteristics of an Aristotelian "complete action" on "with respect to G. A complete action has a beginning, and end, and continuity (Aristotle's Physics, Chapters 3 - 5). If B had no identifiable end or beginning, the assertion "S terminates B at G" could have no meaning. The continuity of B ensures that B continues until G. Under the analysis, unless B changes, G changes, or G is extinguished, B must continue until G is achieved. In the maze running example B is a complete action to G when B is "running the maze" and G is "finding food" or when G is "take a step" and G is "get to the next position in
In general the requirement that B be complete to G does not prevent goal directedness from being predicated in situations which would be judged goal directed using a pre-analytic ordinary language sense of the term. What it does do is place constraints on how the behavior is to be described. For example Rosenblueth, Wiener, and Bigelow asserted that a frog striking a fly was not goal directed because there was no time for negative feedback error correction. It would appear that under this account, a frog striking a fly would also fail as goal directed if G is "eating the fly" and B is "striking". The counterfactual "The frog will strike until the fly is caught" does not 'fit'. The frog executes the flick of its tongue in a very short time -- and the tongue is retracted regardless of whether the fly is caught. The frog's actions can, however, be considered goal directed if the goal is "getting something to eat" and the behavior is described as "striking at particular types of objects in its visual field".¹

Under this analysis goal directedness consists not of discrete behaviors but of a pattern or program of activity. To predicate goal directedness involves not only saying something about the ends of behavior but also it involves saying something about how S goes about...
achieving those ends. It involves looking at the behavior of $S$ and interpreting it as a pattern of activity done for the sake of achieving $B$.

This account of what is implied by asserting "$S$ does $B$ for the sake of $G$" raises a number of issues which attend empirical applications. How are goals determined, on what grounds can one account of goal directedness be chosen over another, in what sense does goal seeking explain behavior? In order to sensibly address those issues, the prior issue of what sorts of $S$'s can count as goal seeking must be resolved. Until the limits of the predicate are understood it is impossible to examine the consequences of the account in empirical situations.

The previous discussion concerned what it means to assert $S$ is goal directed, the second part of the non-mentalistic internalist account of goal seeking involves a specification of the properties the system must be asserted to have if it is to be considered a goal seeking system. The relationship between the first and second parts of the analysis is this: $S$ can do $B$ for the sake of $G$ only if $S$ is a goal seeking system. Thus this second part of the analysis provides criteria for identifying appropriate $S$'s.

There are four properties that must be satisfied by any $S$ if it is to be described as goal seeking. But before discussing those properties, some characterization is needed for a fundamental concept -- a goal. In general the externalists view a goal as some state of the
environment, a thing that happens because of the behavior of S. Rosenblueth, et al. (1943: 18) characterize a goal as a "final condition in which the behaving object reaches a definite correlation in time or in space with respect to another object or event." In his internalist account, Woodfield (1976) argues that the important concept is the analysis of "having a goal", something Woodfield claims the externalists analyzed strictly in terms of behavior. While he seems to take goal to be a state of the environment, Woodfield analyzes "having a goal" in terms of an internal state of S, in particular the state of desiring some environmental state.

While defining G in terms of environmental states is not wrong, it seems to deny S might have a quality of behavior as its goal. For example, concern with the type of behavior used to achieve certain ends cannot be a goal under the environmental state conception of a goal. Similarly, achieving an environmental state with a minimum of cost seems denied the status of a goal.

If goals were conceptualized as involving both states of the environment and states of the system, the problem would be resolved. The internal states or descriptions of S might include such predicates as a capability for future response (cost minimization) or not becoming a law breaker (a quality of behavior). This combination will be referred to as a "state of affairs" in the discussion below. The result is a broadening of what might count as a goal. It may be a particular
state of the environment or a combination of environmental and system states.

The four properties listed below are necessary for S to do B for the sake of G. Because the conditions are necessary but not sufficient for goal seeking, it does not follow that something which satisfies the four conditions will or can do B for the sake of G. The force of the conditions is that if goal seeking capabilities are predicated, then the four conditions must be satisfied. To predicate goal seeking, that is, to assert "S does B for the sake of G" is to also assert the truth of the four necessary conditions.

The four properties that must be claimed to be true of S if S if to be termed a goal seeking system are:

1. S must be able to exhibit at least two internal states corresponding to two distinct states of affairs.

2. There must be at least two internal states of S corresponding at least to S being in G-attaining states of affairs and S being in not-G-attaining states of affairs.

3. The behavior exhibited by S must depend upon at least the internal state of S corresponding to S being in G-attaining states of affairs or not-G-attaining states of affairs.

4. S must not be such that for all internal states S exhibits only one behavior.

The motivation for each of the four conditions will be discussed below.

If S could not distinguish between at least two states of affairs it would be impossible for it to have a goal. Doing B for the sake of G implies B stops when G is achieved; if S could not determine whether G had been achieved it could not properly said to be goal directed toward
G. At basis the motivation for this requirement is to ensure the system can distinguish states of affairs satisfying G from those that do not. Generally S will in fact be able to distinguish more than two states of affairs, but at a minimum it must distinguish between at least two.

The second condition ensures there is some link between G and states of affairs. In other words, it is to prevent the possibility that while the system could distinguish between G-attaining states of affairs and not-G-attaining states of affairs, it could not determine in specific instances whether it was in a G-attaining state of affairs. This ability to match states of affairs with G could be strengthened under the condition that S could distinguish more than G-attaining from non-G-attaining states of affairs -- if the partition supported by 1 did more than divide the states of affairs into two sets.

It might seem that 1 and 2 are not independent; in particular, 2 seems to imply 1. That is not the case. Condition 1 establishes that S can determine which state of affairs it is in, while 2 ensures the distinction supported by 1 can be related to G. For example, if the mechanism which sets the desired temperature in a thermostat were destroyed but the temperature sensing bimetallic strip were intact, it could distinguish between different temperatures, but that distinction could not be related to the goal. Conditions 1 and 2 ensure than in fact S can distinguish more than one state of affairs and that the distinction can be related to G.
Condition 3 ensures that whether $S$ is in a $G$-attaining or not-$G$-attaining state of affairs makes a difference in the behavior of $S$. If $S$ satisfied 1 and 2 but could not relate the distinction between a $G$-attaining state of affairs and a not-$G$-attaining state of affairs to its behavior, $S$ would be goal recognizing but not goal seeking. Conditions 1 and 2 provide for the recognition of being in a $G$ or not-$G$ situation and 3 ensures that it makes a difference in the behavior of $S$. Again the condition is presented in its weakest form. In sophisticated goal seeking systems more than a simple binary distinction would be involved. Notice that 3 has the possibility of including a large amount of substantive content. The entire search, selection, evaluation, and choice processes as well as any beliefs an appropriate $S$ might have about the dynamics of the environment are "contained" in the posited relationship between $G$-attaining and not-$G$-attaining states of affairs, and behavior.

The fourth condition places a constraint on the nature of the relationship between $G$ and $B$ in 3. If the system could only exhibit one behavior, it would be forced to exhibit that behavior constantly. An implicit assumption of goal seeking is that the system is reactive to its environment. But if the system was constrained by its structure to the same behavior in all situations that responsiveness is missing. Furthermore, if this condition ensuring a range of behavior were absent, there would be no need for conditions 1 - 3. Regardless of the state of
affairs S happened to be in, S would always do the same thing.

These four conditions provide the necessary properties which must be asserted true of S if the predicate "goal seeking" is to apply. As discussed above, one requirement for any adequate account of goal seeking is that the application of the predicate must depend upon or be supported by evidence independent of the fact the behavior of S can be interpreted as being done for the sake of G, i.e., it cannot depend only upon the fact that B achieves G. These four criteria provide the grounds for that independent evidence. In practice the theorist will have to do more than simply state "Conditions 1 - 4 are true of S." The conditions must be fleshed out through a description of the capabilities exhibited by S, the states of affairs distinguished by S, which states of affairs are goal attaining and which are not, and how particular states of affairs are related to B. Moreover these assertions and descriptions can be evaluated in terms of accepted background theories. Presumably these background theories would rule out falling rocks and pendulums from the class of goal seeking systems.

2.3.2.3 Summary

If this account of goal seeking is to be progressive in the tradition of Lakatos (1970) it must be able to deflect the anomalies and counterexamples directed against the other competing accounts. The externalist accounts were open to the objections of goal failure, triviality, and the problem of multiple goals. Woodfield's internalist
account was objectionable because of its mentalistic core concept.

Goal failure poses no problem for the account. It does not require that B will actually lead to the goal, or even increase the probability of goal achievement. All this is replaced by the counterfactual: If the goal had been achieved, the system would have terminated the behavior.

The account avoids counterexamples based upon trivial applications to "objectively" non-teleological objects because the account requires more than simply a description of the behavior as goal directed. If an entity is to be described as goal seeking, the theorist must assert other things are true of the system, in particular that it can distinguish states of affairs and relate that distinction to behavior.

Multiple goals pose no problems, although the analysis of this case is more complex than the others. There are two cases of multiple goals to be considered: dependent and independent multiple goals. Dependent multiple goals are characterized by the fact that one goal is necessary for the other goal to be achieved. The problem is that if E is necessary for F and if F is the "final goal", then behavior directed at E is directed at F. Accounts of goal seeking that fail under conditions of multiple independent goals cannot identify F as the goal of the behavior. This is avoided by the terminating nature of goal directed behavior. The goal of the behavior is E only if S terminates B at E — but ex hypothesi the behavior is terminated at F. Thus the account can
distinguish between behavior directed at E and behavior directed at F.

The case of independent multiple goals, where there is no dependency between the goals, is somewhat more complicated for again there are two cases: sequential and simultaneous multiple goals. The sequential case involves two different goals at two points in time. Simultaneous independent goals involve two or more goals held at the same point in time.

The sequential case can be distinguished by the fact that B must change if behavior is to be directed toward two goals in sequence. If the behavior did not change, then it would reduce to a case of dependent goals. The change in behavior can be account for either by goal satisfaction (the normal case of goal achievement) or goal extinction. The first case is clear, since the account will indicate the goal has been achieved and behavior will stop. Extinction will involve one goal replacing another, with the resultant changes in behavior.

The case of multiple, independent, simultaneous goals is characterized by behavior appropriate to any of the goals. The "solution" in this case is to recognize there may be no single goal that underlies a particular B. Thus instead of "B for the sake of G", it is a case of "B for the sake of G₁, G₂, G₃, ..., Gₙ". The danger is that under these conditions the account has the potential for generating inordinately complex descriptions of goal directedness.

The fourth aspect concerns the possibility of an acceptable non-
mentalistic account of goal seeking. Nowhere does the account presuppose S has a mind, or is capable of believing or desiring. But it is important to note that the account does not preclude such capabilities. Thus it would seem appropriate to predicate goal seeking of humans, animals, and machines.

This account of goal seeking provides what appears to be an acceptable account of what it means to assert "S does B for the sake of G". It does this in a non-mentalistic internalist framework that is not inconsistent with the attribution of goals and goal seeking capabilities to humans, animals, and machines — including the thermostat and servomechanism which Woodfield excludes.

2.4 Resolving the Problems

Section 2.2 raised four issues attending the use of goal seeking:

- What does goal seeking mean?
- What role does goal seeking play in explanation?
- Can goal seeking be attributed to collectives?
- How are goals to be identified?

The examination of philosophical accounts of goal seeking in the previous section resolved the first issue. Goal seeking is a predicate asserted of a system. To say S is goal directed is to assert:

- S terminates B when G is achieved; and
- S has the four capabilities necessary for goal seeking.

The current section will address the remaining three issues.
The role of goal directedness in scientific explanation has been a matter of long standing dispute in the philosophy of science. Some (Braithwaite, 1953; Hempel, 1965) argue that teleological explanations are at best elliptical formulations of standard causal explanations. Others (von Wright, 1971; Taylor, 1964; Woodfield, 1976) argue there is nothing lacking in teleological explanations; they are complete in themselves and not mere elliptical formulations of standard causal explanations.

The position to be argued here is that the grounds of this dispute have been misspecified, that there is no fundamental incompatibility between causal and teleological explanations. This account takes the concepts of "generative mechanism" and a "generative explanations" from Harre (1970) and Harre and Madden (1975). By taking the concept of a generative mechanism as the basis for explanation, causal and teleological explanations differ only in the capacities which are attributed to the generative mechanism and not in terms of scientific adequacy.

On Harre's view (Harre, 1970: 101 - 102) "the aim of science is to try to find the structures, states, and inner constitutions from which the phenomena of nature flow .... It is, in short, to look for the causal mechanisms of which the patterns and regularities of phenomena
are the effects."¹ Given this, a phenomenon is explained by exhibiting the structure of the mechanism which generated it.

This generative view of explanation holds equally for the physicist and the political scientist. The behavior of matter is explained by the structure of the atom and the behavior of governments is explained by the structure of the policy making process. For both physicist and political scientist explanation involves showing how phenomena follow the operation of the underlying generative mechanism.

Under this concept of generative explanation both the so-called "causal" and "teleological" approaches converge. The difference between the two is in the capabilities and powers attributed to the generative mechanism. Teleological explanation predicates a capacity for goal seeking while the "causal" does not. The issue of whether goals are causes disappears under this formulation because it is mechanisms that are causes, not Humean events. As a result, both "causal" and

¹Harre's conception of cause as not a Humean conception. He views cause as arising from the operation of the underlying mechanism and not, as a Humean would claim, from the observation of constant conjunction. For Harre, causes exist. See Harre and Madden (1975) for a full discussion.
teleological explanations are causal.\(^1\) Thus the issue of the scientific status of teleological explanations disappears. To explain a phenomena is to exhibit the generative mechanism which generated it whether teleological or not.

Under a generative conception of explanation the results of the philosophical analysis of goal seeking take on a particular importance. Because phenomena result from the exercise of the capabilities of the generative mechanism the four capacities which must be asserted of a system if it is to be described as goal seeking form the basis of a generative explanation of goal seeking behavior. Thus they provide much more than independent evidence for predicating goal seeking; they are the basis for explanation.

The third issue concerns the predication of goal seeking to governments, organizations, and other collectives. The standard position (Sprout and Sprout, 1965) is that individuals have goals, groups do not. This objection to predicating goal seeking of collectives is based upon an essentially mentalistic interpretation of goal seeking. Goal seeking requires desires and beliefs, desire and belief requires a mind, there is no such thing as a group mind, hence collectives cannot be goal seeking. But this objection falls in the

\(^1\)One of the casualties of this approach to explanation is the covering law model of explanation (Hempel, 1965). Under the generative view of explanations laws do not explain, descriptions of mechanisms do. See Harre and Madden (1975) and Harre (1970) for the argument.
face of a non-mentalistic account of goal seeking. The four conditions for goal seeking do not require the existence of a mind. Goal seeking systems require an ability to distinguish different states of affairs and to relate that distinction to behavior. Because the account of goal seeking does not require a mind, the problem of predicing goal directedness to collectives disappears.

There is another sense, however, in which predicing goal seeking to collectives is problematic. The bureaucratic politics (Allison, 1971; Halperin, 1974; Steinbruner, 1974) and organizational decision making literatures (Simon, 1976; March and Simon, 1958; Cyert and March, 1963; Simon, 1964) argues that collectives need not have coherent goals. The result is that while it is not conceptually impossible to predicate goal seeking of collectives, the predications cannot blindly posit consistent coherent goals. Because organizations are a loose aggregation of competing interests and perspectives their behavior need not be globally consistent with a fixed set of objectives.

This problem of predicing coherent goals to collectives is part of the larger problem of the empirical application of the predicate -- the fourth issue. There is no easy resolution to this issue. Goals are attributed as the result of interpretations of a body of evidence. The evidence includes the behavior of the system, the structure of the generative mechanism, and for certain system, the public reports of goals and objectives.
Predicating goal seeking also requires the assertion that the system exhibits the four necessary capabilities. This too requires the interpretation of a body of evidence. Does the posited generative mechanism have a capacity to distinguish different states of affairs? Does the mechanism have a capacity to relate the different states of affairs to its behavior?

An important consequence of the analysis of goal seeking and goal seeking capabilities is that goals cannot be determined solely from an examination of behavior. The internalist analysis of goal seeking does not guarantee that behavior is "objectively" related to achieving the goals toward which it is directed. Doing B for the sake of G does not require B to be necessary or appropriate for achieving G.

In order to determine whether S does B for the sake of G it is necessary to examine the process by which S produces B. With respect to governments, it is necessary to consider the decision making process in relating goals and behavior. The most common approach is to assume a rational optimizing decision process (Allison, 1971) and to supplement that assumed decision process with other assumptions about beliefs and interpretations of the environment.

This internalist account of goal seeking highlights the necessity of knowing something about the character of the process which generates behavior. Because it denies the possibility of determining the goals toward which behavior is directed without considering the decision
making process, theories of governmental decision making become central to the identification of goals.

Moreover, because of the central role of theories of decision making in identifying goals, it becomes possible to replace the rational optimizing theory with a more satisfactory substitute. The theory of Cyert and March (1963), for example, could be substituted for a rational decision process. The result would be to require the attribution of goals to be based upon more than observed behavior. It would be necessary to examine how experience is interpreted, the structure of expectations, the nature of search, and the process of choice.

Although no "mechanical" procedure exists which will guarantee sound attributions of goals and capacities, the general methodological procedures of Lakatos (1970) and Hanson (1958) can form the basis of a critical self-correcting approach. The method is based upon critical revisions based upon anomalies and counterexamples. In the current context the strategy is to posit goals and a mechanism which generates the observed behavior. If the mechanism can at least generate historical behavior then it is, in Newell and Simon's (1963) term, a sufficiency model. This mechanism will have implications (e.g., support counterfactuals) which will go beyond the existing evidence. To the extent those implications are inconsistent with further observations and tests, the mechanism stands in need of improvement (Simon, 1968). This
process of critical revision can be reinforcing when viewed in a Lakatosian competitive environment. A version of the structure of a mechanism is progressive compared to its predecessor when it accounts for all the predecessor accounted for and when it accounts for phenomena the predecessor could not explain. While this critical revision strategy does not guarantee infallible attributions and predications, it is critical self-correcting approach.

2.5 Summary

This Chapter has examined the concept of goal seeking from a philosophical perspective. The four issues which motivated the analysis were:

- What does it mean to predicate goal seeking?
- What role does goal seeking play in explanation?
- Can the predicate be applied to collectives?
- How is the predicate to be applied?

The first issue was resolved through an analysis of what is asserted to be true of a system if goal seeking is predicated of it. In order for goal seeking to be predicated four capabilities having to do with the internal structure and capacities of the system must be asserted.

The second issue was resolved by taking a generative view of scientific explanation. Under this approach there is no fundamental incompatibility between teleological and "causal" scientific
explanations. Phenomena are explained by showing them to be the result of a generative mechanism. Whether the mechanism is teleological is irrelevant to its standing as an explanation.

The third issue, the in principle objection to predicating goal seeking of collectives, disappears in the face of a non-mentalistic account of goal seeking capacities. The problem in attributing these capacities to collectives is not in committing a category mistake, but of incorrectly attributing coherence to goal seeking activities.

The fourth issue was the empirical application of the predicate. The problems under this issue were never really resolved. There is no mechanical procedure which guarantees the application of the predicate will be appropriate or correct. However, the internalist analysis of goal seeking did identify the central role of theories of decision making in linking goals to behavior, viz. goals cannot be identified independently of the structure of the mechanism. Identifying the goals toward which the behavior of collectives requires a theory of decision making. A procedure for criticizing and revising analyses does exist, which while it does not guarantee truth and accuracy, does provide a rational approach to critical growth.

The purpose of all this is to provide the basic structure for a generative explanation of foreign policy behavior. Foreign policy is a reflection of the capacities and capabilities of governments. The theories of governmental decision making examined in the first Chapter
invoked the concept of goal seeking as a basic capacity of governments. Thus the need to determine the nature of those capacities.

Goal seeking is not the only teleological concept which has been applied to governments. The concept of adaptation is often attributed to governments (Rosenau, 1970; Deutsch, 1966; Steinbruner, 1974; Cyert and March, 1963). But is a capacity for adaptation different from a capacity for goal seeking? Deutsch (1966) and Steinbruner (1974) treat them as identical. Under their view, a goal seeking system adapts its behavior to achieve goals. Cyert and March (1963) have a notion of adaptation which appears to go beyond the capacity for goal seeking and includes a capacity for learning and change. Chapter 3 examines the concept of adaptation. The issue is whether this related concept involves a capacity beyond that of goal seeking.
3. AN ANALYSIS OF ADAPTATION

The analysis of goal seeking in Chapter 2 relied upon the existence of an intuitive common sense meaning of the term. The analysis attempted to sharpen and clarify that pre-existing conception of goal seeking. In the case of adaptation such a base does not appear to exist. Although there is a biological sense of the term (Williams, 1966), uses of adaptation tend to be largely independent of a strict biological interpretation.

Because a commonly accepted core concept does not appear to exist, this Chapter approaches the question of adaptation from a different perspective. The strategy will be to sort out the various uses of the term and provide a unification of the various meanings. Thus the question will be: What ought adaptation be taken to mean?

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1Biologists however do not agree on the precise meaning and domain of adaptation. Whether it is possible for group attributes or altruism to be selected is very much an issue in biology. For a selection of the arguments see Smith (1969), Bohm (1969), Waddington (1968, 1969a, 1969b) and Grene (1969).

2Corning (1971), who is concerned with genetic influences on political behavior, adheres to a strict biological usage. He, however, is almost alone. T. Thorson (1970) applies a biological metaphor to society through the concept of a "cultural DNA", Crecine (1977) and S. Thorson (1974a, 1974b) treat adaptation as goal seeking, Rosenau (1970) talks of the adaptation of national societies in functional terms, and Starling (1975) characterizes adaptation as structural morphogenesis.
3.1 The Uses of "Adaptation"

Richard Lewontin (1978: 213) provides a concise description of adaptation in a biological context:

The modern view of adaptation is that the external world sets certain "problems" that organisms need to "solve", and that evolution by means of natural selection is the mechanism for creating these solutions. Adaptation is the process of evolutionary change by which the organism provides a better and better "solution" to the "problem", and the end result is the state of being adapted.

The advantage of this characterization of adaptation is that it is largely independent of the specific biological mechanism of natural selection with its genetic mutations, cross-overs, phenotypes, and genotypes. This is an advantage because it provides a touchstone for evaluating non-biological conceptions of adaptation without imposing a particular biological process.

Adaptation and its cognates, adaptive, adapt, and adapted, are frequently used in a wide variety of disciplines with a wide variety of meanings. Outside of a strict biological interpretation,¹ there appear to be four distinct -- though related -- senses given to adaptation.

The first is a sense of coping or adjusting (Rosenau, 1970, 1973, 1974; Hansen, 1974; Crecine, 1977; Hazelwood, 1973; Ashby, 1960; Steinbruner, 1974).

Any external behavior undertaken by the government of any national society is adaptive when it copes with, or stimulates,

¹Corning (1971) is among the few who apply the biological sense of the term with no change in meaning. His concern is with the biological determinants of political behavior.
changes in its external environment that contribute to keeping its essential structures within acceptable limits. (Rosenau, 1970: 2)

On this view, adaptation is a process of coping with external pressures. Behavior which successfully copes is adaptive and behavior which does not is maladaptive. Thus Rosenau (1970), Hansen (1974), and Hazelwood (1973) speak of national societies coping with pressures from the external environment, Crecine (1977) speaks of U.S. governmental agencies adapting to budget ceiling imposed by the Office of Management and Budget, and Steinbruner (1974) speaks of decision makers adapting to complexity. This conception is consistent with Lewontin's characterization of adaptation as "problem solving": a solution copes with the problem.

A second sense is adaptation as goal seeing (Thorson, 1974a, 1974b; McGowan, 1974; Simon, 1954, 1969; Sommerhoff, 1969).

An adaptive system is generally thought of as one which produces (generates, evinces) outputs in such a way as to seek to attain certain goals. Adaptive systems are goal seeking systems. Thus my earlier assumption that foreign policy behavior is goal directed entails that foreign policy generating mechanisms can be viewed as adaptive systems. (Thorson, 1974a: 131)

On this view behavior adapts to obstacles in the environment to achieve a goal. Thorson (1974a) asserts that if a system is goal seeking it is adaptive, and if it is adaptive then it is goal seeking. Simon (1954) classifies negative feedback cybernetic systems as adaptive. Sommerhoff (1969) speaks of a soccer player adapting his kick to the path of the oncoming ball. This goal seeking sense of adaptation is also consistent
with Lewontin's adaptation as "problem solving". The goal is to overcome the problem; the solution does precisely that.

A notion of structural change is at the base of the third usage of adaptation (Starling, 1975; Buckley, 1968).

[An] adaptive system is more than self-regulating. It is self-directing, self-organizing, and it can modify its behavior in part or entirely .... [It] requires the presence within the system of morphogenetic processes, by means of which changes in its form, structure, or state can be effected. (Starling, 1975: 166)

In this sense of the term, a system is adaptive if it can modify its internal structure. This sense of adaptation is consistent with Lewontin's characterization of adaptation as a solution to a problem, although not in as straightforward a way as the previous senses. Adaptation as structural change focuses not on the solution itself, but on how the problem is solved. The problem is solved, in this sense of the term, by changing the structure of the system.

The fourth sense is adaptation as learning (Davies, 1972; Cyert and March, 1963; Miller, 1978; Kleinmann and Phatak, 1972; Holland, 1975; Ashby, 1960; Weinberg, 1972).

The basic structure of more all of the proposed adaptive models is very similar and involves the partitioning of the adaptive process into the following four phases:

- Optimal control of the pre-failure plant dynamics.
- Detection of a change or failure in plant dynamics.
- Identification or diagnosis of the fault.
- Corrective action or modification of control strategy appropriate to the post-failure plant structure. (Kleinmann and Phatak, 1972: 268)
Under this interpretation adaptation involves modifying a control strategy on the basis of experience. A system adapts by modifying its strategy for controlling the environment. This learning sense of adaptation is also consistent with Lewontin's adaptation as "problem solving". The problem is a failure in the control strategy brought on by a change in the plant. The solution in this case is to modify the control strategy.

These four senses of adaptation: coping, goal seeking, structural change, and learning, are not inconsistent. A system could cope with its environment by changing its structure. Error-controlled goal seeking could be interpreted as either coping or learning. Structural change may be motivated by coping, goal seeking, or learning. Learning may involve coping with environmental changes in order to increase the level of goal achievement.

Although the four senses of adaptation are not fundamentally inconsistent, there are definite differences among them. The coping sense of adaptation focuses upon results. The primary distinction is between actions which cope and those that do not. The former are adaptive and the later are maladaptive behaviors. The goal seeking sense of adaptation also focuses upon the distinction between adaptive and maladaptive. Using Simon's (1954) interpretation of adaptation as involving a process of movement toward "a better", behavior which improves is adaptive and behavior which does not is maladaptive.
The coping and goal seeking sense of adaptation do differ, however, on the nature of the adaptive process. The coping sense of adaptation does not specify the nature of the behavior generating mechanism. The "coping process" is left unspecified -- it could be a process of random mutation with differential survival potentialities or an optimizing choice process. The goal seeking sense of adaptation (particularly in light of the analysis of Chapter 2) does specify the adaptive process. Adaptation is the result of error-corrected goal seeking.¹

If adaptation is taken to mean structural change or learning then the important distinction is between adaptive and nonadaptive systems. Systems which have a capacity to change their structure or a capacity to diagnose and correct control errors are adaptive. Those which do not have the capacity for this sort of change are nonadaptive. This adaptive - nonadaptive distinction does not render the adaptive -- maladaptive distinction irrelevant. It is possible to speak of maladaptive behaviors under both the structural and learning senses of adaptation. But to do so implies the system has a capacity for adaptation.

The learning sense of adaptation differs from the structural sense

¹"Error-corrected" goal seeking and "goal seeking" are not identical. The account of goal seeking in Chapter 2 does not invoke cybernetic feedback loops. Open-loop control systems (Milsum, 1974) are a species of goal seeking systems which do not depend upon negative feedback. Only negative feedback systems can display Simon's (1954) movement toward a better.
in the same way the coping sense differs from the sense of adaptation as goal seeking. The learning sense of adaptation posits a particular process which produces the adaptive capacity. Under the learning sense of adaptation the system can modify its control strategy in light of experience.

There is a strong surface similarity between the goal seeking and learning senses of adaptation. Learning is generally conceived as involving an improvement of performance over time. Learning curves in psychology and Simon's (1954) characterization of adaptation as involving a process of movement to a "better" are paradigmatic cases. It would be natural then to describe a negative-feedback driven servomechanism as a learning system; its oscillations dampening until they stablize at the goal.

But that "gradual improvement in performance" is learning of a sort very different than the sense of adaptation as learning. Goal seeking is learning only in the sense that behavior improves with experience. Adaptation is learning in the sense that a diagnosis of a failure is made and a solution is implimented. Learning in this sense is conscious in a way that goal seeking learning need not be. The learning sense of adaptation involves not only a change in behavior, but also a change in the process which generates behavior.

There is a third sense of learning -- "learning a fact" in the sense that the U.S. government learned of the existence of Soviet missiles in Cuba. The three senses of learning are often not distinguished.
These four senses of adaptation each emphasize a different perspective. Underlying the coping sense is the view that adaptation involves a process by which a system copes with and adjusts to its environment. These adjustments may be successful and thus adaptive or unsuccessful and thus maladaptive. In the limit, unsuccessful adjustments may result in the demise of the system. The goal seeking sense of adaptation is closely tied to the coping sense, but has a more specific mechanism as the genesis of coping. On this reading of adaptation coping is goal seeking. The structural change sense of adaptation emphasizes the capacity of an adaptive system to modify its structure. Adaptation as learning focuses on a specific sort of structural change. The particular sense of learning is a capacity to modify strategies for achieving goals.

Given the diversity of the four senses of adaptation it is not clear what is implied by predicating adaptation of a government. Does it mean a government attempts to cope with its environment? Is it just another word for goal seeking? Does it mean that the structure of a government changes through time? Or, does it mean that governments can modify their strategies for controlling their environment?

3.2 An Account of Adaptation

Two ambiguities about the meaning of adaptation generate a number of confusions and differences in the way the term is used. The first is whether the phrase "X is adaptive" refers to the behavior of the system
or the system's capacities. If it is about the system's behavior then the contrary of the phrase is "X is maladaptive". If it is about the system's capacities then the contrary phrase is "X is nonadaptive". The second ambiguity is whether the seasonal variations in the coloration of certain species occurs because the species adapts to its environment or because the species is adapted to its environment. These two ambiguities, often unrecognized, must be resolved in order to understand what adaptation means.

The difference between the adaptive -- maladaptive and the adaptive -- nonadaptive distinction is the difference between "adaptive" used as an evaluation of the system's performance and an assertion about the system's capacities.¹ Of the four senses of adaptation, the coping and goal seeking senses use "adaptive" in the performance sense. The structural change and learning senses of adaptation use the capability sense.

It is not a case of only one usage being acceptable, for both have a well defined meaning. There is nothing wrong with asserting that a particular behavior is maladaptive or that a rock is nonadaptive. What

¹The distinction comes from Chomsky's (1957) distinction between linguistic performance and competence. Performance refers to how humans use language, the underlying grammar of how they speak and mistakes of usage. Competence refers to the innate Competence of humans to use language. On Chomsky's account the later sense ought to be the primary concern of linguists in their search for linguistic universals.
is at issue is which sense ought to be primary.\textsuperscript{1}

There is a natural asymmetry in the way the capability and performance senses are used which points to the priority of capability. If something is capability-adaptive it is possible for it be be performance-adaptive or maladaptive. But if something is nonadaptive using the capability sense, it makes no sense, to say its behavior is either performance-adaptive or maladaptive. Something which is no capacity for adaptation cannot be performance-adaptive or maladaptive. Because performance carries the presumption of capacity, the capacity sense of adaptive ought to be taken as fundamental.

It is important, however, to realize that taking the capacity sense of adaptive as prior does not imply the evaluative sense of adaptive is never appropriate. Taking capability as primary only places a restriction upon the application of the predicate; only things which are capability-adaptive can be adaptive or maladaptive in the performance

\textsuperscript{1} The problem would not, in all probability, exist if the performance and capability senses of adaptation were not represented with the same word. The context of the invocation is often the only way of determining in which sense "adaptive" is being used. In this dissertation, performance-adaptive refers to the performance sense of adaptive and capability-adaptive refers to the capability sense.
The second ambiguity surrounding the concept of adaptation is really an ambiguity over the nature of adaptive capabilities. Ashby (1960: 64) illustrates the ambiguity:

[T]he word "adaptation" is commonly used in two senses which refer to different processes. That distinction may best be illustrated by the inborn homeostatic mechanisms: the reaction to cold by shivering, for instance. Such a mechanism may undergo two types of "adaptation". The first occurred long ago and was the change from a species too primitive to show such a reaction to a species which, by natural selection, had developed the reaction as a characteristic inborn feature. The second type of "adaptation" occurs when a member of the species, born with the mechanism, is subjected to cold and changes from non-shivering to shivering.

The ambiguity is whether shivering occurs because the animal adapted to the cold or because the species was adapted to changes in temperature.

What is at stake here is not just a way of using a term, but what the evidence counts for: In Ashby's example, what are we to make of shivering? Under the first sense shivering is evidence that members of the species had, at some previous time, acquired the trait of shivering when exposed to cold. Under the second sense shivering is evidence that the organism, at this point, is adapting.

If the second usage of adaptation is accepted, then goal seeing is clearly a case of adaptation. The change from not-shivering to

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1This distinction often goes unnoticed because it is not currently of concern to biologists. Genetic theory established that all species had adaptive capacities. Thus adaptive capacities are not the issue they were before Mendelian genetics. Before genetics came of age a central issue had been the mechanism by which traits were inherited.
shivering is performance-adaptive in the sense that it maintains body temperature. The concept of goal seeking is a natural extension of this use of adaptation. Behavior is performance-adaptive if it achieves a goal, which in this case is the goal of maintaining body temperature.

Of the four senses of adaptation the goal seeking sense takes the second view of adaptation. Change in behavior is adaptation under the goal seeing sense. The structural change sense of adaptation takes the first view of adaptation because shivering does not represent a change in the structure of the organism, only a change in behavior. The learning sense of adaptation does not apply to this example because the conscious control aspect is lacking. Short of specific examples it is impossible to determine whether the coping sense of adaptation would take the first or second view. It would depend upon how the theorist defines coping. Both the acquisition of a capacity to shiver and the exercise of that capacity could be interpreted as coping with the environment. The second usage is, however, the most likely way for a 'coping' theorist to use the term.

Although both uses of the term are consistent with the attributes of adaptation there is a sense in which the first has priority over the second. The first sense of adaptation is the acquisition of a trait. The species changed in Ashby's terms "from one too primitive to show such a reaction to a species which, by natural selection, had developed the reaction ...." The second sense of adaptation is simply the
exhibition of this previously acquired response.¹ Because the first sense of adaptation involves the acquisition of a trait it is the more fundamental of the two.

At this point the two ambiguities about adaptation have been clarified. The capacity sense of adaptation, where the fundamental distinction is between capability-adaptive and nonadaptive systems, has priority over the performance-adaptive — maladaptive sense of the term. And the sense of adaptation as the acquisition of a trait has priority over the sense of adaptation as an exhibition of something previously acquired.

If these two fundamental aspects of adaptation are joined, adaptation is a capacity to acquire a trait.² In a strict biological sense, the traits are the "solution" to the "problem" posed by the environment. Shivering, thumbs, seasonal variation in coloration, and the long necks of giraffes are traits or properties which "solve" the "problem", whether it be maintaining body temperature in the cold,

¹Under a strict biological interpretation of adaptation the second is not an example of adaptation. A single organism cannot adapt (Williams 1966; Wimsatt, 1972; Holland, 1975). Biologists are not, however, in agreement on what does adapt: it may be species or gene pools.

²"Trait" should be taken in its most general sense and may describe a physical characteristic or a way of behaving. It may also be a capacity to do something, e.g., a capacity to use language or to make tools. "A capacity to acquire a capacity" might, however, lead to confusion if the two senses in which capacity are used are not kept distinct. This Chapter is already over-flowing with words used in different senses to include another.
surviving by efficient use of weapons or tools, hiding from predators, or reaching food. But they are more than "problems". They are phenomena which biologists explain by invoking the concepts of adaptation, natural selection, and evolution. According to the generative view of explanation (Harre, 1970) a scientist explains a phenomena by showing it to be the consequence of the behavior of an underlying generative mechanism.

For the biologist there are at least two generative mechanisms involved in explaining long necks in giraffes. The first explains why a particular giraffe has a long neck. It is the mechanism of genetic transmission, reproduction, and development. The second mechanism explains why giraffes as a species have long necks. For that the biologists turns to the mechanisms of adaptation, natural selection, and evolution.

By examining how biologists explain biological phenomena through adaptation it becomes clear that adaptation is a change in the mechanism which produces traits, that is, it is a change in the generative mechanism. A system has a capacity for adaptation when the mechanism which generates its behavior can change. It adapts in the capability sense when the generative mechanism changes; that change is performance-adaptive when it increases the "fitness" of the organism. Adaptation as change also clarifies the status of Ashby's two senses of adaptation: the acquisition and exhibition of a trait. The acquisition of the trait
is the example of adaptation; it involves a modification of the generative mechanism. Exhibiting the trait has nothing to do with a change in the mechanism; it is only a consequence of the genetic heritage and is not an instance of adaptation.

The advantage of characterizing adaptation as a change in the generative mechanism is that adaptation is not tied to a specific biological process. The characterization illuminates the biological sense of the term and allows a natural extension of adaptation outside of a strictly biological context. With this characterization it is possible to impose some order on the four senses of adaptation previously identified.

The coping sense of adaptation could be consistent with adaptation as a change in the generative mechanism; whether it is will depend upon how "coping" is unpacked. If "coping" means only "getting along", "surviving", or "adjusting" then coping is not an instance of adaptation. Changes in the generative mechanism could very well be described as an attempt to cope with the environment, but the implication does not go both ways. Adaptation may be coping, but coping is not necessarily adaptation. Whether coping is adaptation will depend upon how the system copes with its environment.

The goal seeking sense of adaptation is not, properly speaking, adaptation at all. Under the account of goal seeking in Chapter 2, goal seeking does not involve a change in the generative mechanism. Goal
seeking is a predicate asserted of a mechanism, and the four capabilities which must be asserted of a system if the predicate is to apply do not include a capacity to change the generative mechanism. As is the case with coping, a goal seeking system may be adaptive, but goal seeking capabilities by themselves are not sufficient for adaptation.\(^1\)

Adaptation as structural change is consistent with the characterization with the proviso that "structure" is interpreted as the structure of the generative mechanism. A collapsing bridge does change its structure, but it would probably be a mistake in language to attribute adaptive capacities to bridges.\(^2\)

The learning sense of adaptation has a very natural interpretation in terms of a change in the generative mechanism. The control strategy is the mechanism; learning is changing the control strategy; adaptation is changing the mechanism; hence, a capacity for learning is a capacity for adaptation.

The account of adaptation as a capacity to change the generative mechanism illuminates the biological usage without requiring a strict

\(^1\) Whether a system has goal seeking or adaptive capabilities is in part a function of how that system is described. This relative nature of goal seeking versus adaptation is discussed in the next section.

\(^2\) The problems caused by the collapsing of bridges are the same sorts of problems caused by falling rocks for goal seeking. But just as the problems with rocks was resolved by specifying the necessary capacities for goal seeking, so too will the necessary capacities for adaptation resolve the falling bridge problem. This will be discussed in the next section.
biological interpretation. It also provides a way of clarifying the various senses of adaptation. But to state that adaptive capabilities imply a capacity to change the generative mechanism is only a partial analysis of adaptation. The analysis is partial in the sense that the analysis of goal seeking as "S terminates B when G is achieved" is partial. What is missing is an analysis of the capabilities which must be asserted if "adaptive" is predicated of a system. Those capabilities are the subject of the next section.

3.3 Adaptive Capabilities

Taking adaptation to imply a change or modification of the generative mechanism is only a partial analysis of the term. What is it about adaptive systems that allows this change to take place? The answer to this question is important. Without genetics, DNA, and biochemistry, biological adaptation would be so much mysticism. If the concept is to find use in a non-biological context, in a context where there is no genetic theory, then there must be an account of how this change in the generative mechanism takes place. To account for fundamental changes in the behavior of governments, for example, by invoking adaptation without providing the mechanism which produced the change would be unacceptable.

The genesis of these adaptive changes can be divided into two classes. Whether a system belongs in one or the other class depends upon what might be termed the "locus of effective cause". One class contains
those descriptions which place the effective cause outside the system. The other puts the location of cause within the system. In the first the system is seen as a passive recipient of external forces which produce a modification in the generative mechanism. Underlying the second is a notion of agency. Instead of a passive recipient, the system is viewed as modifying its own generative mechanism.

Biological adaptation is a paradigmatic instance of the first perspective. Evolution, mutations, and differential rates of survival "reinforce" or "reward" some genetic variations and "punish" others. These external forces coupled with "accidental" variations in the genetic material of a species results in changes in the generative mechanism. When this external perspective is applied outside a biological context the result is functionalism (Hempel, 1965; Wimsatt, 1972).

The second class of adaptive systems are those in which the locus of cause is within the system. Changes in the generative mechanism occur because the systems makes the changes. There is no "paradigmatic" instance of this type of adaptive system. Intentional human action could be seen as an instance of this, although there is no obvious reason, particularly in light of the non-mentalistic account of goal seeking in Chapter 2, why a mind is required for this type of adaptation.

There are no grounds for dismissing one of the perspectives as
irrelevant. The issues of interest to the theorist will determine which perspective is most illuminating. Nor should the two be viewed as mutually exclusive. It would not be unreasonable to suppose that many systems are influenced by both types of changes in the generative mechanism. Human behavior, for example, has both genetic and intentional roots. There is little question that human behavior is intentional (von Wright, 1971; Louch, 1969; Winch, 1958). And genetic influences on human behavior cannot be denied (Corning, 1971), though there is some dispute on the scope of the genetic influence. The major focus of this dissertation, however, is on the active or agency sense of adaptation. This is in part because the active or agency sense of adaptation has not been widely recognized and in part because it is more directly consistent with the theories of governmental decision making examined in Chapter 1.

When adaptive capabilities are predicated of a goal seeking system (or more properly, a system predicated with goal seeking capabilities) it is possible to speak of "adaptive goal seeking". An adaptive goal seeking system is a goal seeking system with a capacity to modify the goal seeking mechanism. Weinberg (1972: 137) identifies a similar concept in this way:

A system which is doing a good job of regulating [goal seeking] need not adapt.
A system adapts in order to simplify [or improve] its job of regulation.

A system with adaptive goal seeking capabilities adapts in order to
improve its ability to achieve goals. An adaptation is performance-adaptive when the change in the mechanism increases the ability of the system to achieve its goals. The change is performance-maladaptive when the ability to achieve goals declines because of the change.

The difference between adaptive goal seeking and goal seeking capabilities is a subtle but important distinction. A system with goal seeking capabilities can change its behavior in response to the environment. A system with adaptive goal seeking capabilities can change the mechanism which produces goal seeking behavior in response to the environment. For example, a goal seeking system can be viewed as having a strategy for responding to the environment. This strategy might be a set of commands of the sort: In situation X do Y. A collection of these rules will generate behavior which changes as the situation described by "X" changes. If this system had adaptive capabilities then it could change its strategy by respecifying the rules. The behavior of an adaptive goal seeking system will exhibit the "local" changes of a goal seeking system responding to changing situations and the "global" changes which result when new strategies for dealing with the changing situations are introduced.

This distinction between goal seeing and adaptation in an adaptive goal seeking system suggests a two-level hierarchical representation of an adaptive goal seeking system.¹ The 'bottom' level is a 'goal seeker'

¹See Mesarovic, Macko, and Takahara (1970) for a general but abstract of hierarchical control systems.
which produces behaviors designed to control the environment. The 'top'
level is an 'adaptor' which monitors the goal seeker and modifies the
goal seeking generative mechanism in an attempt to improve its
performance.

Because adaptive goal seeking, like goal seeking, is a predicated
asserted of a particular description, this hierarchy should not be taken
as absolute. The hierarchy is imposed upon the description; it does not
exist in nature. A system is not adaptive in a fundamental sense, but
adaptive relative to a particular description. As a result, whether a
system is considered adaptive goal seeking or goal seeking will be an
assertion relative to a description. Under one description a system
could be considered to be an adaptive goal seeking system, while under
some other description, one in which the two levels have been combined,
it may be "only" goal seeking.¹

The relativity of adaptive goal seeking not withstanding, there are
several benefits from viewing adaptive goal seeking in a hierarchical
context. First, as Harre and Secord (1972) note, inconsistencies in
behavior can be accounted for more parsimoniously by appealing to
adaptive changes than they can under a single-level representation.

¹An adaptive goal seeking representation can be transformed into a
goal seeking representation by viewing the different goal seeking
strategies as part of a single global strategy. More technically, to
make the shift from adaptive goal seeking to goal seeking one need only
increase the state space of the goal seeking system (Glushkov, 1966;
Miller, 1978).
Second, the decomposition allows the possibility that "simple" subsystems jointly produce "non-simple" behavior. Because the decomposition divides the processing demands between the two levels the sophistication of the capacities predicated of the system can be minimized. In fact, Miller (1978) claims that often the only practical representation of complex control systems is hierarchical. Finally, it becomes possible to address the issue of adaptation without resorting to a recursive structure, and as Glushkov (1966: 140) indicates, it becomes possible to deal with information exchanges within the system — an ability that is lost if there is no decomposition.

Given this characterization of adaptive goal seeking, a capacity for adaptive goal seeking goes beyond a capacity for goal seeking. Chapter 2 provided four capabilities which must be asserted of a system if the system is described as goal seeking:

1. S must be able to exhibit at least two internal states corresponding to two distinct states of affairs.

2. There must be at least two internal states of S corresponding at least to S being in G-attaining states of affairs and S being in not-G-attaining states of affairs.

3. The behavior exhibited by S must depend upon at least the internal state of S corresponding to S being in G-attaining states of affairs or not-G-attaining states of affairs.

4. S must not be such that for all internal states S exhibits only one behavior.

In order for a goal seeking system to exhibit adaptive goal seeking two

1See Mesarovic and Takahara (1975: 201-209) on simplification through decomposition.
additional capabilities are necessary:

5. S can at least modify the relationship between the behavior exhibited by S and S being in G-states of affairs or not-G states of affairs.

6. There is at least a relationship between S exercising the capabilities in 5 and S being in G or not-G states of affairs.

The fifth condition speaks directly to the self-modifying capabilities which underlies adaptive goal seeking. A system which satisfies the condition can change the basis upon which behavior is generated. The third condition requires the behavior exhibited by S to be related to whether S is in a goal-attaining situation. The adaptive capability condition allows the system to modify that relationship. To require only that S be capable of modifying the relationship between situation and behavior specifies neither how or in what form that relationship is to be modified, nor whether the modifications will ever be made. As was discussed in the previous Chapter, these conditions are intended to establish the minimally necessary conditions which must be asserted to be true if the major predicate, adaptive goal seeking, is to be used.

The sixth condition places a constraint upon the exercise of the self-modifying capability. It requires the exercise of the capability to be related to or depend upon the distinction between S being in a state corresponding to G-states of affairs or S being in a state corresponding to not-G-states of affairs.

This condition is motivated by the intuition that the exercise of
adaptive capabilities must in some sense be related to improving the performance of the system. In sophisticated systems the exercise of adaptive capabilities would presumably depend upon more than the simple distinction between G-attaining situations and not-G-attaining situations. For such systems it would be possible for the exercise of the capabilities to depend upon the history of goal performance as well as inferences about what sorts of modifications were appropriate. But it is also possible to imagine a system which would properly be described as adaptive goal seeking which depended only upon that simple distinction. Ashby's (1960) well known "homeostat" is an example of a system of this sort. When the homeostat is in an unstable non-goal situation it initiates a series of random strategy changes which cease upon the return to a stable goal-attaining state.

On one interpretation, adaptive goal seeking systems are involved in making inferences about the dynamics of the environment they are attempting to control. In other words, adaptive goal seeking systems attempt to "figure out" how the environment works and to modify the strategy of the goal seeking component accordingly. Regardless of the interpretation given to adaptation one point emerges: To speak of adaptive capabilities requires a description of the generative mechanism.
3.4 Summary

This Chapter produced an analysis of adaptation as a change in the 
genenerative mechanism. A goal seeking system with adaptive capabilities 
was characterized as an adaptive goal seeking system. The purpose of 
this analysis of goal seeking in chapter 2 and the present analysis of 
adaptation was to provide the foundation for a generative explanation of 
the foreign policy behavior of governments. Foreign policy behavior is 
a reflection of the capabilities of the mechanism by which it was 
generated. If governments are adaptive goal seeking systems then 
understanding those capabilities is part of understanding their 
behavior. Of course, whether governments have adaptive goal seeking 
capabilities has yet to be determined. That is the task of the next 
Chapter.
4. THE ADAPTIVE GOAL SEEKING CAPABILITIES OF GOVERNMENTS

Chapter 1 examined a number of theories of governmental and organizational decision making. That analysis identified the theory of Cyert and March (1963) as the most promising. Chapters 2 and 3 picked-up upon a common theme of all the theories, but especially the Cyert and March theory, and produced a philosophical analysis of the concepts of goal seeking and adaptation. The result was the concept of adaptive goal seeking and an analysis of the capabilities which must be asserted true if the concept is to be predicated of a system.

This Chapter brings these diverse avenues together. Three questions are considered:

- Does the theory of Cyert and March apply to bureaucratic governments?
- Do bureaucratic governments have a capacity for goal seeking?
- Do bureaucratic governments have a capacity for adaptation?

The theory of Cyert and March is a theory of bureaucratic decision making. As a result it would not, in all probability be descriptive of governments lacking a well established regularized bureaucratic structure. Thus the evidence used in evaluating the theory is drawn from bureaucratic governments, primarily the United States.
4.1 Cyert and March as a Theory of Governmental Decision Making

4.1.1 Previous Applications

One of the few applications of Cyert and March's theory to a foreign policy context is Allison's (1971) organizational process model or model 2.1 Allison's use of Cyert and March, however, is flawed in a number of respects.

One of the central precepts of Cyert and March is that organizational action is the product of goal-directed choice. In Allison's analysis of the Cuban missile crisis, very little attention is

\[ \text{Steinbruner (1974) makes use of Cyert and March, but seems to seriously misinterpret the theory. Steinbruner uses A Behavioral Theory of the Firm as an example of a cybernetic theory of decision. One of the primary characteristics of Steinbruner's cybernetic theory is the almost automatic response to feedback. Cybernetic decision makers do not make choices in any conventional sense, they only respond. This type of decision process bears little relationship to the theory of Cyert and March. Their central concern is with organizational choice, not automatic, pre-programmed responses.}\]
paid to the notion of organizational choice.\textsuperscript{1} Allison's case study emphasizes implementation through standard operating procedures (SOP) rather than the choice process exhibited by the organization. The concepts of choice and decision are almost completely missing from Allison's analysis.

The difference also arises in Allison's interpretation and use of SOP's. Allison (1971:78-79) treats SOP's as pre-packaged sequences of organizational actions:

> The decisions of government leaders trigger organizational routines. Government leaders can trim the edges of this output and can exercise some choice in combining outputs. But most behavior is determined by previously established routines.

Given this view of SOP's the choice itself becomes largely irrelevant; the primary cause of the organization's actions are to be found in the SOP's.

Cyert and March's treatment of SOP's differs in a subtle, yet fundamental way: SOP's are not pre-packaged sequences of organizational output, but are pre-packaged sequences of what might be termed "decision points". On this view, SOP's are procedures for making decisions and notifying others of decisions once they have been made. While they may influence the ultimate choice, they are conceptually independent of the process.

\textsuperscript{1}Allison's analysis of the imposition of the U.S. blockade of Cuba (Allison, 1971:117-132) falls into three parts. The first part treats the organizational routines involved in the discovery of the missiles in Cuba. The second part examines the options provided by the military to the Executive Committee of the National Security Council. The final section treats the implementation of the blockade. Nowhere does Allison discuss the choice of a blockade.
choice itself. An almost paradigmatic case of this interpretation of SOP's is the highly formalized nature of military procurement decisions (Art, 1968). To be sure, SOP's do heavily influence implementation of choices, and alternatives are constrained by organizational capabilities which reside in implementation SOP's, but to neglect the process of choice itself over these implementation SOP's results in a peculiarly disembodied account of governmental decision making.¹

A second problem with Allison's interpretation of Cyert and March is the role of incrementalism, which is Allison's (1971:87-88) key explanation of organizational behavior. Says Allison (1971:88): "The best explanation of an organization's behavior at t is t-1." Although the proposition that governmental behavior is largely a marginal adjustment to what was done previously may be true, to accept incrementalism as the explanation of that action makes the concept of choice superfluous. Allison does not attempt to penetrate beneath the surface appearance and examine why organizations tend to exhibit incremental changes in their behavior.

It is possible to view incrementalism as the decision strategy used by policy makers as do Braybrooke and Lindbloom (1963). On the basis of

¹That Allison, Halperin, Steinbruner, and others who write in this area tend to focus upon military decisions where formalized lines of authority, procedures, and contingency plans abound may distort their image of governmental decision making. Less "implementation minded" bureaucracies, the U.S. Department of State for example, would be less suitable to a heavy emphasis on implementation SOP's.
Cyert and March's analysis, however, it appears that incrementalism is not a strategy, but a symptom. In part, incrementalism does serve to avoid uncertainty. But the fundamental source of incrementalism is to be found in the need for consensus within the organization. Cyert and March argue that organizations are coalitions held together by bargaining over goals and policies, and that the alternative selected by the organization must meet -- or at least be consistent with -- all the immediately relevant organizational goals. Given this consensus-based nature of the process, past policy sets a strong precedent. Assuming the justification of previous policy still holds, that past bargains and side payments do not change rapidly, and that the situation has not changed drastically, the expectation would be that new action would differ only marginally from past action. But this expectation is seriously qualified, unlike Allison's. If past side payments are sufficient to hold consensus, the choice will differ only marginally from the present alternative. But if the situation has changed dramatically, incremental change would prove a poor predictor of organizational action because it ignores the dynamics of the decision making process. Incrementalism produces an image of the organization which shares little with the image of the organization as a decision maker.

The third shortcoming of Allison's analysis is the lack of integration. Allison does not treat the government in the aggregate.
Even though he relies heavily upon Cyert and March for the basis of his organizational process model, it is as though he approached foreign policy decision making from a bureaucratic politics perspective but with institutional actors. His analysis draws out the institutional impact on framing alternatives and implementation, but largely ignores the question of organizational choice.

Although Allison's organizational process model is based upon Cyert and March's theory of organizational decision making, Allison's approach differs from the Cyert and March theory in significant ways. As a result of this divergence, Allison's (1971) analysis of the Cuban missile crisis is only partially helpful in assessing the adequacy of Cyert and March's theory of firm decision making as a theory of governmental decision making. In what follows, the central principles of the theory of Cyert and March will be examined and illustrated with examples from foreign policy decision making. Collectively these examples and illustrations justify the assertion that the theory of Cyert and March can be used to understand governmental decision making in a bureaucratic context.

4.1.2 Justification Through Examples

4.1.2.1 Quasi-resolution of Conflict

The goals of a business firm according to Cyert and March (1963) have two primary characteristics. They are used by the organization as independent constraints on what counts as an acceptable situation and
are expressed as aspiration levels. The first characteristic produces a number of results which reduce demands upon the organization. Because goals are independent constraints on acceptable outcomes, agreement on specific states of affairs to be realized by action is not necessary. In fact, it is possible for the individual constraints to be incompatible without paralyzing the decision making process. El-Khawas and Cohen (1976:101), a reproduction of a secret U.S. National Security Council study on southern Africa, lists several U.S. objectives in the area, including, "To improve the U.S. standing in black Africa and internationally on the race issue." and "To protect economic, scientific, and strategic interests and opportunities in the region, including the orderly marketing of South Africa's gold production." In summarizing the list, the authors of the NSC study note: "These objectives are to a degree contradictory -- pursuit of one may make difficult pursuit of one or more of the others." These goals or objectives, stated as independent constraints, are recognized by policy makers as incompatible, and yet, such a situation does not make the formulation of U.S. policy for the area impossible.1

The independence of goals can be found in other examples of foreign policy decision making. The conflict generated by McNamara's TFX

1This study of U.S. objectives and options provides an uncommonly comprehensive and reflective image of policy formulation. In the "normal" course of policy making, the inconsistency of the goals would probably only be realized as a result of a policy failure. See Halperin (1974).
decision (Art, 1968; Smith, 1963) and the Skybolt decision (Neustadt, 1970; Brandon, 1973) can be seen as arising out of the independence of the individual goals. In the TFX case, the goals of interchangeability and service needs were applied in a different order by McNamara and the military. For McNamara, interchangeability was primary and specific service needs were secondary; the situation was precisely the opposite for the military. The Skybolt cancellation which precipitated the crisis between the U.S. and Britain resulted from the decision by the U.S. to cancel the missile program because it violated the goals of cost containment and effectiveness. These constraints were not viewed as a package with what counted as constraints for the British.

A final example is provided by Richard Crossman's diaries (Crossman, 1976). The diaries are filled with his frustrations in dealing with British foreign and domestic policy in the absence of a comprehensive image of what was to be achieved. In particular, he objected to the lack of direction in Cabinet policy on Rhodesia and British commitments in the Far East.

In many respects, goals viewed and independent constraints are closely tied to another concept of Cyert and March, the sequential attention to goals. Because goals are independent constraints they need

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1 In many respects the phenomena of "faces of issues" (Allison, 1971; Halperin, 1974) is related to independent goals. That different faces of issues arise reflects the fact that end states are not conceptualized as a piece, but differ among participants.
not be taken as a whole, but may be considered sequentially. Crossman's complaints of the lack of a comprehensive British policy, the Skybolt Crisis and the TFX controversy reflect a sequential attention process. Immediate problems are handled separately without comprehensive evaluation. Halperin (194:235-236) summarized the situation as faced by U.S. Presidents:

The President seldom makes a single comprehensive decision covering a wide range of interrelated issues. More often he decides a series of questions discretely, each one on its own merits, adding up to a series of diffuse and, on some occasions, contradictory guidelines to the bureaucracy about what should be done.

In a similar vein, Townsend Hoopes (1973:7) provides this explanation of the Vietnam policies of the Johnson Administration:

I believe the decisions and actions that marked our large-scale military entry into the Vietnam War in early 1965 reflected the piecemeal consideration of interrelated issues, and that this was a natural consequence of a fragmented NSC and a general inattention to long-range planning.

The second characteristic of organizational goals is their form. Cyert and March argue that goals are largely in aspiration level form, i.e., achieve a 35% share of the market. Foreign policy goals, however, do not appear to be expressed as aspiration levels. Most commonly, goals are expressed as commands: "Do not lose Vietnam before the next election"; "Encourage moderation of the current racial policies of white

\[1\] Cyert and March might object to Hoopes' imputed cause. On their analysis, piecemeal consideration of interrelated issues is a basic property of organizational decision making. Of course, the unacceptable consequences of such a process may be avoidable, though probably not by changing the basic structure of decision making within the organization.
regimes"; or "minimize the opportunities for the USSR and Communist China to exploit the racial issue in the region." Allison (1971:82) argues that goals are typically "formulated as imperative to avoid roughly specified discomforts and disasters."

This has important consequences for organizational learning. Cyert and March's (1973:123) account of organization learning requires goals to be in aspiration level form. On their account of goal change, which they term "goal adaptation", the aspired level changes with experience. In particular, they hypothesize that goal change can be represented using a linear equation: 

\[ G_t = a_1 G_{t-1} + a_2 E_{t-1} + a_3 C_{t-1}, \]

where \( G \) is the goal, \( E \) is experience (the actual level of achievement), and \( C \) the experience of competitor organizations. They assume the coefficients, \( a_1, a_2, a_3 \) sum to 1.0.

For this representation of goal change to hold, goals must be expressed in numerical form, a requirement met by very few foreign policy goals. More important than the numeric representation is the requirement that goals be expressed as levels. If numeric aspiration level goals were replaced by ordinal indications of high, medium, or low level achievement, Cyert and March's account of goal change would remain intact. The nonnumeric representation would require some modification.

\[ ^1 \text{That foreign policy goals are expressed in a negative form, viz., situations to be avoided, is more than a question of wording. The situation is one of being specific about what you don't want but unable to state what you do want with any precision.} \]
of technique, but the basic core, that goal levels rise when the aspired level is exceeded and fall when the achieved level falls below the aspired level, would remain.

The evidence suggests, however, that foreign policy goals tend to be expressed as situations to be avoided or as general situations to be achieved, and not as levels (Allison, 1971). Without a basic level characterization, Cyert and March's account of goal does not hold; goal change in governments must be generated by a different process. Goals may become more ambitious during periods of success, but the metric by which ambitiousness might be measured will probably not bear a strong relation to aspiration levels. The process of change in the organization, what has been termed adaptation in this dissertation, will be examined in detail below.

Other than goal adaptation, nothing in Cyert and March's theory depends upon goals being in aspiration level form. Their accounts of organizational expectations, search, and choice are all insensitive to whether goals are aspiration levels or simply general imperatives to avoid certain situations.

A second proposition developed by Cyert and March (1963) is the principle of "local rationality". Business firms factor problems into subproblems and assign the task of solving these subproblems to subunits of the organization. Cyert and March (1963:117-118) make three claims about local rationality: It reduces the complexity of the problems
facing the organization; it reduces conflict in the organization; and it results in consistent individual decisions when acceptable-level decision rules are used.

The justification of the first claim is easy to see. Complex problems are divided into simple problems; simple problems are easier to solve than complex problems. Specialization of subunits in business firms and governments is widespread. Firms have separate marketing and production divisions. In governments, the organization of the executive departments is based upon "problem areas". In the United States, the Department of State specializes in foreign policy, the Department of Defense in military policy, and the Department of Agriculture in farm policy. When a problems involving milk support prices arises, there is no need for the whole of the executive to be involved in the decision. The Agriculture Department assumes responsibility. When broader issues arise, like inflation, relevant subunits in the executive take on the appropriate subproblems. In this way, complex problems are solved by dispersing responsibility for solving parts of the problem.

However well such a strategy might work in principle, dividing complex problems into simpler problems will not necessarily reduce conflict in the organization or result in a satisfactory solution of the problem. The division of complex problems must reflect the structure of the problem as well as the structure of the environment. If the division of the problem is not consistent, there will be no resolution
of conflict in the organization, and the actions of the various subunits of the organization will not be consistent. For example, if foreign policy problems assigned to the foreign office contain economic, agricultural, or military facets, foreign office actions may be incompatible with decisions made by other subunits. The number of inter-agency coordinating committees in the U.S. government (Halperin, 1974) could be taken as evidence that the specialization within the government does not reflect the structure of either the problem or the environment, and that the committees are required to resolve conflict created by the specialization. Specialization through local rationality, while present in governments, does not seem to reduce conflict or result in consistent organizational action.

Factoring problems into subproblems is also used within subunits to simplify decision making tasks. Jones (1973) discusses weapons procurement in the U.S. Defense Department. The procurement process operates, on paper, as a sequential process with decisions on particular aspects of the proposed weapons system made in sequence. Jones (1973:47) points to incentives in the organization to override the sequential nature of the process and treat procurement as a single comprehensive decision. Under a sequential decision process, an individual has only one chance to influence the final decision. The other decisions in the sequence will be made by others, possibly involving other sections or offices in the bureaucracy. If an
individual is uncertain how those other decisions will be made, the
individual has an incentive to make or influence all future decisions.
When each individual has an incentive to shape the final decision, "the
result tends to be a complete systems decision with all foreseeable
decisions made at the outset" (Jones, 1973:147). Thus in addition to
the potential conflict producing effects of specialization, there are
forces within the organization which tend to reduce specialization and
delegation.

That delegation through local rationality may actually increase
conflict within the organization does not invalidate the theory of Cyert
and March. The importance of local rationality is its existence and its
influence on organizational decision making. Furthermore, if
organizations did not exhibit local rationality then complex problem
solving would be more difficult and conflict-prone than it is.

One of the central assumptions of Cyert and March's theory is that
organizations use acceptable-level decision rules. This assumption is
the core of the satisficing choice procedure developed by Simon (1955).
Decision making is not a task of finding the optimal alternative for a
situation, but of finding an alternative which results in an acceptable
outcome.

The use of acceptable-level decision rules can be seen as a product
of two forces. The first is the limited capacity of humans to know all
relevant factors in the environment and to process the information which
exists. The second force is the need for consensus within the organization. These two factors combine to produce acceptable-level decision rules.

Limits on human information processing and their relation to decision making has received attention from many theorists of decision making (Simon, 1955; Lindbloom, 1959; Braybrooke and Lindbloom, 1963; Simon, 1976). The conclusion reached by these theorists is that humans do not have a capacity to examine the full range of alternative courses of action or the consequences which follow from those actions. Thus the optimal or what Braybrooke and Lindbloom (1963) call the synoptic ideal is unfounded. Unlike Steinbruner (1974), these theorists do not deny that decision makers are capable of some degree of self-conscious examination of costs and benefits. From the view of these theorists, humans can and do make decisions based on their expectations of the consequences of action, and select a course of action which generates acceptable outcomes.

But even if humans could approach the optimizing ideal, the consensus-based nature of organizational decision making would tend to produce only acceptable sub-optimal decisions. As previously discussed, Cyert and March view the organization in terms of a coalition. Goals, policy, and choices are generated within this coalition framework. Given the different goals, objectives, expectations, and beliefs of the members of the organization, any action of the organization must reflect
compromises made to secure agreement. As discussed above, these compromises are a form of side payment made to members of the coalition. Unlike traditional side payments (Luce and Raiffa, 1957) these side payments are not derived from a fixed booty accruing to the winners. These side payments involve compromises on organizational goals, policies, and actions. Acceptable-level decision rules stem from these compromises.

Although the limits on human information processing remain invariant across organizations, consensus plays a particularly central role in governmental policy making. The central role consensus plays in governments stems in large part from the "divided loyalties" within the executive branch. Individuals have loyalties to the head of government, the bureaucracy of which they are a part, and external constituencies in the legislative branch, business, and general public. (See Halperin, 1971; Hilsman, 1971; and Neustadt, 1976.) Unlike members of business firms, individuals within a government can in effect appeal governmental decisions to non-governmental actors.

Downs (1967), Hilsman (1971), and Halperin (1974) note the requirement for consensus in governmental decision making. Downs (1967:178) traces the requirement to the scale of governmental action. Because of the large scope, no individual in the government "encompasses all the goals relevant to the bureau's whole operation." Thus agreement among a diverse set of people is the only assurance that separate
actions will not be inconsistent. For Hilsman (1971:117-130), the existence of independent participants government requires consensus. Without consensus, these independent participants have opportunities to block, sabotage, or snipe away at governmental policy. Halperin (1974:77) sees the drive for consensus as a result of a desire to protect current policy as does Hilsman, and in addition, to bring individuals or groups into the coalition in order to protect other policies and actions.

Neustadt (1976), Hilsman (1971), and Halperin (1974) argue that U.S. Presidents devote more of their energy building and maintaining a consensus inside and outside the government than they do on making decisions. In Neustadt's (1976:78) phrase: "Presidential power is the power to persuade." The adjudication of bureaucratic disputes, persuading bureaus to accept policy positions for reasons that go beyond parochial organizational goals, missions, and objectives, and generally presiding over an organization which must be bargained with rather than commanded are the tasks of a U.S. President. Kissinger (1968) adds to this point of view with the observation that high level decisions get made only when they generate administrative conflict.

Hoopes (1973:161-164) provides a number of examples of how consensus was preserved within the U.S. government through acceptable-level decision rules. When confronted with an Air Force request for additional airpower which had little justification other than to
maintain an existing airpower to ground force ratio, the Johnson Administration chose not to question the justification for the existing ratio. Such questioning would have provoked Air Force-Army conflict over their respective roles and missions. A second example is provided by McNamara's response to military requests for more support. As Hoopes (1973:163) recounts it: "McNamara's instinctive reaction on receiving the new military request was to 'manage the problem', whittle down the numbers, muffle the differences, and thereby avoid a bruising confrontation within the Administration." These cases provide examples of strategies designed to minimize conflict and preserve a consensus. In both cases the bargaining and finessing produced outcomes which were minimally acceptable to all parties.

Interaction between bargaining on organizational goals and acceptable-level decision rules is illustrated by an incident recounted in Richard Crossman's diaries (Crossman, 1976:603-604). During a Cabinet debate on British policy toward South Africa, Anthony Crosland, the President of the Board of Trade, remarked: "If we have to tolerate this South African arms policy I must insist on the postponement of the Industrial Expansion Bill." The Prime Minister, Harold Wilson, had been fighting Cabinet opposition to the Industrial Expansion Bill for some time, and had recently received Cabinet approval to submit it to Parliament. Although it is unclear what influence Crosland's threat had on Wilson and the Cabinet, the Cabinet agreed that Britain should not
sell arms to South Africa (a position which Crosland favored), and the Industrial Expansion Bill was submitted to Parliament.

This incident provides an example of the interaction between bargaining on goals and acceptable-level decision rules. Crosland threatened to reopen negotiation on established goals and policies in order to influence bargaining on the South Africa question. The result was a bargain on the South African arms issue which preserved the consensus on the Industrial Expansion Bill.

4.1.2.2 Uncertainty Avoidance

Uncertainty avoidance is another concept which plays a large role in the theory of Cyert and March. On their analysis, organizations avoid error-prone long-range forecasts of the behavior of the environment. Organizations tend to structure the situation so that choice does not depend upon the anticipation of long-run future events. Cyert and March identify two strategies used by organizations to avoid the uncertainty associated with long-range forecasts: feedback-react decision procedures and a negotiated environment.

The use of feedback-react decision procedures as a way of avoiding uncertainty has been noted by many other theorists. It plays a particularly important part in Lindbloom's (1959) concept of incrementalism in policy making and the "science of muddling through". Incremental policy making is based on the assumption that decision makers know very little about the dynamics of their environment; they
have only the roughest ideas of the consequences of their action. They do not, however, attempt to improve their knowledge, a feat which Lindbloom considers impossible for any moderately complex environment, but to cope with the situation by basing future action on the observed effects of past actions. If action X produces unacceptable consequences, some other action is chosen. If action X produces acceptable consequences, the incremental strategy calls for doing more of X. In essence, the organization uses the environment in order to evaluate various alternative courses of action. Braybrooke and Lindbloom (1963), Hilsman (1971), Steinbruner (1974), Halperin (1974), Downs (1967), and Hoopes (1972) provide numerous supporting arguments and illustrations for the prevalence of feedback-react decision procedures in governments.

The second strategy, a negotiated environment, has received considerably less attention in the literature. This neglect is particularly surprising because the concept probably applies more directly to governmental decision making than it does to business decision making.

A negotiated environment occurs when the actors negotiate among themselves about each other's behavior. A negotiated environment is one in which there is an understanding among the actors of what sort of response will be given in a particular class of situations. Collusion is one form of negotiation, though the negotiations can be much less
formalized and the bargains much less explicit.

Trade associations and standard business practices such as customary mark-ups and costing procedures provide a negotiated environment for business firms. Diplomatic procedures, treaties, and international law fulfill similar functions for governments in the foreign policy area.

There is another manifestation of the negotiated environment in foreign policy: Informal communications consultations, and private agreements all provide for a more predictable environment. Sometimes this informal collusion takes place between competitors. Prior to the Cuban Missile crisis, Krushchev conveyed his assurance to Kennedy that the Soviet Union would not do anything which might influence the forthcoming elections (Abel, 1966:8). More often, these negotiations take place between Allies. According to Wagner (1974:73) the Israelis sent Abba Eban to Washington, Paris, and London to "sound out" the heads of state with regard to opening the Straits of Tiran (by force). President Johnson told Eban (Wagner, 1974:48): "In the end the final decision is yours." According to Wagner, this was taken as a signal that the U.S. would support Israeli military action. By sounding out the American position, the Israelis decreased their uncertainty about the consequences of their actions.

But signals between allies can become confused or misinterpreted as Neustadt's (1970) analysis of the Suez Crisis illustrates. After the
abortive British-French attempt to take possession of the canal under cover of a Middle East war, the following exchange was reported to have occurred between U.S. Secretary of State Dulles and British Foreign Secretary Lloyd (Neustadt, 1970:29): Dulles: "Why did you stop?"; Lloyd: "Why didn't you give us a wink?"; Dulles: "Oh, I couldn't do that."

A negotiated environment as a strategy for avoiding high uncertainty plays a large role in foreign policy decision making. Governments attempt to control the situation so that actions of the environment are predictable. This predictability is not based on anticipating or forecasting using beliefs about the motivations and desires of other governments. Instead, predictability is based on what is usual or customary or upon "agreements" that have been struck between the relevant governments.

4.1.2.3 Problemistic Search

The final major concept in the theory of Cyert and March is problemistic search. The view of organizational decision making emphasized by Cyert and March is one in which organizations recognize problems resulting from a failure to achieve a goal. That failure is the motivation for a search for a solution.

Governments do follow this problem-motivated style of decision making in many respects. The most obvious examples of problem-motivated
decision making are foreign policy crises.珍珠港、韩国、柏林、古巴，和类似的情况，都是美国政府在其中遭遇需要做出决定的情况。相似的列表也可以为其他国家政府（Holsti, 1971）。

但以问题为导向的决策制定并不局限于符合明确定义的危机的情况。Moorsteen 和 Abramowitz (1971:5) 观察到："美国政府是行动导向的，通常对外部事件更常做出反应，而不是创新性地制定政策。" 他们认为，这种反应性或问题导向的决策风格是政策碎片化的原因，尤其是在与中国的关系方面："与中国相关的问题通常作为另一问题的一部分出现...整个中国没有得到关注。这对高级政策制定者考虑我们与中国之间长期关系..."（Moorsteen and Abramowitz; 1971:viii）。

但假设所有外交政策决策都由目标约束的违反或更广泛地由外部问题驱动是错误的。Halperin (1974:101-104) 列出了另外五种情境，可能影响外交政策或国家安全决策：新技术、共享图像的变化、常规事件、赫尔曼（1969）定义的危机是一种具有高威胁、短决策时间和出乎意料的情况。危机，正如赫尔曼所定义的，是问题导向决策的典范性情形。
changes in personnel, and self-generated problems.

Technology plays an important role in the national security arena. New technology opens possibilities and removes obstacles to new weapons development. Two characteristics separate decisions motivated by new technology from problem-motivated decisions. Technology-motivated decisions are rarely stimulated by external events. They do depend upon the perception of a hostile environment, for without a potential threat, weapons are unnecessary. But they do not, however, require a recognized failure. The potential for improving strategic or tactical capabilities is sufficient to motivate some members of the bureaucracy to push for expansion (Halperin, 1974; Sapolsky, 1972; Art, 1968).

The second difference between problem-motivated and technology-motivated decisions is the source of the stimulus for decision. Technology-motivated decisions result from requests and demands from the "lower" levels of the organization, generally from research and development projects. Top officials rarely have the technical expertise to specify applications of new technology. Individuals with the technical knowledge and foresight to see potential new applications are initiators. The result is a proposal for development which requires a decision by the organization. An examination of the origins of the TFX (Art, 1968), Polaris (Sapolsky, 1972), H-Bomb (Schilling, 1961), and ABM (Halperin, 1974) programs shows the initial stimulus which provided the occasion for a decision to be motivated by technological
breakthroughs.

Technology-motivated decisions generally present the organization with a decision on whether to develop the application of a particular technology. These decisions can result in "problems" by generating conflict within the organization (Art, 1968; Halperin, 1974), but their basic character is one of resource allocation.

Changes in the shared images of the society or bureaucracy can also result in a decision. These changes do not directly result in decisions, but provide individuals with opportunities to reopen issues and present new arguments or proposals. Halperin (1974:102-103) notes three situations in which changing beliefs and images served as stimuli to reopen and reargue issues. He argues that changing public attitudes toward the Peoples Republic of China and the "China Threat" increased pressures on the U.S. government to modify the official stance toward the PRC and lessened the potential domestic political costs of President Nixon's overtures to the PRC.

Increasing public disillusionment with the Vietnam War is cited by Halperin as a factor in U.S. decision making. He argues the potential domestic political cost of expanding the War outweighed what foreign policy gains might have been achieved.

Halperin's final example concerns changes in the perception of strategic capabilities on the ABM issue. He argues that acceptance within the bureaucracy of the impossibility of maintaining a nuclear
superiority allowed ABM-opponents to reopen the ABM decision. The opponents argued that under the new view of deterrence, the ABM system was unnecessary.

From the evidence, changes in the shared images result in decision by changing costs associated with policies (the China and Vietnam examples) and by providing supporters or opponents of policies with new arguments and strategies for lobbying. Changes in shared images do not "force" decisions as a solution to a problem, but change the arguments and strategies of individuals seeking to change existing policies.

Routine events can stimulate decisions in a number of ways. They can "force" decisions by imposing constraints on the organization. The annual budget is a prime stimulus for organizational conflicts and allocation decisions. Because the budget directs governmental activity and is a public statement of intentions, it generates explicit decisions.

In a similar way, international organizations and conferences require decisions on how governments are to vote on resolutions. Special meetings, the U. N. Disarmament Conference for example, and conferences, like the NATO Foreign Ministers Conference, require public statements of governmental policy on issues on the conference agendas.

Other events, though they do not "force" decisions, provide opportunities for participants in the organization to raise issues. Speeches, visits of foreign leaders, and other opportunities for public
statements can produce organizational conflict over the content of the statements. This conflict requires some form of decision to resolve it.

Changes in organizational personnel can serve as a stimulus for decisions. But the decisions which result need not necessarily stem from the impact of new ideas or perspectives brought by new participants. New participants, particularly at the senior level, provide opportunities for continuing participants to reopen issues on which they have "lost". According to Halperin (1974:103-104), the Joint Chiefs of Staff reopened issues after Robert McNamara was replaced as Secretary of Defense by Clark Clifford and the CIA pushed for approval of the Bay of Pigs invasion after the Eisenhower Administration passed control to the Kennedy Administration.

Halperin's last stimulus for a decision is a category which cuts across the other stimuli. "Self-generated efforts", as Halperin terms them, may involve small changes in the behavior of other governments, technology, or shared images. Together these influences may produce opportunities for new decisions or the reconsideration of past decisions. Many times the stimulus for a decision may change with time. The TFX weapons program started as an application of new technology (Art, 1968). But it soon became McNamara's test case for his new management techniques, and the doctrine of a single-service aircraft became attached to the project. Similarly, Britain's entry into the super sonic transport (SST) program which resulted in the joint French-
British Concorde was initiated in 1954 with a suggestion in the Royal Aircraft Establishment (RAE), that they ought to give more consideration to civilian aircraft. The proposal resulted in a study group and a proposal for a super sonic passenger aircraft. At the time, there was no "demand" for government research in civil aircraft and there was an established government policy against government funding for private aircraft development (Bruce-Gardyne and Lawson, 1976). The stimulus was the existence of organizational slack and a potential area for the application of military technology for civilian use. According to Bruce-Gardyne and Lawson (1976) all this changed when the Government announced a drastic reduction in expenditures for military aircraft. At this point the Royal Aircraft Establishment stepped in with their proposal for a civilian SST. As compensation for losses in military orders, the British government agreed to fund research and development work in private industry for a civilian SST.

Both these cases illustrate decisions made for what are basically internal reasons having little to do with solving problems posed by a failure to achieve a goal. In addition, each decision provided opportunities to raise other issues and stimulate other decisions.

These non-problem-motivated stimuli for decisions share common properties with Cohen, March and Olsen's (1972) "garbage can" model of organizational decision making. New technology, changing images, routine events, changing personnel, and self-generated efforts create
opportunities for raising issues, generating conflict, and reconsidering past decisions. In their terms, they create opportunities for solutions to search for problems to solve. This is particularly true in the TFX and SST cases. There was no "pressing" need for a single-service aircraft or for initial development of a civilian SST. When the opportunity was presented however, McNamara's new scientific management techniques and government support for SST development quickly attached themselves to problems for which they were "perfectly" designed.

While problem-motivated decision making is an important part of organizational decision making not all governmental decisions follow this problem -- solution sequence. The order is often solution -- opportunity -- problem.

Cyert and March (1963:121) do recognize the second sequence, though their primary emphasis is on problem-motivated search. In part the difference can be subsumed under biases in search, viz. "pet projects" are among the first solutions examined. But the distinction rests upon more than search bias. Even with bias in search, solutions sometimes create their own problems. Subsuming this sort of activity as bias in problem-motivated search distorts the basic nature of the process.

4.2 Governments as Adaptive Goal Seeking Systems

While it is difficult to fully evaluate the adequacy of the theory of Cyert and March without specific interpretations of goals, expectations, and search rules, in outline it does seem descriptive of
governmental decision making. If governments were characterized solely in terms of the concepts developed by Cyert and March, the essential properties and processes of governmental decision making would be captured with little distortion.

The purpose of the preceding, often detailed, examination of theories of governmental decision making is to provide a context for examining the adaptive goal seeking capabilities of governments. Adaptive goal seeking capabilities are information processing as well as decision making capabilities. It is impossible to discuss adaptive goal seeking without invoking the concept of decision making. The theory of Cyert and March provides a theory of governmental decision making. The adaptive goal seeking capabilities of governments will be interpreted in light of the theory of governmental decision making provided by Cyert and March.

4.2.1 Governments as Goal Seeking Systems

One of the results of the philosophical analyses of Chapters 2 and 3 was a set of six minimally necessary conditions for adaptive goal seeking. The six conditions were divided into two sets, conditions for goal seeking and conditions for adaptation. Taken together, the six conditions specify the necessary capabilities for adaptive goal seeking. In order for the adaptive goal seeking capabilities of governments to have meaning those six conditions must be given an interpretation in terms of governmental decision making. In what follows those conditions
will be interpreted using Cyert and March's theory.

Speaking loosely and without the sensitivity to the subtle philosophical distinctions of the earlier analysis, predicating goal seeking to a government means that governmental behavior is aimed at achieving a goal. In the phrase of Chapter 2, a government does B (some behavior) for the sake of G (some goal). The four conditions which underly one description of the capability of a government to do B for the sake of G are:

1. S must be able to exhibit at least two internal states corresponding to two distinct states of affairs.

2. There must be at least two internal states of S corresponding at least to S being in G-attaining states of affairs and being in not-G-attaining states of affairs.

3. The behavior exhibited by S must depend upon at least the internal state of S corresponding to S being in G-attaining states of affairs or not-G-attaining states of affairs.

4. S must not be such that for all internal states S exhibits only one behavior.

The first condition ensures that S can recognize at least two different situations. As discussed in Chapter 2, a state of affairs is a description of the system and its environment. This allows for the system to recognize attributes of itself as well as its environment.

Substituting "government" for "S" the condition asserts that governments can recognize at least two states of affairs. There is little doubt this condition is true of the description of governments provided by Cyert and March. In a degenerate case, the problem-oriented decision procedure of the theory requires governments to distinguish
between acceptable and unacceptable situations. Governments under the Cyert and March description recognize much more than that simple distinction. Using an information interpretation of the theory, the U.S. government recognizes a multitude of situations: the presence or absence of war, South Africa's intransigence, the military status of the USSR, and the balance of trade with Japan.

The second condition requires the system to exhibit at least two internal states corresponding to G-attaining and not-G-attaining states of affairs. The intuitive motivation behind this condition is that the goals and states of affairs of the system be linked. Without this linkage between goals and situations, the system could not properly be said to have goals in any ordinary sense of the term. This condition ensures the system can recognize when it is not in a goal achieving situation.

The interpretation of this condition with respect to governments raises a number of issues pertaining to goals. There is little evidence that governments confront their environment as a single piece. Specialization, local rationality, and the dispersion of control all argue against this. Nor is there much evidence that the goals used by governments are statements of specific states of affairs. The evidence of Cyert and March (1963), Allison (1971), Hilsman (1971), and Halperin (1974) points to goals as general rather than specific. Cyert and March (1963) characterize goals as constraints on what counts as an acceptable
situation. Allison (1971) characterizes goals as general statements of situations to be avoided. These sorts of goals do not uniquely specify the goal attaining situation. Instead they define a class of acceptable situations by the use of the dictum: "Any situation which does not violate X, Y, and Z is acceptable." Given this sort of goal, it would be unlikely that a government could articulate specific goal-attaining situations.

The problem-motivated satisficing choice process attributed to organizations by Cyert and March's theory fits an interpretation of condition two based upon the constraint definition of goals. A partition of states of affairs into acceptable and unacceptable situations provides a reasonable interpretation of condition two. This condition, along with the first, specifies the capabilities required to "have" goals -- an ability to interpret the environment in terms of goals.

The third condition requires the behavior exhibited by the goal seeking system to be related to the goals of the system. It states that the behavior of the system depends upon whether the situation is goal attaining. Without satisfying this condition the system could not properly be called goal seeking because the behavior of the system would be unrelated to its goals.

The condition is deceptive in many ways. It does not specify what sort of relationship exists between behavior and goals or the process by
which a particular piece of behavior is chosen. All of what might be called decision making or alternative selection is contained within the unspecified relationship between achieving a goal and behavior. As stated, the condition is consistent with a wide range of alternative theories of decision making including optimal control (Gillespie and Zinnes, 1975), utility optimizing choice (Luce and Raiffa, 1957), and satisficing.

The description of government provided by Cyert and March is critical in providing an interpretation of condition three. The condition specifies what sort of relationship exists between goals and behavior. Cyert and March identify the relationship as a problem-motivated satisficing choice procedure. Problems, which are failures to meet goal constraints, motivate search for a course of action which will produce an acceptable situation with respect to the constraints. Selection among possible courses of action is guided by a satisficing procedure: the first acceptable alternative is chosen.

The search and selection procedure specified by Cyert and March meets the requirement imposed by condition three. It is sensitive to whether the government is in a G-attaining state of affairs. This is guaranteed by the problem-motivated basis of the process. Problems result from failures to achieve G-attaining states of affairs; decisions result from problems; and behavior results from decisions.

The fourth condition is essentially a technical condition designed
to prevent vacuous satisfaction. By itself it is of little interest or import. It is clear that under the description of Cyert and March, governments do not exhibit one behavior. But without the condition, it is possible that a system could satisfy the first three conditions and still fail to conform to the informal concept of goal directed behavior.

Governments, under the description of Cyert and March, satisfy the conditions for goal seeking. This satisfaction of the conditions allows governmental behavior to be analyzed in terms of the account of Chapter 2: "Governments do B for the sake of G" means that governments stop doing B when G is achieved.

The analysis of goal seeking has three important characteristics in light of the satisficing non-optimizing character of the decision process identified by Cyert and March. The analysis of "B for the sake of G" does not imply that B is optimal, unique, or causally effective for a particular G.

Optimality plays no role in the analysis. There is no implicit or hidden assumption that B is best suited for G. All that is implied is that B is done for the sake of G. It is possible, of course, for a goal seeking system to behave optimally. What is important is that optimal behavior is not required for goal seeking.

In a similar way the uniqueness of B is not required. Even if the behavior was not optimal it is conceivable that it was uniquely
determined by the goal.\textsuperscript{1} But the analysis does not presume the uniqueness of B for a particular G. The existence of other possible behavior for achieving a goal is not ruled out by the analysis.

The absence of an assumption that B is causally effective in bringing about G is perhaps the most important characteristic of the analysis. Many of the philosophical accounts examined in Chapter 2 assumed the effectiveness of G for achieving G. But that assumption presupposes some limited form of optimality and denies the possibility that mistakes can be made in selecting a B for a G. The arguments of Simon (1955, 1976), Lindbloom (1959), Braybrooke and Lindbloom (1963), and Cyert and March (1963) all point to the fallible nature of decision making. If causal efficacy were assumed the account would have to confront numerous counter-examples and anomalies which could not be dismissed by invoking and \textit{ceteris paribus} clause.

There are three characteristics of the analysis which are important, for without them the account of goal seeking would be inconsistent with the description of governments provided by Cyert and March. However the analysis of "B for the sake of G" still requires explication. The philosophical analysis was not addressed to any

\textsuperscript{1}Taylor (1964:9) makes the assumption that behavior is necessary for the occurrence of the goal. He argues this simplification is inconsequential because some well-defined selection process within the organism chooses B. Since he is generally unconcerned with the selection process the simplification \textit{may} be of no consequence for his analysis. Without doubt such an assumption would have consequences for the present analysis.
particular interpretation and several issues relevant to governmental decision making must be addressed.

The first issue is the level of description of the major concepts of Cyert and March. Behavior, goals, expectations, and search rules can be interpreted at many levels of detail. While there is no a priori correct level of detail, there are interdependencies among the concepts. For example, the level of description of behavior must be consistent with the level of description of goals. Behavior must not be too detailed for the goal toward which it is directed. If each step taken by a Secretary of State were counted as a governmental behavior, anomalous situations can result. If the Secretary of State is walking to a SALT negotiation, it would be inappropriate to attribute limiting strategic arms as the goal of each step. Under the analysis of "B for the sake of G", B stops when G is achieved. Using "taking a step" for B and "limiting strategic arms" for G, the Secretary of State would continue walking until a SALT treaty were signed, ceteris paribus.

A second requirement is that goals must be consistent with the capabilities of the system. What this means is that the system must have the capacity to recognize the achievement of the goal. In all but the most extraordinary circumstances, a government could not negotiate with another government over the territorial status of a single grain of sand. Not only is it unlikely that a grain of sand might be the object of negotiations, but it is also unlikely that a government would
identify the grain of sand, the status of which was being negotiated.

A third issue, particularly relevant to governments, is the aggregation of the description of behavior. Even restricting governmental behavior to foreign affairs, on any given day a government is exhibiting a wide range of behaviors: Diplomatic notes are being exchanged, informal low level consultations being held, questions are asked, answers given, negotiations conducted, and public positions stated. In addition these behavior take place across a wide range of foreign policy issues from trade to the disposition of armed forces.

If all these diverse actions are aggregated to "the behavior" of the government then goals, expectations, and choice procedures must reflect that level of aggregation. But the result is an implicit description of governmental decision making which is highly unlikely. Cyert and March (1963) argue for sequential attention to goals and the delegation of problem solving through local rationality. Allison (1971), Davis (1972), and Halperin (1974) argue that governmental behavior is really an aggregate of separate often unrelated actions of separate bureaucracies. All these observations are inconsistent with high levels of aggregation in defining behavior. What counts as behavior must be consistent with the structure of decision making in the government.

The final issue related to the level of description issue concerns requirements imposed by the philosophical analysis of the description of
behavior. The analysis requires that behavior have continuity, a beginning, and an end. The phrase "S does B for the sake of G" was taken as equivalent to "S stops doing B when G is achieved." For "S stops doing B" to make sense B must have the attributes of a beginning, duration, and end. The primary impact of this requirement is that behavior descriptions must preserve the underlying continuity of behavior. Assume the Soviet Union undertakes an action, say denying exit visas to Soviet Jews. Assume the U.S. responded with a diplomatic protest. A diplomatic protest is a discrete event, one which does not appear to have the requisite continuity. The sentence, "The U.S. will stop the diplomatic protest when the Soviet Union lifts exit visa restrictions for Soviet Jews" verges on the ungrammatical. The U.S. does not continually protest Soviet actions; diplomatic protests are not stopped and started.

There are two ways to rephrase the sentence. The first is to change the goal from the lifting of Soviet visa restrictions to objecting to Soviet visa policies. With this change the sentence would be: "The U.S. will stop the diplomatic protest when the U.S. has objected to Soviet visa policies." This alternative while being technically adequate presents a somewhat stilted analysis of U.S. motivations.

A better way to treat the action is by redescribing the behavior. The sentence: "The U.S. will stop pressuring the Soviet Union to change
its emigration policies when the Soviet Union lifts exit visa restrictions for Soviet Jews." This redescription of the behavior preserves the requirement of a beginning, duration, and end while at the same time presents a plausible account of U.S. motivation.

There can be no guarantee that the impact of these restrictions on the description of behavior will not have important substantive implications for the analysis of governmental behavior as goal directed. The impact does not appear, however, to be critical.

The second major issue attending the interpretation of the philosophical analysis is the nature of goal statements. The analysis implicitly assumes goals are expressed as positive states of affairs. Cyert and March (1963) and Simon (1976) view organizational goals as independent constraints rather than descriptions of situations to be achieved. Moreover Allison (1971) argues that foreign policy goals are expressed as general statements of situations to be avoided. Neither of these characterizations is obviously equivalent to the implicit positive state of affairs assumed in the analysis.

Elion (1972) addresses the difference between positive and constraint forms of goals. His argument is that there is no difference between the two. If all possible states of the world are conceived in set-theoretic terms, a positive statement of a goal would directly identify a subset of possible states as desirable. A constraint form of the same goal would identify the same subset by specifying which states
are to be excluded because they violate the constraint. Thus on a formal level both forms are equivalent.

However then goals are expressed as general constraints, viz. Allison's (1971) general situations to be avoided, an additional complication arises. Because the situations are general, e.g., avoid allowing the USSR to influence events in the Middle East, there are many specific situations which satisfy the goal as well as many behaviors would could realize those situations. This lack of a one-to-one pairing between goals and behaviors raises problems in identifying goals.

The indeterminancy in behavior-goal linkages makes it impossible to uniquely determine the goals of a government from its behavior. How goals are to be identified in practice is the final issue attending the interpretation of the philosophical analysis of goal seeking.

Hermann (1978) identifies three strategies for identifying foreign policy goals. The first strategy is to use public statements of goals and objectives by governmental officials. This strategy requires governmental officials to be both candid in their assessments and sufficiently forthcoming in attributing goals to foreign policy actions. Hermann argues full and candid assessment of goals by governmental officials is unlikely given the political environment in which they operate. Governments are accountable for public statements by officials; given the sensitive nature of these public political statements governmental officials have strong incentives to shape and
shade what they say in public. This sensitive political context would in addition tend to circumscribe those issues for which officials would be willing to articulate the goals and motives behind governmental action.

The character of governmental decision making also tends to undermine this strategy. Cyert and March (1963) argue that organizational goals are determined through a process of bargaining. Allison (1971) adds to this description of the goal bargain process the observation that foreign policy goals are expressed as general situations to be avoided. Public statements by participants actively engaged in the bargaining process may imperfectly reflect the bargaining outcome, side payments made to achieve consensus, and the character of the relevant constraints.

A second strategy for identifying goals is to infer goals from governmental behavior. Hermann notes that there is no unique assignment of behavior with goals. Different behaviors can be directed toward the same goal; and the same behavior can be directed toward different goals. Hermann also argues that this strategy may mask mistakes and miscalculations by governmental officials. As argued in Chapter 2, an acceptable account of goal seeking cannot presuppose that behavior will always be appropriate for the goal.

Hermann's final objection to this strategy is that it ignores the bargaining process which underlies goal consensus. The literature on
bureaucratic politics (Allison, 1971; Halperin, 1974) argues that goals are determined in a context of bureaucratic bargaining. Subtle consequences of this bargaining process will not be reflected in governmental behavior. In addition Allison and Halperin both argue that parts of this bargaining process can spill over into the public arena. The public behavior of governmental officials is not always goal directed "foreign policy" behavior but may reflect internal bureaucratic strategies for influencing the bargaining outcome. Given only the public behavior it is often difficult to distinguish the "official" governmental actions designed to achieve foreign policy goals from the actions of governmental officials designed to influence bureaucratic bargaining.

Hermann's final strategy for identifying foreign policy goals is for the analyst to posit the appropriate goals given the environment and the capabilities and requirements of the society. Hermann notes that this prescriptive strategy of goal identification does have its use. However the usefulness of this strategy is limited to the evaluation of governmental behavior. The strategy can produce very misleading results
if it is used to understand and explain foreign policy behavior.¹

The large degree of indeterminancy in the relations among decision making, goals, and behavior makes a nonproblematic strategy for goal identification impossible. Goals do not reveal themselves in behavior, though goals and behavior are related. Public statements of goals by governmental officials are not reliable, though these public statements are related to goals. Analyst-proscribed goals based upon an "objective" national interest are not accurate, though as long as some consensus on the national interest exists these prescribed goals will be related to the actual goals.

The common problem with these three strategies is that goals cannot be directly observed. Goals must be inferred from a body of evidence. And it appears that this body of evidence must include the process of decision making and problem solving within the organization. In particular those aspects of organizational decision making that require the organization to consider its goals must be analyzed. Cyert and March (1963) characterize organizational decision making as problem solving. Organizational goals will be manifest in what aspects of a

¹Mohr (1973) seems to treat organizational goals strictly in evaluative terms. He criticizes Cyert and March (1963) and Simon (1976) because their approach identifies the goals used by the organization rather than the goals the organization ought to have. While there is a place for the evaluation of organizations based on their professed "official" goals, that does not make attempts to understand the goals used by the organization irrespective of the relationship to the "official" goals illegitimate for explaining and understanding organizational behavior.
particular situation result in its being classified as a problem. The process of alternative search and selection will also require the organization to use goals. The process will identify alternatives as generating acceptable or unacceptable situations. Analysis of what criteria are used to evaluate alternatives will identify aspects of organizational goals. Finally, organizational goals are established and maintained through bargaining. This bargaining process illuminates aspects of organizational goals. In short, the strategy for identifying organizational goals is based upon the decision making behavior of the organization.

This strategy does have certain drawbacks. The information required to use the strategy is large. The theorist must examine the decision process within the organization in order to determine organizational goals. This information is difficult and costly to obtain. Moreover, this sort of information usually can be obtained long after the point at which decisions were made. The sensitive nature of foreign policy decision making limits access to reliable and verifiable information. This limits the analysis to largely *ex post facto* explanation.¹

Although the passage of time renders the information less sensitive, access to it is often difficult (Holsti, 1976). But even

¹The primary exception is where press reports of governmental decision making are sufficiently current and detailed to illuminate governmental decision making. This situation is, however, a rare occurrence.
with access to the information the passage of time and the necessity of relying upon documentary evidence raises problems of interpretation.

The dangers of misinterpretation are not restricted to \textit{ex post facto} analysis. No matter how current the information, goal identification rests upon inferences drawn from evidence. There is no mechanical procedure for inferring goals from evidence; whatever the attributed goals the inference process is open to errors and distortions.

However limited this strategy for identifying goals may appear there is an important point that must not be ignored. Even though the analyses may be largely historical case studies, the results of those studies nonetheless add to our knowledge of governmental decision making. The situation is not unlike the study of decision making in the firm. The profit motive has been recognized as only one of a possible number of goals pursued by business firms (Simon, 1976; Cyert and March, 1963). The fall of the single goal of profit maximization has forced economists and organizational theorists to rely more heavily upon a case study approach to identify the goal structure of particular firms. While a theory of the firm containing fully articulated interpretations of goals, expectations, and search and choice rules is unlikely in light of the diversity in organizational decision making, that does not imply that organizational decision making cannot be understood. Nor does it imply that case studies do not increase our knowledge of organizational
decision making. The implication instead is that expectations of the single universal theory of governmental decision making must be revised.  

1 The product will not be anything quite so dramatic as the theory of decision making. But that product will not be without merit.

It is possible to speculate on what this product might look like. The theories generated about governmental decision making will treat particular governments facing particular problems as members of an equivalence class.2 The elements of the equivalence class are similar in some respect. A theory of the elements in an equivalence class is a theory of those common attributes. Equivalence classes do not exist ready made and must be created by theories which point out the common characteristics and generate hypotheses about governments which share those characteristics.

Case studies and more general analyses play an important role in the construction of equivalence classes. The theorist examining a particular case must identify the defining attributes of the class. Moreover the theorist must base the theoretical predictions solely upon

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1Rosenau (1967) presents a criticism of Snyder, Bruck, and Sapin's decision making approach (1962) which reflects the universal theory ideal.

2An equivalence class is a technical term from set theory. For a basic introduction see Suppes (1972). All the elements of an equivalence class are equivalent in some respect. This "equivalence" is generated by an equivalence relation between elements which is reflexive, symmetric, and transitive. The most common equivalence relations are equality in arithmetic, "=", and congruence in geometry.
those common attributes. Theories which are based upon attributes not held in common by the elements of the class will not be true of the class as a whole.¹

Theories based upon this strategy will not in general make "specific" predictions about the behavior of a particular government. Instead the theories will probably produce predicates describing the actual behavior. A theory might for example predict that during the Cuban Missile crisis the U.S. government would exhibit behavior which would avoid precipitate military action. Such a prediction would differ markedly from a prediction that the U.S. would initiate a blockade of Cuba with a 500 mile limit.

In a similar way the theories which result will capitalize upon the stabilities in governmental decision making. One of the central premises of this dissertation is that not only are there similarities in governments, but also that the decision making processes exhibited by governments have some stability. Analyses of governmental decision making provides information about the specific decision in addition to information about how the government makes decisions in general. The

¹This strategy does not differ substantially from more traditional defenses of case studies (Holsti, 1976; Axelrod, 1976; Bonham and Shapiro, 1976; George and Smoke, 1974) although it uses slightly different language. The strategy also shares characteristics with Chomsky's program for research in linguistics (Chomsky, 1965), where the universal linguistic capacity is distinguished from individual competence. The essence of the strategy outlined here addresses the universal capacity by examining necessary capacities for individual competence.
assumption is that governments do not concoct unique decision processes, goals, expectations, and search rules for each decision but the process displays some short-run stability. This stability supports generalizations across decisions and problems.

This stability is however only stability in the short run. Governments do change most obviously in terms of participants, but also in terms of goals, expectations, beliefs, and rules for search and choice. This long-run change in governments which are stable in the short run raises the second major concern of the dissertation: adaptation in a government which is goal seeking, or the adaptive goal seeking capabilities of governments.

4.2.2 Governments as Adaptive Systems

A capacity for adaptive goal seeking differs from a capacity for goal seeking in that it includes a capacity for change beyond that implicit in goal seeking. Put informally, goal seeking implies a responsiveness to the environment; goal directed behavior changes in reaction to the responses of the environment. Cyert and March (1963) capture this characteristic of goal seeking behavior with the term "feedback-react" decision procedures as do Braybrooke and Lindbloom (1963) with "incrementalism".

Some goal seeking systems do, however, have capacities for change which go beyond simple responsiveness. These goal seeking systems can change the mechanism or process which generates behavior as well as
change their behavior in response to the environment. Goal seeking systems with a capacity to change the process by which goal seeking behavior is generated are adaptive goal seeking systems.

The terms "generate", "mechanism", and "process" do not have a well specified meaning. What counts as a mechanism or process in specific instances cannot be determined directly. They acquire a meaning only under some description. Without that description it is difficult to determine what is meant by adaptive goal seeking.

The Cyert and March (1963) theory of governmental decision making provides a description which can provide a context for interpreting adaptive goal seeking capabilities. The decision making process, including organizational goals, expectations, and choice of Cyert and March provides an interpretation for "process" and "mechanism". If governments are adaptive goal seeking systems, then governments can change their decision making process in ways which go beyond changing behavior in response to the environment. In particular they can change organizational expectations, and rules for search and choice.¹

In order to determine whether governments are adaptive goal seeking systems, the capabilities implied by adaptive goal seeking must be

¹The description of governmental decision making is critical in interpreting adaptive goal seeking. For example, under Braybrooke and Lindbloom's (1963) incremental theory of governmental decision making, adaptive goal seeking is not possible. Their theory is predicated on the basis that the only change exhibited by governments is short-run incremental responsiveness.
determined. The philosophical analysis of Chapter 3 identified two conditions which specify the capabilities for adaptive goal seeking which go beyond those of goal seeking:

5. S can at least modify the relationship between the behavior exhibited by S and S being in G-attaining or non-G-attaining states of affairs.

6. There is a relationship between S exercising the self-modifying capability described in (5) and S being or the potential of S being in G-attaining or non-G-attaining states of affairs.

The fifth condition states that the system can modify the relationship between its goals and its behavior. As was true of condition three, which specified the existence of the relationship, this condition is a monumental understatement. It specifies neither the form of the relationship nor the range of modifications which are possible. This condition embodies the informal characterization of adaptive goal seeking as a modification of the process or mechanism which generates behavior. The relationship between goals and behavior is the mechanism; adaptation is the modification of this mechanism.

The informal characterization of mechanism or process as the decision making process of a government provides an interpretation for the meaning of condition five. The adaptive goal seeking capabilities of governments includes the capacity to modify the decision making process. The most obvious of the possible modifications are modifications to organizational structure, expectations, and rules for search and choice.
The sixth condition is similar to the non-vacuous satisfaction condition for goal seeking (condition four). It requires the modification of the mechanism which generates behavior to be related to goal achievement.¹

Whatever sense can be given to adaptive goal seeking by interpreting it as a modification of the decision process, two critical questions must be addressed before the proposition that governments exhibit adaptive goal seeking capabilities can be fully evaluated: What is changed under adaptive goal seeking and what is the mechanism which produces the change.

The range of possible changes in the decision making process is enormous. These possibilities include changes in the organizational structure, standard operating procedures (SOP's), search rules, attention rules, choice rules, expectations, goals, beliefs about specific facts, and personnel.

In addition to the range of possibilities, the issue is made more complex by ambiguity in what sort of changes are to count as falling under adaptive goal seeking.

¹The violation of this condition, however, would not prove as destructive as the violation of the third condition. Violation of the third condition would open the possibility that systems which fail to meet intuitive concepts of goal seeking would be classed as goal seeking systems. This condition is not as fundamental. The condition limits those modifications by systems with adaptive goal seeking capabilities which are classified as an exercise of those capabilities. For example, the decision making process of a government might be changed for reasons having little to do with goal achievement. Under condition six, these modifications would not be considered as an exercise of adaptive goal seeking capabilities.
under adaptive goal seeking. The last three types of change, changes in beliefs about specific facts, for example whether there is a war in the Middle East or whether the USSR has placed offensive missiles in Cuba, could be termed a change in the decision making process. But there are reasons for excluding this sort of change as an exercise of adaptive goal seeking capabilities. There is something not quite right about a goal seeking system which fails to "update" its information about the environment; goal seeking capabilities seem to imply a sensitivity to current information. Changing information about the current state of affairs does not seem to require adaptive capabilities.

The second reason for excluding the change of information as an exercise of adaptive goal seeking is based upon the fifth condition. Condition five states that adaptation involves a modification of the relationship between goals and behavior. One interpretation for this relationship is that it consists of statements of the sort: If G is the goal and the current state of affairs is S, then do B. Under this interpretation of a relationship between goals and behavior a change in the current value of S, the current state of affairs, is not a change in

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1 There is, of course, nothing inherent in goal seeking which requires a system to have perfect information about its environment. Intelligence failures in governmental decision making are well documented phenomena (Wohisetter, 1962; de Rivera, 1968; The Village Voice, 1976). The argument is that maintaining a current description of the environment does not require the additional capabilities of adaptive goal seeking. The capability is part of what it means to be goal seeking (see the second condition for goal seeking).
the relationship. A change in S could evoke a different statement and result in different behavior. It does not however produce a change in the relationship between G and B for a given value of S.

Change in personnel is also best excluded as an exercise of adaptive goal seeking capabilities. Personnel changes may very well influence governmental decision making; these changes, however, rarely meet the requirement of condition six. Under condition six, changes must be related to goal seeking. Unless personnel are changed in order to increase goal achievement, the change would not be an exercise of adaptive goal seeking capabilities.

Cyert and March (1963) identify the "adaptation of goals" as a type of change exhibited by organizations. If the organization experiences sustained goal achievement or if competitor organizations experience sustained goal achievement, Cyert and March hypothesize the aspired level of achievement will rise. Allison's (1971) analysis of governmental decision making based in part upon the concepts of Cyert and March identifies a similar phenomenon: The aspired level of goal achievement varies with experience in actual achievement. The evidence points to goal change in governments and business firms. But should the "adaptation of goals" be considered an exercise of adaptive goal seeking capabilities?

Based on the definition of adaptive goal seeking provided by the six conditions the answer to the question is no. Conditions five and
six are particularly relevant in this context. Condition five asserts that adaptive goal seeking involves a modification of the relationship between goals and behavior. Condition six asserts that this modification is related to either the actuality or potentiality of $S$ being in $G$ or non-$G$-attaining states of affairs. The implications are that goals and behavior are fixed and that adaptation involves changing the relationship between them.

"A government adapts in order to improve its job of goal seeking", a paraphrase of Weinberg (1972:137), is an informal interpretation of adaptive goal seeking. It is possible to "make sense" of the phrase: "A government changes its goals in order to improve its job of goal seeking". If the aspired goals are lowered, goal achievement should be easier; similarly, if goal levels are raised and achieved the result is a more desirable situation.

But there is a fundamental sense in which the phrase is paradoxical. Adaptive goal seeking is motivated by performance. Changing the ground rules under which a government evaluates its performance undermines the motivation for adaptation.

The exclusion of changes in beliefs about the current state of affairs, personnel, and goals as exercises of adaptive goal seeking capabilities emphasizes the fact that a theory of the adaptive goal seeking capabilities of governments does not encompass all changes which governments can exhibit. A comprehensive theory of organizational
change will not be limited to changes which result from adaptive goal seeking. The changes which do result from those capabilities will, however, play an important role in any comprehensive theory of organizational change.

Even excluding change in "facts", personnel, and goals the range of changes which result from adaptive goal seeking is large: changes in organizational structure, SOP's, information handling rules, search rules, attention rules, choice rules, and expectations.

Changes in organizational structure are perhaps the most visible manifestations of adaptive goal seeking capabilities. They range from ad hoc committees for dealing with special problems to comprehensive studies of organizational reform. The ExCom of the National Security Council started as an informal group of advisors during the Cuban missiles crisis (Abel, 1966), and was later institutionalized under the Kennedy Administration. A second organizational reform occurred in the Department of State following the crisis. Until after the crisis it was not standard procedure for the State Department to maintain a round-the-clock staff to monitor the cable traffic and respond promptly to emerging crisis situations. Following the crisis, Secretary of State Rusk established the Operations Center. Its purpose is to identify emerging crises and notify appropriate officials (Campbell, 1971).

Excluding ad hoc inquiries, the U.S. Department of State has probably been the subject of more attempts at organizational reform than
any other U.S. governmental institution since World War II. Allison and Szanton (1976:222) list six official studies of the State Department. Allison and Szanton's book itself is based upon the most recent study, the Murphy Commission. Each of these efforts at organizational reform was motivated by a recognition that the performance of the U.S. in foreign affairs was inadequate and that the organization of decision making was part of the problem.¹

Allison and Szanton's (1976) proposal for organizational reform, based upon the Murphy Commission, argues that poor organization within the U.S. government is an important reason for the failures of performance in U.S. foreign policy. They argue the current organizational structure cannot be expected to produce effective policy because it is designed to deal with the issues and problems of the post-War years. Changes in the environment and the types of problems facing the U.S. have made the current structure obsolete and ineffective in achieving U.S. foreign policy goals.

The Allison and Szanton proposals are modifications of the relationship between goals and behavior designed to improve goal achievement. If they were implemented they would be a manifestation of adaptive goal seeking capabilities.

¹Campbell (1971), Bacchus (1974), and Warwick (1975) are the most recent analyses of the ultimate impact of organizational reform on U.S. foreign policy decision making. The long sequence of recommended reforms reinforces a common theme in these three studies: On the whole, reorganization has done little to improve the process.
Adaptive goal seeking is not limited to sweeping changes of organizational structure. Adaptive goal seeking can also result in less global modifications including changes in SOP's, organizational expectations, attention rules, search rules, and choice rules.

Expectations and search rules play an important role in governmental decision making. Search rules uncover alternative courses of action; expectations forecast the consequences of action. Taken together they have a major impact on which alternatives are considered and how they are evaluated. From the perspective of a theory of the adaptive goal seeking capabilities of governments they are particularly important because they can change as a result of experience.

Ernest May (1973) presents an analysis of foreign policy decision making based on the premise that decisions are influenced by what the participants take to be the lessons of history. These lessons, expressed in terms of analogies and parallels, largely determine expectations and search rules.

May's analysis focuses on four cases in U.S. foreign policy: planning for years following WW II, the emergence of the Cold War, the Korean crisis, and U.S. involvement in Vietnam. He argues that in each instance U.S. foreign policy was based upon analogies with the past. The experience of the interwar years formed the basis for the planning for the end of World War II; the costs of the failure to oppose Nazi expansionism shaped the U.S. posture toward the Soviet Union after the
War; the lessons of Munich and Ethiopia were applied to the invasion of South Korea by the North; the successful opposition to guerilla wars in Malaya and the Philippines served as models for the U.S. involvement in Vietnam during the Kennedy Administration.

On the basis of the May's interpretations, the impact of the lessons of the past shaped expectations and biased search. In the Vietnam case the past provided an exemplar to be followed. In the other three cases, the past provided a negative exemplar and emphasized the costs of past mistakes.

In order for the lessons of history to influence governmental decision making, governments must have adaptive goal seeking capabilities. That capacity allows governments to learn from experience by changing the structure of the relationship between goals and behavior.

Changes in U.S. foreign policy under the Nixon Administration also reflect an attempt to improve goal achievement by modifying the basis for governmental action. The Nixon-Kissinger style of foreign policy by-passed existing organizational channels and relied upon secret extra-bureaucratic channels (Kalb and Kalb, 1974; Szulc, 1978). The evidence suggests Nixon and Kissinger initiated this change in order to improve
U.S. foreign policy. Presidential frustration with the foreign policy bureaucracy has been a fact since at least World War II (Neustadt, 1976; Sorensen, 1965; Schlesinger, 1965; Campbell, 1971). Side-stepping that organizational structure was the Nixon-Kissinger solution to the problem.

Detente, the end of the Cold War, and the opening to the Peoples Republic of China during the Nixon years have been seen not just as a result of particular circumstances, but also as a result of the perception by Nixon and Kissinger that a change in the big-power relationships was possible (Kalb and Kalb, 1979; Szulc, 1978).

The reliance upon extra-bureaucratic channels and the major foreign policy initiatives reflect adaptive goal seeking capabilities. The new initiatives changed the assumptions which governed expectations and search rules. The concentration of policy making and the reliance upon "personal diplomacy" was seen as the only method of initiating these new

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1Kissinger's contempt for the foreign policy bureaucracy is illustrated by a quotation in Newsweek of 21 August 1972: "There are twenty thousand people in the State Department and fifty thousand in Defense. They all need each other's clearances in order to move ... and they all want to do what I'm doing. So the problem becomes: how do you get them to push papers around, spin their wheels, so that you can get their work done?"
These different adaptations all share a common characteristic: they are changes in decision making motivated by observation and experience. In a sense they all involve organizational learning. Analogies, parallels, and lessons of history must be recognized and generalized; failures of performance must be diagnosed and corrected; possibilities for new relationships and initiatives must be identified and implemented.

Adaptive goal seeking and organizational learning involve a modification of the decision making process. The preceding analysis identified the sorts of modifications involved in adaptive goal seeking. What remains to be determined is the mechanism of adaptation.

Just as organizational decision making differs from individual decision making, the mechanism of organizational learning differs from individual learning. Although the two differ, they do share an important similarity: Both involve generalizations from the past.

The most straightforward mechanism for adaptation is based upon the simple negative feedback cycle of the servomechanism (Weiner, 1961; %...%

Once these changes in foreign policy were started, Kissinger spoke of the need to institutionalize detente. This process of institutionalizing detente required bringing the Department of State into the normal flow of policy making so that the changes initiated by Kissinger would become part of the standard operating procedures of the U.S. government after his departure. The recognition of the need for making detente more permanent reinforces the adaptive goal seeking character of the changes.
Deutsch, 1966). Under this mechanism the organization observes its performance and makes appropriate changes in its behavior.¹ Cyert and March (1963:99) apparently have this mechanism in mind as the basis for organizational learning when they assume:

Any decision rule that leads to a preferred state at one point is more likely to be used in the future than it was in the past; any decision rule that leads to a nonpreferred state at one point is less likely to be used in the future than it was in the past.

As does Allison (1971:85) when he discussed the effects of failures in foreign policy:

Confronted with an undeniable failure of procedures and repertories, authorities outside the organization demand change, existing personnel are less resistant to change, and key members of the organization are replaced by individuals committed to change.

However straightforward this mechanism for organizational learning, Axelrod's (1968) analysis of the U.S. Military Assistance Program (MAP) provides evidence that organizational learning is not based directly upon a simple application of the cybernetic model. MAP is involved in arms grants and sales by the U.S. to foreign governments. Axelrod chose Indian-Pakistani war of 1965 to investigate organizational learning and adaptation in MAP. The war could be considered a failure of sorts for

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¹It is important that his feedback mechanism not be confused with the traditional cybernetic illustration of goal seeking by servomechanism (Deutsch, 1966; Weiner, 1961; Rosenbleuth, Bigelow, and Weiner, 1943). The simple servomechanism, often illustrated by a thermostat or heat-seeking missile, adjusts its behavior as a function of performance. Adaptive goal seeking systems adjust their policies, strategies, or plans as a function of performance.
MAP because both India and Pakistan used American-supplied arms against each other. This was recognized as a failure by MAP officials, Congress, and other officials (Axelrod, 1968). The situation would seem a paradigmatic case for organizational learning using the cybernetic mechanism. There was a policy and a recognized failure of that policy. The question is how the organization responded.

When MAP officials were asked if there were lessons to be learned, there was unanimous agreement. But only three of the sample of twenty-five could cite an actual modification of MAP procedures resulting from the experience. When Axelrod asked what lessons could be applied from the Indian-Pakistani failure to the 1967 Middle East war, more than half asserted the one was not relevant to the other.

One conclusion is that while there were lessons to be learned, the organization did nothing to implement them. Axelrod suggests an alternative explanation of the failure of MAP to learn its lessons. He suggests that learning need not involve modifications tied directly to the lessons of the past. Axelrod argues that there are a multiplicity of sources for organizational change; modifications cannot be attributed to specific sources. Moreover, organizational procedures change almost constantly, without specific identifiable stimuli. Thus the Indian-Pakistani failure may have been one of many factors leading to changes in MAP, and it would be inappropriate to attribute specific changes to that experience. He also suggests that participants may become more
sensitive to potential problems in the use recipients make of U.S.- supplied arms. Under these conditions Axelrod argues failures can stimulate organizational adaptation without involving specific modifications in procedures.

Axelrod's inability to find clear failure-stimulated learning emphasizes the severe assumptions required for a simple extension of negative feedback to adaptive goal seeking. The cybernetic-inspired mechanism outlined above requires organizational action to be discrete and distinguished from other actions of the organization, unambiguous cause and effect linkages, outcomes which can be recognized as either successes or failures, and unambiguous diagnoses of successes and failures.

If a policy cannot be identified then it cannot be modified. Allison (1971) and Halperin (1974) argue that coherent clearly defined policies are uncommon. Without cause and effect linkages policies cannot be identified as causing an outcome. In a complex environment these relationships are often sources of controversy, and effects may be apparent only long after the action. If outcomes cannot be classified as successes or failures, then nothing can be learned from the experience. As with cause-effect linkages, success or failure may be ambiguous and cannot be established until long after the event. Moreover, outcomes must be interpreted as successes or failures; organizations do not receive direct reward or punishments from the
environment. Without clear diagnoses of the causes of successes or failures, experience cannot be generalized.

The literature on bureaucratic politics and other studies of foreign policy decision making (Halperin, 1974; Halperin and Kanter, 1973; Allison, 1971; Art, 1968) suggest these ambiguities are a fundamental part of governmental decision making. These ambiguities do not make organizational learning and adaptive goal seeking impossible, but they do undermine a simple negative feedback representation of the mechanism.

This explanation of a cybernetic-based mechanism of organizational learning and adaptation has used an engineering or design perspective. Ambiguity in cause, effect, and diagnosis make a cybernetic-based mechanism unlikely as a mechanism for organizational learning.

March and Olsen (1976) examine the plausibility of a cybernetic model of organizational learning from a performance perspective. They identify four types of "incomplete learning cycles" where the cybernetic feedback cycle is broken.

The first is "role-constrained" learning. This involves knowledge separated from action and results when an individual's role in the organization prevents or inhibits the application of experience to organizational action. This is often manifest as self-censorship by participants who for reasons of their position, a desire to maintain a united organizational front, or an unwillingness to publicly challenge
the established view, suppress private doubts and refrain from criticizing organizational action (Halperin, 1974; Hoopes, 1973; Hilsman, 1971).

"Superstitious learning" occurs when effects are wrongly imputed to organizational action. The organization may "learn" from its "feedback", but because the effect is unrelated to the supposed cause, the resulting change in the organizational may be irrelevant. The experience of the U.S. military in Vietnam is often interpreted as a form of superstitious learning (May, 1973; Gabriel and Savage, 1978).

The third incomplete learning cycle, "audience learning", occurs when individual learning does not affect the action of the organization. March and Olsen (1976) suggest that politics often involve situations where individual learning does not affect subsequent organizational action.

"Learning under ambiguity" is the fourth incomplete learning cycle. This type of learning is related to superstitious learning, and involves situations where the environment does not send clear feedback signals. The organization will interpret the environmental response, but without an accurate image of the effects of actions the lessons of experience will not improve performance.

The simple cybernetic-based mechanism thus fails on two grounds. The ambiguity of the environment makes implementation of a feedback learning strategy difficult. Breakdowns in the learning cycle undermine
the self-correcting nature of the cybernetic feedback.

Whatever the failings of the cybernetic view of organizational learning and adaptation, it would be a mistake to reject the central core of the argument: Learning and adaptation are based upon experience. The cybernetic argument is not wrong; but care must be taken in its interpretation. Ambiguities in the organization and its environment undermine a simple interpretation.

Any account of the mechanism by which organizations exhibit adaptive goal seeking capabilities must recognize that lessons learned from experience depend upon interpretation of experience in the face of ambiguity, and that lessons learned by individuals may not affect organizational action. No matter what the precise structure of mechanisms for adaptive goal seeking, it rests fundamentally upon the interpretation of organizational experience.

4.3 Summary

Although the Chapter raises many more issues than it resolves, the three questions posed at the beginning of the Chapter can be answered affirmatively.

- The theory of Cyert and March does appear to be descriptive of bureaucratic governments.

- Governments, under the theory of Cyert and March, do appear to exhibit a capacity for goal seeking.

- Governments, under the theory of Cyert and March, do appear to exhibit a capacity for adaptation.

But however important the answers to those three questions may be,
providing an affirmative response is only the start. What specifically is it about governments that allows them to exhibit adaptive goal seeking capabilities? How does that knowledge of the structure of the generative mechanism increase our understanding of governmental behavior? What more is there to be learned about governments and their behavior?

The next two Chapters are an attempt to work-out the implications of the first four Chapters. Chapter 5 presents a formalization of an adaptive goal seeking system. The formal structure provides a basis for further exploration of the adaptive goal seeking capabilities of governments. Chapter 6 speculates as to the nature of those further elaborations: Having come to this point, the question is what lies in the future.
5. THE STRUCTURE OF AN ADAPTIVE GOAL SEEKING SYSTEM

The previous chapter concerned the status of the claim that governments can be described as exhibiting adaptive goal seeking capabilities. This chapter builds upon the acceptance of that claim by proposing an abstract and formal structure within which the adaptive goal seeking capabilities of governments can be described. The language of mathematical systems theory, which takes the concept of a set as its primitive term, is used to build this structure.

5.1 Preliminaries

The formal representation of adaptive goal seeking is restricted to adaptations which involve changes in beliefs about the causal operation of the environment. This simplification reduces the complexity of the structure by ignoring structural changes in the organization and changes in SOP's. As a result, organizational structure is not represented. The formal description does, however, capture a central intuition about learning -- the modification of beliefs based upon experience.

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1Mathematical systems theory started as an attempt to formalize the concepts of general systems theory (von Bertalanffy, 1968). Its current relationship with general systems theory is largely historical; it has developed largely independently of any continuing influence of general systems theory. Windeknecht (1971) and Mesarovic and Takahara (1975) are standard texts in mathematical systems theory. Mesarovic and Takahara (1975) provide the basic terminology for the development in this chapter. For a sometimes acerbic view of this approach, see Berlinski (1976).
5.1.1 The Aggregates

The structure is composed of four aggregates based upon the distinctions made by Simon (1969) and Bailey and Holt (1971). Governments can be viewed as attempting to achieve some goals in an environment. Systems involving control and goal seeking can be viewed as "artificial systems". (Simon, 1969). Artificial systems, according to Simon, are designed by man to achieve goals in some environment. Simon argues that the artificial system can be conceived in terms of an inner environment (IE) and an outer environment (OE). The inner environment is designed to achieve goals in an outer environment.¹ Using this distinction, the IE or government attempts to achieve goals in the

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¹Simon (1969:8) argues that the explanation of the behavior of the inner environment "demands an understanding mainly of the outer environment" and that "we can often predict behavior from knowledge of the system's goals and its outer environment." While that may be true in some cases, as a general claim it is probably false. Knowledge of goals and the outer environment are sufficient for predicting behavior only if the "minimal assumptions" about the inner environment uniquely identify behavior. If the inner environment is assumed to be a satisficing problem solver similar to Cyert and March's (1963) theory of organizational decision making, knowledge of goals and the outer environment are not sufficient to predict behavior. We must also know what counts as an acceptable situation and the structure of the rules governing expectations and search. These additional pieces of information go far beyond Simon's "minimal assumptions" about the inner environment.
OE or international environment.¹

Bailey and Holt (1971) extend Simon's IE -- OE distinction by viewing the structure within an explicit control perspective. Simon (1969: 6 - 7) speaks of a general interface between the IE and OE. Bailey and Holt expand upon this concept of interface by distinguishing an observation interface (OI) from an access interface (AI). The OI is an interface which transmits information from the OE to the IE. This information consists of descriptions of the behavior of the OE. The AI is a one-way transfer of information from the IE to the OE. This information transfer involves the implementation of actions in the OE which were selected by the IE.

The assignment of the outer and inner environments depends upon the focus of study. Because foreign policy decision making is the primary focus, the inner environment is strictly speaking, the foreign policy bureaucracy; the outer environment is everything else. There are many other ways in which the distinction between the OE and IE could have been drawn.

¹The assignment of the outer and inner environments depends upon the focus of study. Because foreign policy decision making is the primary focus, the inner environment is strictly speaking, the foreign policy bureaucracy; the outer environment is everything else. There are many other ways in which the distinction between the OE and IE could have been drawn.
The linkages among the OE, OI, IE, and AI result in a cybernetic feedback control system. Figure 5-1 illustrates the structure. This structure provides the elemental aggregates for the mathematical structure of an adaptive goal seeking system. The IE is the decision making component of the foreign policy bureaucracy, the OI is the observation and intelligence component, the AI is the implementing component, and the OE is the environment.¹

These four aggregates form the basic elements of the formal structure. The primary focus of the chapter is upon adaptive goal seeking by the IE. Consequently, the OE, AI, and OI will be given minimal structure.

5.1.2 Initial System Specification

The starting point of any specification of structure begins with an identification of the "system objects". These objects are the bases for a specification the the structure of the system (Mesarovic and Takahara, 1975: 11).

Figure 5-1 identifies four subsystems, the OE, OI, IE, and AI. The OE receives controls from the AI and sends information to the OI. The controls passed from the AI will be represented as elements from the set M. The behavior observed by the OI will be represented as elements from the set Y. In a similar manner, the OI receives elements from Y and

¹These components represent a functional but not necessarily a physical decomposition of a government. Portions of the bureaucracy may be assigned to more than one component. The CIA, for example, functions as an OI when it gathers and analyzes information, and as an AI when it initiates covert operations.
sends elements of \( Y^* \) to the IE. The IE receives \( Y^* \)'s and sends \( M^* \)'s to the AI. The AI receives \( M^* \)'s and sends elements of \( M \) to the OE. \( Y^* \) is a description of the actual behavior of the OE. Similarly, \( M^* \) is a description of the control passed from the IE to the AI. The \( M^* \) is the "ordered" control and \( M \) is the "implemented" control.

The elements of these four sets are information patterns or streams of information through time, i.e., \( m_i \in M \) is a pattern or sequence of controls from the AI to the OE. If the events in the Cuban missile crisis (Allison, 1971) were described using this structure, \( m_i \in M \) could be: The U.S. initiates U2 flights over Cuba, the U.S. announces the discovery of Soviet missiles in Cuba, the U.S. proposes an OAS resolution supporting a blockade of Cuba, and then, the U.S. Navy imposes a naval blockade of Cuba. \( y_j \in Y \) could be: The Soviets deny the existence of missiles in Cuba, the Soviets increase the rate of construction at the missile cites, the Soviets condemn the U.S. blockade, and then the USSR threatens to run the blockade.

Based upon this interpretation of the sets as information patterns through time, each aggregate can be given an input -- output (Mesarovic and Takahara, 1975) or behavioral (Zeigler, 1976) description:

\[
OE \subseteq M \times Y \quad (1) \\
UI \subseteq Y \times Y^* \quad (2) \\
IE \subseteq Y^* \times M^* \quad (3) \\
AI \subseteq M^* \times N \quad (4)
\]

Each aggregate or subsystem has been specified as a subset of the cross-
product of the appropriate objects.\textsuperscript{1} The OE receives an element of M as "input" and produces an element of Y as "output".\textsuperscript{2} For example, if $m_i$ and $y_j$ are defined in the previous example, $(m_i, y_j) \in OE$ is a pair of information patterns. OE is defined in equation (1) as a set of pairings of m's and y's. A particular element of OE is termed an "appearance" of OE and represents one possible history or sequence of inputs and outputs. Taken together, the elements of OE are some subset of all possible input -- output histories. In a sense, OE consists of everything that could have occurred in the environment. The actual events of the crisis are just one appearance of the OE.

5.1.3 Time

The elements of M, M*, Y, and Y* have been informally characterized as sequences over time. Before the aggregates can be given more structure, the concept of time must be introduced in a more formal way.

Following the set theoretic basis of mathematical systems theory developed by Mesarovic and Takahara (1975), time will be introduced as a set.

\textsuperscript{1}A cross-product is the set of all ordered elements from the specified sets. E.g., $A = \{1,2\}$, $B = \{3,4\}$, $A \times B = \{(1,3),(1,4),(2,3),(2,4)\}$.

\textsuperscript{2}Because the OE may be an arbitrary subset of the cross-product there is no guarantee that outputs will be predictable from inputs. If A and B are defined as above, then $Z \subseteq A \times B$ and $Z = \{(1,3),(1,4),(2,3),(2,4)\}$. Knowing that the input was "1" does not uniquely specify the output. It may be "3" or "4".
Let T be a set linearly ordered by a binary relation $\rightarrow$ with the structure of a monoid with a binary operation $\cdot$ and identity $t_0$.

The aggregates OE, AI, IE, and OI are structured as time systems if their objects are sets of time functions. If T is taken as a time set with identity $t_0$, a linear relation $\rightarrow$ and binary operation $\cdot$ according to the definition, then the time system representation of OE is:

$$OE \subseteq M \times Y.$$ 

$$M = \{m : m : T \rightarrow A_1\}$$
$$Y = \{y : y : T \rightarrow A_2\}$$

(7)

$M$ and $Y$ are sets of time function. $A_1$ and $A_2$ are called the "alphabets" of $M$ and $Y$ respectively (Mesarovic and Takahara, 1975: 17). An element of $M$ is a sequence of controls over time, and $a_1 = m(t) \in A_1$ is the control at time $t$ received by the OE. The pair $(m_i, y_j) \in OE$ is a pair of time functions. Thus the OE is a set of pairs of input -- output sequences defined over the time set $T$.

Using the interpretation of $m_i$ above, $A_1$, the alphabet of $M$, is the set [The U.S. initiates U2 flights over Cuba, the U.S. announces the ________________________

1 A linear binary relation $\rightarrow$ is irreflexive ($\forall x \in X, \lnot x \rightarrow x$), transitive ($\forall x, y, z \in X, x \rightarrow y \land y \rightarrow z \rightarrow x \rightarrow z$), and weakly connected ($\forall x, y, z \in X, x \neq y \rightarrow x \rightarrow y$ or $y \rightarrow z$). The binary relation "less than" is a linear relation over the set of integers.

2 A monoid is a set, say $X$, and a binary relation, say $\cdot$, which satisfies the following properties:

$$\exists x_0 \in X \text{ such that } \forall x \in X, x \cdot x_0 = x_0 \cdot x$$

$$x, x', x'' \in X,$$

$$x \cdot (x' \cdot x'') = (x \cdot x') \cdot x''$$

(6)

The binary relation "plus" and the positive integers is a monoid. $x_0$ is the identity element, or zero in integer addition.
discovery of Soviet missiles in Cuba, the U.S. proposes an OAS resolution supporting a blockade, the U.S. imposes a blockade. \( m_i \in M \) is a function which associates the elements with the time set. For example, \( m_i(t_j) \) might be: "the U.S. imposes a blockade".

Segments of time functions can be specified as restrictions on the time set. The following restrictions will be used in specifying the structure:

\[
T_t = \{ t' : t' > t, t, t' \in T \} \\
T^t = \{ t' : t' \geq t, t, t' \in T \} \\
T_{t \leq t'} = \{ t'' : t < t'' < t', t, t', t'' \in T \} \\
T_{t \leq t'} = \{ t'' : t \leq t'' < t', t, t', t'' \in T \}
\]

These restrictions are applied to the system objects in the following way:

\[
m_t = m \upharpoonright T_t \\
m^t = m \upharpoonright T^t \\
m_{t \leq t'} = m \upharpoonright T_{t \leq t'} \\
m^t_{t \leq t'} = m \upharpoonright T^t_{t \leq t'}
\]

\( m_t\ t' \) is a segment of \( M \) between \( t \) and \( t' \), but not including \( t \) or \( t' \).

The final preliminary specification is the introduction of two additional time sets. The structure requires three time sets: a "real" or "base time" set \( T \), a "task" time set \( T \), and an "event" time set \( T_e \).

Real time is the time set from the perspective of the IE. Schlesinger's (1965) history of the Kennedy years, A Thousand Days, or Kennedy's (1969) account of the Cuban missiles crisis, Thirteen Days, are both examples of task time. The initial element in Schlesinger's time set corresponds to 20 January 1961 in "real time". Kennedy starts his task time at 16 October 1962 in "real time". In the formal
structure, the first element of the task time set corresponds to the point in the real time set when an adaptive change occurred. Knowing the value of task time indicates how long ago the last adaptation occurred. As discussed previously, adaptations are restricted to changes in beliefs about the environment. Thus whenever a change occurs in the belief structure of the IE, a "new" task begins and task time is reinitialized.

Event time is a subset of real time and increments whenever an adaptation occurs. Adaptations "occur" at points in real time. In general, event time will be a "lumpy" version of real time. If real time is denoted by the positive integers, event time might be the set \{2, 4, 6, 8, 10, ...\} or \{2, 9, 10, 15, 20, 100\}. In the first set, adaptations occur every second point in real time. In the second, they occur at differing intervals. The specific elements of event time will not in general be known at the outset. As will be clear below, adaptations are not pre-scheduled events, but occur as a function of performance. The elements of event time are well defined only after the fact.

Just as it was possible to relate Schlesinger and Kennedy's task times to real time, it is possible to relate task time with real and event time. Conceptually the real time equivalent of a task time is the event time plus the task time: the time since the last event or adaptation (task time) plus the real time of that event (event time) equals the real time equivalent of the task time. Although the relationship between task and real time is conceptually simple when all time is expressed in integers or real numbers, the definition of the
time set did not specify the contents of the set. The elements may be arbitrary symbols, letters, or numerals. As a result, the specification of the relationship between task and real time is somewhat involved.

\[ T = \text{real time with binary operation } +. \]
\[ T = \text{task time with binary operation } \cdot. \]
\[ T \subseteq T. \]

It is necessary to assume that \( <T,+> \) and \( <T,\cdot> \) both define monoids. Let \( 0 \in T \) and \( t_0 \in T \) be the identity elements. Let \( \rho: T \rightarrow T \) be a function such that:

\[ \forall t_1, t_2 \in T \]
\[ \rho(t_1 \cdot t_2) = \rho(t_1) \cdot \rho(t_2) \land (t_0) = 0. \]  

(16)

and \( \Phi: T \times T \rightarrow T \) be a function such that

\[ \forall t \in T, \forall t \in T, \Phi(t,t) = t + \rho(t) \]  

(17)

The function is a formal statement of the verbal relation between real and task time given above. Let \( t_e \in T e C T \) be the time of the last adaptation. \( t \in T \) is the task time since the last adaptation. The real time equivalent of \( t \) is \( \Phi(t_e, t) = t. \)

5.2 A Formal Representation of an Adaptive Goal Seeking System

With these preliminaries as background, the following is the input-output description of the four aggregates in Figure 5-1:

\[ \text{OE} \subseteq M \times Y \]

(18)

\[ \text{Ol} \subseteq Y \times Y^* \]

(19)

\[ \text{IE} \subseteq Y^* \times M^* \]

(20)

\[ \text{AI} \subseteq M^* \times M \]

(21)

such that:

\[ M = \{m \mid m: T \rightarrow A_1\} \]  

(22)

\[ Y = \{y \mid y: T \rightarrow A_2\} \]  

(23)

\[ M^* = \{m^* \mid m^*: T \rightarrow A_3\} \]  

(24)
\[ Y^* = \{ y^* : y^* \in T, a_4 \} \]  

Because the primary focus is upon adaptive goal seeking capabilities, no additional structure will be given to the OE. As written, it is a cross-product of time functions of controls \( M \) and responses \( Y \).

5.2.1 The Observation Interface

The OI receives the responses of the environment and produces a description of the responses as output. Two characteristics of the OI are important. First, the "actual" and "observed" environmental responses are distinct. The alphabet upon which the actual responses are based, \( A_2 \), is different than the alphabet used by the OI to describe those responses, \( A_3 \). This distinction is not always maintained in some formal theories (Mesarovic, Macko, and Takahara, 1970; Mesarovic and Takahara, 1975).

The second important characteristic is the differing time bases of \( Y \) and \( Y^* \). \( Y \) is defined on the real time set of the OE and \( Y^* \) is defined on the task time set of the IE. The differing time bases are made consistent by the following condition:

\[
\forall t \in T, \forall t_e \in T_e \subseteq T, \forall t \in T, t > t_e, \forall (y, y^*) \in OI \\
((t, a_{2j}), (t, a_{4j})) \in (y, y^*) \Rightarrow y_e(t) = t
\]

This condition ensures the time subscripts of \( Y \) are correctly shifted with the appropriate time subscript. The shift is well defined only when \( t_e \) is known. Without the event time there may be many values for \( y_e(t) \) -- one for each element of \( T_e \).

No additional structure is assumed for OI. The condition does not
specify how $Y$ and $Y^*$ are related. The condition requires that once the
relation between $Y$ and $Y^*$ is given, i.e., $(y,y^*) \in OI$, then $y(t)$ and
$y^*(t)$ have a particular relationship given $t_e$.

5.2.2 The Access Interface

The AI, like the OI, is defined on two different time sets:

$$AI \subset M^* \times M$$ (27)

$M^*$ is defined on IE task time and $M$ is defined on OE real time. The
following condition synchronizes the two objects:

$$\forall t \in T, \forall t_e \in T_e, \forall t \in T, \forall t > t_e, \forall (m^*,m) \in AI,$$

$$(t,a) \in (m^*,m) \leftrightarrow \phi(t_e,t) = t$$ (28)

As in the case of the OI, no additional structure is imposed. Thus the
only restriction on the AI is that the time functions be synchronized.

5.2.3 The Inner Environment

The central concern of this chapter is the structure of the IE. It
represents the decision making component of the foreign policy
bureaucracy and is the locus of adaptive goal seeking capabilities.
This capability involves a modification of the relationship between
goals and behavior. The capacity to modify that relationship will be
represented using a two-level description of the IE. The first or
bottom level is the goal seeker or controller. It receives inputs from
the OI and emits outputs to the AI. The second level, the adaptor,
receives information from the OE and produces a structure for the
controller as output.

Although a two-level representation of adaptive goal seeking is
standard in mathematical systems theory (Miller, 1978; Mesarovic, Macko,
and Takahara, 1970), there is no reason why it must be done in that manner. Both Miller (1978) and Glushkov (1966) argue that a single-level system can exhibit what amounts to adaptive goal seeking capabilities. They note, however, that a single-level representation has disadvantages. By imposing a single-level description, the complexity of the structure increases dramatically. Miller (1978:23) argues that a single-level description of a complex adaptive system is impractical from a design standpoint. The state space of the system would be too large to comprehend.

Glushkov (1966:140) argues that while it is possible, in principle, to specify a single-level description, it becomes impossible to clearly distinguish adaptation from goal seeking. In addition, the ability to conceptually account for dependencies between adaptation and goal seeking is lost when a one-level description is used.

The exposition of the structure of the IE will begin with the goal seeker or controller. Once its structure has been specified, the structure of the adaptor will be examined.

5.2.3.1 The Goal Seeker

The initial structure of the IE is based upon a subset of the cross-product of $Y^*$, a set of time functions of observations, and $M^*$, a set of time functions of chosen controls or behaviors. Both $Y^*$ and $M^*$ are defined upon the task time set $T$.

The initial specification of the IE was given in equation (3) as: $IE \subseteq Y^* \times M^*$. The IE is structured by specifying other sets, relations, and functions which relate the two sets $Y^*$ and $M^*$. This structure
consists of a state estimation function family, a process model or image of the OE, a tolerance function, a set of acceptable controls, and a choice function.

The state estimation function family is a set of functions which estimate the state of the OE. The state space of the OE is assumed to be finite. A function is defined for each time segment in T starting from \( t_0 \), the minimal element in T. The family is used to estimate the current state of the OE using the initial state of the OE, which is specified by the adaptor, and the observed behavior of the OE. This estimated state of the OE is used to evaluate the consequences of alternative courses of action.

\[
I = \{ I_{t_0} t \mid I_{t_0} t : SD \times y^*_t \rightarrow SD, \ t \in T \} 
\]

where \( SD \) is the set of state estimates for the state of the OE. All \( I_{t_0} t \in I \) have the property that:

\[
I_{t_0} t (s_{t_0}, y^*_t) = s_d t
\]

\( s_d t \) is the estimated state of the OE at \( t \), \( s_{t_0} \) is the initial state of the OE, and \( y^*_t \) is the segment of \( y^* \) from 0 up to but not including \( t \).

The estimated state at \( t \) depends only upon the initial state \( s_{t_0} \) and the segment of \( y^* \) before \( t \). This is the property of strong non-anticipation (Mesarovic and Takahara, 1975:33). The implication is that state estimates do not change instantaneously upon the receipt of new information. At \( t \), \( y(t) \) is known, but because of the property of strong non-anticipation, it plays no role in estimating the state of the OE at \( t \).

The process model or causal image of the OE estimates the
consequences of controls given an estimated OE state:

\[ P_t : SD \times A_3 \rightarrow \mathcal{P}(SD) \]  

where SD is the estimated state, \( A_3 \) the control alphabet, and \( \mathcal{P}(SD) \) the power set of SD. For a given estimated state and a control \( P_{te} \) produces a set of possible resulting states. This aspect of \( P_{te} \) reflects uncertainty about the effects of controls. The function does not produce "the" consequence, but rather a set of possible consequences.

As discussed previously, adaptation occurs at points in \( T_e \in T \) and involves a specification of the process model. Thus the process model specification is indexed by the event time at which it was specified, i.e., the point of the last adaptation.

The tolerance function \( TL \) evaluates the consequences produced by the process model:

\[ TL : \mathcal{P}(SD) \rightarrow \{0,1\} \]  

\( TL(sd) = 0 \) if the consequences in \( sd \in \mathcal{P}(SD) \) are not acceptable and \( TL(sd) = 1 \) if the consequences are acceptable. This characterization of a tolerance function is consistent with Simon's (1955) satisficing view of choice. The tolerance function does not rank outcomes but partitions them as acceptable or unacceptable.

Given \( I, P_{te} \), and TL the set of acceptable controls can be defined:

Given \( t \in T \), \( sd_0, y^*_t \), and \( I_{t_0} \) \( t_0 \) \( (sd_0, y^*_t) = sd_t \)

\[ M^* = \{ a_{3_i} \mid TL(P_t (sd_t, a_{3_i})) = 1 \} \]  

\( M^* \) is the set of controls which produce acceptable consequences as
evaluated by TL and P_{te}.

Because the possibility exists that \( M^* \) will contain more than one element, a choice function is required to select a control from \( M^* \) for implementation by the AI:

\[
CH : \Pi(A_3) \rightarrow A_3 \tag{34}
\]

\( CH(M^*) = a_{3i} \) is the chosen control and is implemented by the AI. As stated, the choice depends only upon the alternatives in \( M^* \). This is a very strong and unreasonable assumption. But because the range of possibilities for a specific choice function is so great, it seems better to say nothing about the specific nature of \( CH \) than to arbitrarily impose specific properties at this time. Whatever the specific structure of \( CH \), it must at least depend upon \( M^* \).

This completes the specification of the controller. The controller receives the observations from the OI in the form of elements from \( Y^* \). The outputs set to the AI, \( M^* \), are selected on the basis of the tolerance function and the process model.

5.2.3.2 The Adaptor

The adaptor level of the IE produces a specification of the process model and an initial state estimate for the goal seeker or controller. The adaptor is constructed on a real time base and produces models and initial states at points in \( T_e \subset T \).

The first structure is an adaptor observation interface for observing the performance of the controller:

\[
AOI \quad Y \times \hat{Y}
\]

\[
\hat{Y} = \{\hat{y} | \hat{y} : T \rightarrow A_5\} \tag{35}
\]
Y is the set of time functions describing the behavior of the OE.

Like the controller, the adaptor estimates the state of the OE:

\[ O = \{ O_{t_0} \in 0_{t_0} : D \times \hat{Y}_{t_0} \rightarrow D \} \]  

(36)

where \( D \) is the set of possible estimated states of the OE.

The family of adaptor state estimators also exhibits the property of strong non-anticipation:

\[ O_{t_0} (d_0, \hat{y}_{t_0}) = d_t \]  

(37)

The adaptor function produces model families and initial states for the controller:

\[ \alpha : D \rightarrow P \times SD_0 \]  

(38)

where \( P \) is the set of functions of the form:

\[ P : SD \times A_3 \rightarrow \Pi (SD) \]  

(39)

and \( SD_0 \subseteq SD \) is the set of initial states for \( P \) and \( I \).

The adaptor also has a process model of the performance of the controller given a process model, initial state, and adaptor estimated state of the OE:

\[ \forall t \in T_e, \forall t \in T, t > t_e \]

\[ A \hat{P}_{t_e} : Y_{t_e} \times P \times SD_0 \rightarrow D \]  

\[ A \hat{P}_{t_e} (Y_{t_e}, P_{t_e}, SD_0) = d_i \]  

is the expected OE state which will result from the operation of the controller with process model \( P_{t_e} \) and initial state \( SD_0 \).

A tolerance function, a set of acceptable process model -- initial state pairs, and a choice function complete the specification of the adaptor:

\[ ATL : D \rightarrow \{0, 1\} \]  

(41)

\[ P^* = \{(P_k, SD_j) \mid ATL(A \hat{P}_{t_e} (\hat{Y}_{t_e}, P_k, SD_j)) = 1\} \]  

(42)

\[ ACH : \Pi (P) \times \Pi (SD_0) \rightarrow P \times SD_0 \]  

(43)
The following condition applies to the operation of the adaptor $\alpha$:

$$\forall t \in T, \forall t \in T, t > t_e,$$

$$\gamma(d_t) = (P_1, sd_m) \ni P^* \text{ such that}$$

$$P^* = \{(P_{k'}, sd_j) : ATL(A_{t_e} (\hat{y}_{t_e} t, P_k', sd_j)) = 1\} \&$$

$$\alpha(P_1, sd_m) = ACP(P^*)$$ (44)

The adaptor observes the OE performance, and when that performance is not acceptable, constructs a set of acceptable specifications for the controller, and chooses one of them for implementation.

5.2.3.3 Summary

The goal seeking -- adaptor composition provides an IE with the following properties:

- The goal seeker receives information about the OE from the OI.
- The goal seeker uses that information to estimate the state of the OE.
- Based upon the estimated state and a process model or image of the OE, the goal seeker selects its behavior subject to the constraint that behavior produce acceptable outcomes.
- The adaptor observes the performance of the goal seeker. When the performance is unacceptable, the adaptor generates a new process model and a new initial state estimate of the OE.

These properties of and dependencies within the structure are illustrated in the following example.

For the purposes of illustration, assume $t_n$ is the current real time, $t_m$ is the current task time, and $e_k$ is the current event time, with $t_n > e_k$.

At $t_m$ the controller has received the segment $y^*_m$ from the OI. The estimated state of the OE is

$$sd_{t_m} = I_{t_m} (sd_{t_0}, y^*_{t_m}).$$ (45)
Assume
\[ M^* = \{ a_{31}, a_{3j} \} \] (46)
and satisfies the condition that
\[ \forall a_{3m} \in M^*, TL(P_{ek}, t_m, a_{3m}) = 1. \] (47)
Let \( CH(M^*) = a_{3j} \) be the chosen control passed to the AI.

The AI implements \( a_{3j} \) which results in \( m(t_n) = a_{1k} \), i.e.,
\[ ((t_m, a_{3j}), (t_n, a_{1k})) \in AI. \] (48)

This process continues until the adaptor specifies a new process model and initial state. The adaptor operates on a continuous basis, observing the environment and evaluating performance. When the adaptor enters those d-states which result in a new specification of the controller, task time is set to the minimal element \( t_0 \), and \( e_k \) is changed to \( e_{k+1} \) or the current real time point at which the changed occurred, say \( t_p \). These time changes are all subject to the condition that
\[ \phi(e_{k+1}, t_0) = t_p. \] (49)

Assume the current real time is \( t_p \) and that \( t_n \) is the current task time. What follows is a description of the operation of the adaptor.

The OE produces \( y(t_p) \) and the adaptor observation interface produces \( \hat{y}_{ek_{t_p}} \), the segment of adaptor inputs since the last adaptation.

\[ O_{ek_{t_p}}(d_0, \hat{y}_{ek_{t_p}}) = d_{t_p} \] (50)
is the description of the behavior of the OE and the performance of the controller since the last adaptation.

Assume \( d_{t_p} \) is a d-state which results in an adaptation. The adaptor function \( \alpha(d_{t_p}) \) equals a process model and initial state pair \( (P_{e_m}, sd_0) \) where \( e_m = t_p \). is subject to the condition that
\[ P^* = \{ (P_k, sd_j) \mid AT(A_P (\hat{v}_e, sd_j)) = 1 \} \] (51)

and that
\[ ACH(P^*) = (P_{e_m}, sd_0). \] (52)

The controller now has a new process model and initial state and emits controls based upon the new specification from \( t_0 \).

In interpreting this structure, it is important to keep the following in mind: The structure is independent of the specific implementation of the process of adaptive goal seeking. Regardless of how governments produce behavior, whether through a satisficing or optimizing process, regardless of the structure of the representation of governments, whether unitary or as a collection of individuals, the behavior of governments must be consistent with the structure. In other words, the behavior of governments must be describable in terms of these sets, functions, and relations if they are members of the class of adaptive goal seeking systems.

5.3 The Six Conditions for Adaptive Goal Seeking

The analysis in Chapters 2 and 3 produced six conditions which must be asserted of any system of which adaptive goal seeking is predicated. If the abstract structure of the previous section has adaptive goal seeking capabilities then the six conditions must have an interpretation in terms of that structure. The six conditions were:

1. S must be able to exhibit at least two internal states corresponding to two distinct states of affairs.

2. There must be at least two internal states of S corresponding at least to S being in G-attaining states of affairs and S being in not-G-attaining states of affairs.
3. The behavior exhibited by S must depend upon at least the internal state of S corresponding to S being in G-attaining states of affairs or not-G-attaining states of affairs.

4. S must not be such that for all internal states S exhibits only one behavior.

5. S can at least modify the relationship between the behavior exhibited by S and S being in G-states of affairs or not-G states of affairs.

6. There is at least a relationship between S exercising the capabilities in 5 and S being in G or not-G states of affairs.

The first condition requires the IE to distinguish at least two states of affairs. This condition is satisfied if the set of state estimates SD has at least two elements. The goal seeker uses SD as the state space for the OE. The process model and the state estimate are used to project the consequences of actions by the IE in the OE.

The second condition requires the IE to be able to partition states of affairs into goal and non-goal attaining states of affairs. The tolerance function TL meets this requirement. For any $s_{d_i} \in SD$, $TL(s_{d_i}) = 1$ if $s_{d_i}$ is an acceptable or goal attaining state and $TL(s_{d_i}) = 0$ if $s_{d_i}$ is an unacceptable or non-goal attaining state. In order to fully meet the condition, however, the following must be true:

$$\exists s_{d_i} \in SD \text{ such that } TL(s_{d_i}) = 1 \land \exists s_{d_j} \in SD \text{ such that } TL(s_{d_j}) = 0.$$

In other words, at least one situation must be acceptable and at least one situation must be unacceptable.

Condition three requires that the behavior of the IE be sensitive to whether the current situation is goal-attaining. Unlike the other conditions, this condition does not have a direct interpretation given the structure imposed on the IE. The behavior of the goal seeker does
not directly depend upon whether the current situation is goal attaining. The output of the IE at a given point is the value of the choice function \( \text{CH} \). The argument to \( \text{CH} \) is the set of controls which are expected to produce acceptable situations given the current situation. This relationship may be put more formally as:

\[
\forall (y^*, m^*) \in \text{IE}, \forall t \in T, m^*_j(t) = a^+_j \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ (54)
\]

\[
\text{TL}(P_{t_0}(s_{d_0}, y^*, a_3), t_0) = 1
\]

where \( s_{d_0} \) is the initial state estimate and \( e \) is the event time.

In other words, if a behavior is exhibited by the IE then it will, according to TL and P, produce an acceptable outcome. There is, of course, no guarantee the outcomes will in fact be acceptable. In order to support a direct interpretation of the condition the sets and functions must be substantively interpreted.

The fourth condition requires that the system exhibit more than one output. Nothing in the structure precludes that condition from being met. As with condition three, a specific interpretation is required. However, regardless of the interpretation \( A_3 \) (the control alphabet) must contain at least two elements.

The fifth condition requires that the adaptor have the capacity to modify the relationship between goals and behavior. The specification of the process model and initial state for the goal seeker by the adaptor meets this requirement.

The sixth condition requires that the specification of the initial state estimate and process model be related to goal achievement. This
requirement is met by the condition that the adaptor respecifies the process model and initial state estimates when the performance of the goal seeker is unsatisfactory.

Under a suitable interpretation the mathematical structure satisfies the six conditions for adaptive goal seeking. A "suitable interpretation" of the structure is one which is not perverse in the sense that the sets contain more than one element, e.g., SD, A_3, D, and the functions are not constant, e.g., I, P, TL, CH, AOI, AP, ATL, and ACH. Thus the structure supports the predicate "adaptive goal seeking".

5.4 Summary

Strictly speaking, the mathematical structure is not a representation of a government, but of an adaptive goal seeking system. Chapter 4 did make the argument that governments have adaptive goal seeking capabilities. Thus the structure should apply to governments even though it is not about governments per se. More to the point, because governments have adaptive goal seeking capabilities, the structure serves as a foundation for the theory of the adaptive goal seeking capabilities of governments. How the structure can be used to that end and the more general issue of extensions, elaborations, and applications of the approach are the subject of the sixth and concluding Chapter.
6. CONCLUSION: SUMMING UP

This dissertation is an exploration of the implications of an answer to the question: What do we need to know to explain the foreign policy behavior of governments? The answer is a posture with respect to explanation: To explain the foreign policy behavior of governments we need to know the capabilities of the mechanism which generates foreign policy behavior. This concluding chapter returns to this motivating answer to assess the results of the inquiry and to examine the implications of the posture.

6.1 Summing Up: What Was Accomplished?

6.1.1 Chapter 1

The review of theories of organizational decision making in Chapter 1 identified two attributes of an acceptable theory: acceptable theories represent organizations as integrated non-optimizing decision processes. This proposition was supported by the criticisms of theories which represent choice as an optimization problem or that provide a non-integrated representation of the organization.

Optimizing theories view choice as an optimization process. Theories of this type assume coherent preferences, perfect information, exhaustive alternative search, and optimal choice procedures. But the evidence suggests that preferences may be inconsistent and unknown prior
to choice, information may be incomplete or incorrect, alternatives must be discovered, and the choice process is, at best, a task of selecting an acceptable rather than optimal alternative. The result was two broad criticisms of optimizing theories of the organization. They are inconsistent with the known limits on the capacities of organizations; and they distort the task facing the organization. The force of both criticisms is that optimizing theories of organizational choice are highly implausible representations of the process.

Non-integrated theories of organizational decision making are not really theories of organizations at all. They do not provide an account of the organized choice process that is characteristic of organizations. Non-integrated theories stop with a representation of individual choice in an organizational setting; they do not aggregate those individual actions to provide an account of organizational action.

The advantages of non-optimizing integrated theories of organizations are that they are plausible representations of organizational decision making given what we know about the capabilities of humans and the task faced by the organization, and they represent the organization as an organization. They are capable of accounting for organized action, not just the behaviors of individuals in an organization.

6.1.2 Chapter 2

The philosophical analysis of goal seeking in Chapter 2 accomplished three major tasks. It provided a coherent philosophical
interpretation of "goal seeking", it dissolved the methodological problem of attributing goals to collectives, and it illuminated the central role of theories of decision making in attributing goals to organizations.

One of the central problems in the use of teleological concepts is their problematic philosophical foundation. There is marked disagreement in the philosophy of science over what it means to predicate goal seeking. The existing philosophical accounts fall to a number of counter-examples -- situations which would be judged to be instances of goal seeking, but are denied that status by the account, or situations which would not be considered instances of goal seeking, but are considered to be such under the account.

The philosophical accounts often require behavior to be appropriate or necessary for the achievement of the goal. That requirement fails in the face of common experience. Behavior may be inappropriate for the achievement of a goal, but nonetheless be directed toward that goal. People make mistakes, and they have incorrect beliefs about the world, but those mistakes ought not imply that behavior based upon them is not goal directed.

The account of goal seeking proposed in the chapter had two properties. The attribution of goal directedness was independent of the appropriateness of the behavior for achieving the goal, and the account was non-mentalistic in that it did not require the presence of a mind in order to support the application of the predicate. Furthermore, the account provided four conditions which any goal seeking system must
satisfy. Those conditions serve to limit the application of the predicate to those systems with goal seeking capabilities.

The methodological prohibition against the attribution of goal seeking to collectives vanishes with a non-mentalistic account of goal seeking. The prohibition was based upon the assumption that a mind was required for goal seeking. But because the account was not based upon the presumption of a mind, it only presumes the satisfaction of the four conditions, the problem of attributing goal seeking capabilities to collectives is no longer a problem.

The third accomplishment of the analysis was to identify the central role of theories of decision making in identifying the goals of organizations and governments. The goals of a government cannot, in general, be directly determined from behavior because a given behavior can be directed toward any number of different goals.

It is, however, possible to determine the goals of a government with the knowledge provided by a theory of governmental decision making. The traditional approach is to assume the organization to be an optimizing actor. Under those circumstances, one only needs to know the structure of the environment to identify goals from behavior. The analyst simply asks himself what strategy could be behind a particular course of action given the structure of the environment.

With the growing criticism of the optimizing view of governmental action, a common conclusion was that it was no longer possible to identify the goals toward which governmental behavior was directed. But that conclusion is founded upon the belief that nothing other than
optimizing unitary actors can be goal seeking. If non-optimizing non-unitary actors can be goal seeking, then goals can be identified. But a more plausible theory of decision making must be substituted for the optimizing ideal. It is no longer possible for the analyst to assume the government has perfect knowledge of its environment or that organizational choice is based upon an exhaustive search of the possible alternatives.

With the substitution, other types of information become relevant. The objective situation is no longer of interest. The question is how the government interprets its environment. Exhaustive search can no longer be assumed. The question is the organizational and bureaucratic influences on alternative search. Complete information of the effects of actions cannot be assumed. The question is the nature of the relevant beliefs about the dynamics of the environment assumed by the government. Choice cannot be assumed to be a process of selecting the optimal alternative. The question is the influences which effect the selection of alternatives by the organization.

The philosophical analysis of goal seeking provides a consistent interpretation of the goal seeking predicate. It eliminates any in principle objections to the predication of goal seeking to collectives. And it highlights the central role of theories of decision making in identifying the goals pursued by the organization.

6.1.3 Chapter 3

The analysis of adaptation in Chapter 3 accomplished three tasks.
It identified the fundamental character of the capability sense of adaptation. It sorted the various interpretations of the term and identified a conception of adaptation that did not depend upon a biological metaphor. The analysis provided an interpretation of adaptation that was a natural extension of the analysis of goal seeking in Chapter 2.

Adaptation is used in two very distinct ways. There is a capability sense of adaptation in which the distinction is between systems which have a capacity for adaptive changes and those which do not. The other sense of adaptation is a performance or evaluative sense of the term. In this use of adaptation, the central distinction is between those systems which are successful, those which exhibit adaptive behavior, and those which are unsuccessful, those which exhibit maladaptive behavior. The capability sense of adaptation is the fundamental sense: a system which does not have a capacity for adaptive behavior cannot be maladaptive. Thus the primary issue is whether a system has adaptive capabilities. Only after that question has been answered positively is it possible to evaluate the performance of the system using the adaptive -- maladaptive concepts.

Adaptation has been used in ways which would suggest it is either a process of coping, another term for goal seeking, a process involving structural change, or a process of learning from experience. While the four senses share certain attributes, they differ with respect to the nature of the adaptive process. Given the fundamental nature of the capability sense of adaptation, the central core is adaptation as a
change in the generative mechanism which underlies the behavior of the adaptive system. With this non-biological interpretation of adaptation the most plausible interpretation of adaptation is either structural change motivated by performance, or learning from experience. Coping may be the product of an adaptive system, but not all coping is necessarily the product of adaptation. Goal seeking, under the analysis in Chapter 2, does not involve a change in the underlying mechanism, and thus is not an instance of adaptation.

The non-biological basis of this characterization is important. With the biological metaphor as a basis applications of the term to non-biological phenomena require an interpretation of genes, heridity, and natural selection. The interpretation of adaptation proposed in the course of the analysis is consistent with the biological usage, illuminates the essential nature of the biological use of the term, but does not require the use of a biological metaphor.

The final accomplishment was the explication of the concept adaptive goal seeking. The compound predicate adaptive goal seeking describes a system which is responsive to its environment in ways which go beyond the responsiveness of simple goal seeking. Systems with adaptive goal seeing capabilities can exhibit short-term responses to the environment as well as long-term changes in the relationship between the system and its environment.

6.1.4 Chapter 4

Chapter 4 consists of a defense of three propositions:
1. The theory of Cyert and March is descriptive of the foreign policy process in bureaucratic governments.

2. Governments, under the theory of Cyert and March, have goal seeking capabilities.

3. Governments, under the theory of Cyert and March, have adaptive capabilities.

Three major concepts form the basis of the theory of Cyert and March: organizational goals, organizational expectations, and organizational choice. Organizational goals are viewed as independent constraints and are determined through a bargaining process. They are not well defined coherent preference orderings over outcomes, but are a loose collection of independent criteria which may be imperfectly rationalized. Organizational expectations are based upon simple images of causality, and the organization uses various devices and strategies to decrease uncertainty about the environment. Organizational choice is problem-motivated in that decisions are reactions to recognized problems and not simply attempts to better an already acceptable situation.

The evidence examined suggests that bureaucratic governments exhibit these characteristics. It appears that if the foreign policy process of bureaucratic governments were described exclusively in terms of the concepts developed by Cyert and March the essential character of the process would be faithfully represented.

Given the description of the foreign policy process provided by Cyert and March, it is possible to ask whether the process has a capacity for adaptive goal seeking. The six conditions necessary for the predication of adaptive goal seeking are satisfied by the description of
the process provided by Cyert and March. The examination of cases supports the assertion that governments do in fact exhibit adaptive goal seeking behavior.

6.1.5 Chapter 5

Chapter 5 builds upon the positive results of Chapter 4 and consists of an abstract description of a system with adaptive goal seeking capabilities that is consistent with the major propositions of the theory of Cyert and March. The structure not only serves as an abstract description of the structure of the process, it also identifies the central characteristics and relations which must be accounted for in any adequate characterization of the process. Moreover, the structure serves as a skeletal model which when given an interpretation can serve as the basis for a formal theory of the foreign policy process in bureaucratic governments.

6.2 Summing Up: What it Means

The first five chapters can be described as a theoretical inquiry into the capabilities of governments. They can also be described as a particular sort of theoretical inquiry about governments -- an inquiry motivated by the view that explanation involves illuminating the underlying generative mechanism. On this later view, the dissertation contains theoretical arguments about governments as well as being an implicit argument about priorities and approaches to understanding the foreign policy behavior of governments. The previous section recounted the arguments in the dissertation. This section will address the
Discussions of methodological issues often depend upon appeal to philosophical authority to delineate sense from nonsense and science from non-science. But this appeal to authority runs the risk of imposing a dogmatic point of view which distorts our perception of what it is we are trying to do.

If the philosophy of science is of any interest to the working scientist, it is because it illuminates the grounding of his scientific activity. But the tendency has been to use the philosophical doctrines to direct scientific activity rather than illuminate it. Toulmin (1972: 150) makes the point nicely:

The quality of a scientist's judgement is shown less in his commitment to a general "method" than in his sensitivity to differences in the requirements of his problem.

What are the requirements of the problem? First, what is the problem? Whatever else may be true, one central problem is to understand the behavior of governments. But what does it mean to understand the behavior of governments? For some, understanding requires causal laws; for others, it involves theories; and for others, it involves describing the world. Though lacking in elegance and subtly, the simple questions: Why does it do that? How does it work? How can it do that? provide an exemplar. Why do governments do what they do? How do governments work? How can governments do what they do? Answering these questions is the fundamental problem.¹

¹There are, of course, many different ways of characterizing the problem. The point here is not that this is the only or best rendition. The characterization of the problem is not implausible, and is, I suspect, widely shared.
Each of these questions is asking something about an underlying mechanism: What is its structure? How does it work? What are its capabilities? There is a correspondence between the generative view of explanation and this characterization of the problem. And this correspondence makes the generative explanation posture appropriate for the problem of understanding the behavior of governments.¹

A consequence of adopting this generative posture on explanation is the importance of asking the theoretical question: What is the mechanism and what are its capabilities? Identifying the mechanism is a central task, for it is the basis for explanation. The capabilities of the mechanism are important for they account for its performance. These are the questions the first five chapters attempts to answer.

Given this position on explanation, two questions arise:

1. What is a generative mechanism?
2. From where do generative mechanisms come?

Taking the position that explanation is based upon identifying a generative mechanism is not to advocate a "mechanistic" point of view. A generative mechanism is simply the mechanism or process which

¹The works of Allison (1971), Steinbruner (1974), Deutsch (1966), and Rosenau (1970) can be seen as attempting to explicate the underlying generative mechanism.
generates phenomena. ¹

As to the source of these mechanisms, Harre (1972: 172) has the following to say:

When we do not know what are the mechanisms underlying the process we are studying, then we must imagine them, and they must be plausible, reasonable, and possible mechanisms. To achieve this we proceed by the method of analogy, supposing that they are like something which we already know a great deal, and upon the basis of our knowledge of which we can imagine similar mechanisms at work behind the phenomena we are investigating.

The ultimate source of the mechanisms is our imagination. But the product of our imagination must be "plausible, reasonable, and possible". This means our imagined mechanisms must be consistent with our knowledge of the phenomenon. The optimizing theories of governmental decision making were criticized because they were not "plausible, reasonable, and possible" given what is known about governmental decision making.

The larger methodological implications of the dissertation follow from the generative posture on explanation. Explanation involves an underlying generative process. Explaining the behavior of governments is based upon our hypotheses about the structure and capabilities of the underlying causal process.

6.3 Summing Up: The Research Agenda

The close relation between theories of foreign policy decision making and the generative mechanism underlying foreign policy behavior

¹If anything, the controversial aspect of Harre's (1970) notion of generative explanation is his ringing denial of Humean causality. For Harre, it is the capabilities and powers of the mechanism which are causes.
has the important implication that differences in the decision making process result in differences in the explanations of foreign policy behavior. For example, one would expect explanations of the foreign policy behavior of non-bureaucratic governments, Uganda under Amin or Saudi Arabia, would differ dramatically from explanations of the foreign policy behavior of bureaucratic governments. The personal characteristics of the leader would probably predominate in non-bureaucratic governments and be less important in bureaucratic governments. The reason the dissertation focused upon bureaucratic governments is that it is these types of governments which the theory of Cyert and March describes.

The sorts of differences in decision style which make a difference is an important theoretical question. It is fundamentally a problem of determining which differences can be ignored. This problem is a variation on the problem of the uniqueness of events. If every event is unique, then it is impossible to make general statements about them. What is the same and what counts as different is an issue of specifying a set of criteria for "sameness". Implicitly, the theorist creates a set of events, entities, or time periods which do not differ on some critical attribute. The elements of this set, an equivalence class, are treated as "the same" for the purposes of the analysis. The criteria for constructing these equivalence classes are based upon background knowledge, theories, intuition, and trial and error.

Regardless of how the equivalence classes are constructed, the assumption is that the explanations for elements of the class will be
distinguishably different from explanations for elements outside the class. That is the justification for distinguishing bureaucratic from non-bureaucratic governments. The expectation is that the generative mechanisms underlying the foreign policy behavior of bureaucratic governments will be distinguishably different from the generative mechanisms underlying the foreign policy behavior of non-bureaucratic governments.

Given this distinction between bureaucratic and non-bureaucratic governments, an important research question is: What is the generative mechanism underlying the foreign policy behavior of non-bureaucratic governments? Given the diversity among non-bureaucratic governments, it may be unreasonable to suppose they can be characterized as an equivalence class. That determination rests upon identifying the structure and process of the mechanisms.

Four important research questions follow from the examination of bureaucratic governments. The theory of Cyert and March has been defended as descriptive of the foreign policy process in bureaucratic governments. But the theory is, in many ways, only a basic outline or sketch. The concepts identified give a rough account of governmental decision making. But the task of explaining foreign policy behavior requires a more careful explication of the mechanism. What is the structure of foreign policy goals? How does the goal setting bargaining process produce agreement on goals? What is the structure of expectations? How are alternatives identified and evaluated? How do all these come together to generate organizational action?
Moreover, there is the question of the extent to which bureaucratic governments differ. Does Cyert and March adequately characterize all bureaucratic governments, or only a subset?

A second important research question is concerned less with description, although it has important theoretical consequences: How stable is the mechanism? Both Art (1973) and Hermann (1978) have argued that the foreign policy policy process is not invariant. Under some circumstances, particularly crises, small groups direct organizational action. Under "normal" circumstances, the various parts of the bureaucracy act with relative autonomy. A wholly adequate theory of the foreign process must account for these differences. It is more than an issue of identifying the circumstances under which the process changes. The central issue is the structure of the process -- the description of the mechanism which includes both types of decision making.

A third issue concerns the capacity for adaptive goal seeking. Adaptive goal seeking is a capacity to learn from experience. This learning can take many forms. It can involve changing organizational expectations. This is the most obvious interpretation of learning. But experience can motivate changes in the search process, organizational structure, and the decision process. How the experience of the organization is interpreted will determine the resulting modifications to the organization. As was argued in Chapter 4, the interpretation of experience is not a straightforward process. The complexity of the foreign policy environment makes a simple cybernetic learning model implausible. The environment does not respond with clearly articulated
rewards and punishments. The relation between action and outcome, between cause and effect, is ambiguous. But lessons are learned regardless of the ambiguity. The central question is how the organization responds in the face of ambiguity and uncertainty.

The fourth research implication has to do with the general relationship between capacity and performance. Whatever else might be true of the enterprise, understanding and explaining performance is the primary task. Capabilities are of interest because they are important in explaining performance. But how do capabilities affect performance?

Decision making and information processing capabilities affect performance by placing constraints on the ability to perform some tasks and by making the performance of other tasks possible. Thus the limits on the ability of the organization to identify alternatives, to use information, and to examine consequences all constrain organizational choice. A capacity to use experience and information to modify the decision process allows a responsiveness to environmental changes. The issue is how the information processing capacities -- the limits and possibilities -- influence governmental performance. That governments have adaptive goal seeking capacities is not the end to the investigation of the capacities of governments. The limits on how governments use information and experience will determine how and under what conditions they make changes in the process of organizational choice.

Information processing and decision making capabilities are not the only influences of capabilities on the foreign policy behavior of
governments. Capabilities for action also influence the behavior of governments. A common theme in the bureaucratic politics literature is that the capacity of the organization to perform various actions, what Simon (1976) terms the organizational repertoire, will constrain the possible courses of action open to the organization. How those capacities influence organizational action is an important research question.

There is also a sense in which the options open to the organization are influenced by the external environment. The United States is involved in negotiating an end to the Middle East conflict because of the status and role of the United States government in the international system. It would be surprising to find the governments of Monaco or Albaina involved in the negotiations because of their position, role, and status. There is a sense in which the environment sets the possibilities for action. The possibilities for action might very well differ for large and small governments, for third world and western governments, for governments of developed and developing countries, for oil producing and oil importing governments, and for rich governments and poor governments. How the possibilities for action are influenced by the role, status, and attributes of the government is important in determining the foreign policy initiatives undertaken by the government.

The research agenda which flows from the dissertation is extremely broad and varied. But they all stem from the same fundamental question: What is the structure and what are the capabilities of the mechanism which generates foreign policy behavior?
6.4 Summary

This dissertation began with an answer to the question: What do we need to know about governments to explain their foreign policy behavior. The answer was: We need to know the capacities of the mechanism which generates foreign policy behavior. The dissertation is an exploration of the implications of that answer. The exploration of these implications is a step in identifying the generative mechanism which underlies the performance of governments. The dissertation justifies the assertion that bureaucratic governments have adaptive goal seeking capabilities. The task ahead is to discover other capabilities of governments and to use those bits of knowledge about governments to explain their behavior.
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