The Design of Alternatives in Organizational Contexts: A Pilot Study

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A review of decision research suggests that the design stage is a neglected aspect of the decision-making process. This study develops a conceptual model for analyzing the design of alternatives in organizations, and applies it in three case studies. The model has two basic dimensions which may affect the range and quality of options generated in the design process. One is the mix and type of creativity and search; the other is the degree and type of closure to other phases of decision making. Comparative analysis of the cases offers qualified support for the hypotheses, and clear evidence that the impact of alternatives design on decision outcomes warrants greater attention to this stage of the decision-making process.•

Individuals, groups, or organizations make rational decisions in a sequence of stages. The first stage is the perception of a need for a decision — the sense of a problem and the definition of a shortfall from a desired state. The identification of such a desired state may involve a process of goal articulation. The problem-solving process then begins with the development of alternatives, continues with their evaluation, and, through the application of decision criteria related to the individual's or organization's goals, ends with the choice and implementation of the preferred action.[1]

The stages of problem perception and goal articulation have been studied extensively and are described in a wide literature ranging through cognitive psychology, sociology, and organization theory. Normatively, these stages are covered in the organizational development literature and analytic decision theory. The process of evaluation, acceptance, and implementation or diffusion of solutions is also described in studies dealing with organizational innovation, and a range of evaluation techniques and applications have been developed in economics, decision theory, operations research, and management.

When it comes to developing the alternative solutions which are to be evaluated, we discover a surprising gap. Nearly fifteen years ago Feldman and Kanter (1965: 620) noted:

> Most research on decision making has ignored the problems involved in generating alternatives. The major interest has been on procedures for selecting the best alternative from all those presented (on the assumption that all alternatives have been presented).

Up to the present, even extensive descriptions of the decision process take this stage for granted, and pass over it in a sentence or two (Marschak, 1968: 42–43; Mack, 1971: 17, 119; Wendt, 1970; Zaltman, Duncan, and Holbeck, 1973: 4).

How are alternatives identified? This stage of the decision process is actually a form of design, in the sense used by Simon: "Everyone designs who devises courses of action aimed at changing existing situations into preferred ones" (1969: 55). How does the design process take place in organizational contexts, and how does it affect decisions and their outcomes?

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See, among others, Bross (1953: 18–23); Simon (1960: 1–4); Dyckman (1961); Quade (1967: 1–16); Mack (1971: 71, 175–249); Zaltman, Duncan, and Holbeck (1973: 53–58).

The answers to these questions are linked to some normative issues which are important for effective planning and management (Dror, 1971: 55). If planners, administrators, and managers are being equipped today with tools and techniques for articulating goals and evaluating projects and programs, how should they develop those alternative solutions which they are to evaluate, and choose one for implementation? Are there any normative techniques for systematically designing alternative solutions in a given situation? If there are, how appropriate are they in the light of actual behavior and perceived constraints in real environments?[2] How crucial these questions are is clear when we realize that the best evaluation techniques can only be applied to those alternatives which are given. Therefore, the quality of the options which are developed for evaluation is a necessary — though not a sufficient — condition for a good decision.

THE GENESIS OF ALTERNATIVES — THEORY

A review of models and descriptions of the alternatives-design process suggests two main dimensions of analysis — one relating to the nature of the process and the other to its form. The first dimension raises the question of whether alternatives are created or found. The second one addresses the degree of closure of the design phase. Both issues have important normative implications.

Search or Creation?

The question of how alternatives are generated has a bearing on the adoption of normative methods. Should they enhance creativity like "brainstorming," though this possibility has been called into doubt philosophically (Hausman, 1975) and its utility questioned empirically (Taylor, Berry, and Black, 1958)? Or should the emphasis be on developing techniques for systematic search and reducing complexity? Some possible answers are offered by sources in a number of different disciplines which include studies dealing with the decision process and problem solving by individuals, groups, and organizations. For the individual, Marr (1973: 60–92) reviews numerous studies in the area of cognitive psychology which explore the effect of creativity on problem solving abilities.

Another approach, best typified by Newell and Simon (1972), sees problem solving as a search process with the problem solver involved in a complex information-processing task, which can only be mastered with the aid of simplifying heuristics. Simon (1957, 1960) has extended his findings on the problem-solving process from individuals to organizations. He described a limited search for alternatives which stops when an option is found which meets a minimal aspiration level — an approach which he has called "satisficing."

On the organizational level, the question of how alternatives are developed has also been addressed. One group of decision theorists headed by Lindblom (1959: 59–88; 1967) sees the development of alternatives as an incremental modification of preceding and existing options — again a limited search process (Braybrooke and Lindblom, 1963). Cyert and March identified what they called "problemistic

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The importance of relating descriptive and normative answers to these questions becomes apparent if we recall the debate — beginning in the mid-1950s and still current — between proponents of the "rational" planning and decision approach, and the proponents of "satisficing" and "incrementalism." The former began with an abstract view and tried to mold reality to its precepts — with limited success. The latter proceeded from a positivistic approach, and remained content to accept a limited reality as the only possible norm. An earlier integration of the positive and the normative views could have avoided this sterile dichotomy.

search." Here organizations' scanning and perceptions of available options are motivated by the views of the problem prevailing in the organization, biased by the specialized orientations of participants, and guided by their hopes and expectations from the organizational environment. Search is heuristic, following simple intuitive rules (Cyert and March, 1963: 44–66, 79, 120–122). The existence of a "programmed" search for alternatives in organizations with a need for routinized solutions to recurring problems has also been suggested (March and Simon, 1958; Simon, 1960); a reverse search process, too, of solutions looking for problems, may be taking place (Cohen, March, and Olson, 1972: 1–25).

Finally, the descriptive approach to the development of alternatives includes some of the studies of organizational innovation, which are fully reviewed in Zaltman, Duncan, and Holbeck (1973). Here again, one is left with a sense that the solutions to problems are already there, and that the problem-solving process is a search ending in the discovery of a feasible — this time innovative, rather than precedented — alternative. This literature concentrates on the factors in organizations and their environments which affect the development of innovations, and on analysis of all the stages of the innovation process. The stage at which alternatives are generated is dealt with only in passing.

Among these sources we may distinguish between two views of the alternatives-generation process. The first sees the development of alternatives as a process of search and discovery: the solution to the problem is *there,* and it only needs to be identified by processing the relevant information or by discovering and perhaps recombining its preexisting constituent parts. This approach fills most of the descriptive and some of the normative organizational literature, and is shared by some studies in creativity in cognitive (especially associational) psychology.

The second view sees the development of alternatives as a process of design or creation to a significant extent *ex nihilo;* solutions do not preexist but have to be generated by conceiving, designing, or creating new ideas, processes, or products. Some of the creativity literature implies this view, especially that which is gestalt-oriented (Wertheimer, 1945), while other accounts of creativity tend more to emphasize its associational aspects (Koestler, 1964).

But there is no reason why these views have to be mutually exclusive. The creative process appears to be a blend of invention and discovery (or adoption), the proportions of which might vary with the characteristics of the problem and the decision environment. The associational approach to creativity offers such a link between insight and search (Rothenburg and Hausman, 1976: 149–153, 161–165), a blend also implied in some of design methods which involve complexity-reducing processes which are also a method of systematic search through a problem space (Alexander, 1964; Jones, 1970). The nature of this blend should be of interest, however, since an association between creativity and innovation is often inferred (Crosby, 1968), and there seems to be some relation between the directions of search and the quality of decisions (Marquis, 1969).

To facilitate analysis of the mix between creativity and search in designing alternatives, we might envisage them as two dimensions of a multidimensional process. An effective creative process would combine high levels of both creativity and search, where the latter might range from formal systematic search, through informal or heuristic search, down to passive search based mainly on participants' memories and experience.[3]

Freedom or Constraint?

The degree to which the design of alternatives is inhibited also affects the quality of outcomes. The "rational" model demands an exhaustive development of options (Schoeffler, 1954), a requirement which clearly cannot be met (Simon, 1957). Indeed, some limits are indispensable: Simon (1964) identifies these as constraints on the generation of alternatives, which enable the synthesis of viable solutions, and "alternatives' testing," ensuring that the options to be evaluated are feasible.

Perceived limits of knowledge, time, and resources may constrain alternatives design, tending to elicit a narrow range of options differing only marginally from known precedents (Lindblom, 1967). The exercise of power may be another type of constraint, limiting the range of options by setting the decision agenda (Bachrach and Baratz, 1962). Constraining the development of alternatives may be a prevalent and effective form of "non-decision" making: this may become manifest in covert conflict, or even in the maintenance of a consensus which makes certain options "unthinkable" (Lukes, 1974: 21–24). Such a consensus may not only be the product of preconditioning, but also the result of manipulation of information as a power resource (Pettigrew, 1973: 233–240, 275).

Another source of constraints on the design of alternatives is the relation between the design phase and the adjacent stages of the decision-making process: problem definition and evaluation. The rational decision-making model envisages a distinct phase of the alternatives' development, intimately related to preceding problem or goal definition, and clearly separated from a succeeding stage of formal evaluation and selection. The degree of interaction across these interfaces will here be called closure: high closure suggests limited or no interaction while low closure implies intensive interaction and feedback.

Prescriptive theory suggests that the greatest openness for the uninhibited design of alternatives is offered by the "rational" approach, where goal or problem definition interacts with design but judgment is deferred. We may hypothesize, therefore, that as types and degrees of closure diverge from this ideal, the design of an optimal alternative and the rational evaluation of options will be preempted by perceptual or political factors. But the implications of different types and degrees of closure must be addressed separately on the interface between design and goal-problem articulation and on the interface between design and evaluation because closure has opposite normative implications for each.

Low closure between design and problem identification or goal setting has positive associations, permitting the fruitful

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Mintzberg, Raisinghani, and Theoret (1967: 255) suggest a roughly analogous division: "memory search," "passive search," "trap search," and "active search."

interaction between ends and means. Some closure is necessary to establish a framework for the synthesis of options, but too much closure, such as rigidly predetermined goals or a problem diagnosis locked in by organizational or disciplinary predilections, may inhibit the emergence of potentially optimal alternatives.

Available evidence suggests that there is a good deal of closure between design and problem definition. One source of such closure may be when problems are defined in one institution and plans or policies are made in another (Rittel, 1967: 1/18). Perceptual filters (Rittel and Webber, 1973) threaten another type of closure. Often theoretical paradigms or institutional ideologies define a problem in such a way as to predetermine the type and range of options that will be considered (Warren, 1971). Disciplinary biases and even personal propensities may preempt an investigator's or decision maker's vision, even in such ostensibly objective areas as the physical sciences (Mitroff, 1974).

On the design-evaluation interface, on the other hand, high closure is associated with suspension of judgment, which is good. Low closure implies a premature leakage of evaluation into the design phase, preempting or eliminating possibly valuable options.[4] But interaction, rather than closure, between design and evaluation has been noted in one of the few systematic empirical analyses we have of complex decision processes (Mintzberg, Raisinghani, and Theoret, 1976: 257). Several systematic planning efforts described by Lichfield, Kettle, and Whitbread also used an iterative and progressively more detailed development and evaluation approach, an approach which these authors recommend (1973: 287–288, 294–298).

The normative combination of factors suggested by the rational model leads us to expect the most uninhibited development of alternatives to take place when closure to the

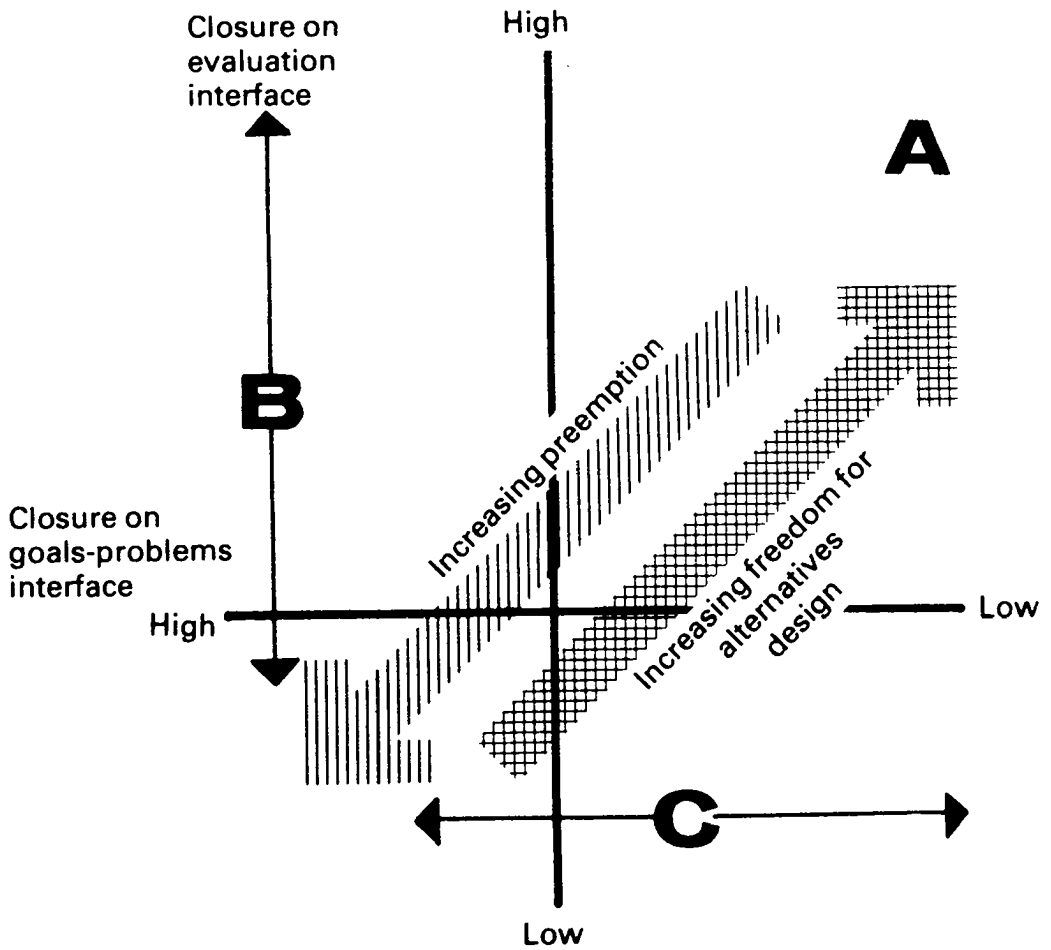

Figure 1: Closure and alternatives design.

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Of course, evaluation criteria must be considered in the form in which alternatives are presented and the dimensions they take into account (Lichfield, Kettle, and Whitbread, 1975: 33–35).

preceding phase of goals-problems articulation is at its lowest, and closure to the following evaluation stage is highest. To test these propositions, we want to examine the relationship between various types of design and the combinations of closure described above, as illustrated in Figure 1.

Four design categories may be identified on a continuum made up of combinations of these variables. The first of these, *A,* is the ideal "rational" approach, involving the free and uninhibited generation of options with feedback linkage to incorporate a variety of problem definitions, and closure to the evaluation stage to avoid premature elimination. The second, *B,* is the generation of alternatives, "limited" by any combination of problem definitions, goal articulations, and real or perceived constraints. The third category, *C,* involves preformal alternatives' elimination, where an informal evaluation process selects out the options to be forwarded for formal evaluation. The final category, *D,* is an integrated and iterative alternatives-design and evaluation process.

Alternatives and Outcomes

Observations linking the design process with decision outcomes are sparse. It may be inferred that "created" designs would be more innovative than "found" ones, and much of the impetus for research into creativity rests on this assumption. The type of search undertaken has been linked with the number of alternatives generated: heuristic search and scanning will tend to elicit a limited number of familiar options, while systematic search should yield a much wider range of options (Rittel, 1970: 19–20).

Lindblom is one pragmatic observer who has linked the alternatives-design process with the resulting range of options, but his "disjointed incrementalism" explicitly excludes unprecedented situations and novel problems (Lindblom, 1967: 36–37), and its necessary result in certain types of outcomes is still under question (Bailey and O'Connor, 1975). Steinbruner (1974: 107–109) suggests that in many complex decision processes only one alternative at a time is actually elaborated to the point of evaluation. But this may understate the process of preformal alternatives genesis and elimination, a process which observations indicate precedes this outcome (Mintzberg, Raisinghani, and Theoret, 1976: 256).

The evidence reviewed here is not extensive, and it offers only tentative conclusions to some of the questions raised above. In view of the critical role of design in the decision-making process, a more systematic examination of the process that generates alternatives seems called for. Such an examination, however, is only possible with a more formal articulation of the design process than has been attempted to date.

The design process can be described by a combination of several dimensions: (1) the mix and quality of creativity and search, and (2) the type and degree of closure. A matrix of possible combinations along these two dimensions allows us to ask what the relations are between these factors and the results of the alternatives-design process — the characteristics of the solutions which are identified and chosen for

evaluation. In particular, how do the nature, form, and environment of the design process affect the number,[5] diversity, and innovativeness of alternatives. These characteristics must be assessed, of course, in relation to the organization or unit being analyzed. A radically novel solution in one field may be commonplace in another; this is typical, for example, of many technology transfers (Schon, 1967: 8–11, 16–18, 161–164).

The types of options which are developed may also depend on the source of ideas, or models which may also affect problem definition, and be a repertoire of available solutions. Such models can include extraorganizational experience or applications, and theoretical knowledge (Pounds, 1969: 11–17), or they can enable the design of alternatives using or modifying given (often unique) or ready-made solutions (Mintzberg, Raisinghani, and Theoret, 1976: 249, 251).

Appropriate evaluative data on the effects and impacts of decisions could also allow an assessment of how alternatives-design and its environment relate to the feasibility and effectiveness of the options finally chosen and implemented. This is only possible, of course, when sufficient time has passed to enable a reasonable evaluation of the impact of alternatives which were adopted, and some perspective to speculate on what the impact of different options might have been. This is difficult to do, but it is the only type of analysis that enables descriptive findings to infer normative conclusions with some claim to validity.

To show how such an inquiry might be operationalized, a pilot study is presented below. Its analysis is structured around these questions, but the conclusions cannot be generalized beyond these particular instances. At best, analogies may be inferred to similar circumstances or types of organizations, but valid generalizations must await an accumulation of comparable studies large enough to constitute a satisfactory sample.

THREE CASES

This study presents three cases of alternatives generation in organizational contexts. The cases were not chosen a priori to explore the suggested taxonomy of alternatives design; in fact, the taxonomy emerged to test questions raised by the cases. They were chosen to display as wide a range of variation as possible while still exhibiting the minimal characteristics of the design process: the deliberate identification of a number of options, and the selection of some of them for systematic evaluation.

The choice of cases was limited by the need for descriptions which document the alternatives-design process in detail, so that abstraction would not project a spurious image of rationality. Consequently, these cases exhibit the bias which, according to March and Romelaer (1976: 251), pervades traditional studies of decision making: the decisions had high salience for their participants, and usually took place within a well-structured organizational context. The first case is the development of Vietnam policy in the higher echelons of the U.S. national security establishment. The second case is the choice of a site for the third London

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The number of alternatives might be subdivided into the number of solutions first identified, and then the number of alternatives actually chosen for evaluation. If we assume that the alternatives-generation process is not hermetically sealed off from the evaluation stage, but that it may incorporate in itself a preliminary informal selection process, then these numbers will differ significantly.

Airport by a Parliamentary Commission. The third case involved a University of Wisconsin task force.[6]

These cases all deal with the kind of high-level staffwork backed issues which display a systematic development of alternatives and are of enough general interest to warrant their documentation. This is the natural result of the need for adequately described cases. But these cases are not necessarily different from lower-level decisions such as the selection of an appropriate garbage disposal technology by a town council, or a community health agency's decision on an optimal drug abuse prevention program. It is possible that the only difference is that cases like the latter are lost in the mists of obscurity.

Finally, a word on the case descriptions. Each of these episodes unfolds within a political context which is no less important than the decision process of which it is an integral part. The descriptions often allude to the political aspects of decisions and outcomes, but that is not their focus. The outcomes in these cases, we believe, are more the results of the decision process itself than of political considerations or relationships. Where this is not so, explicit reference is made to the political factors that affected the decisions or their outcomes.

CASE I: NATIONAL SECURITY: U.S. VIETNAM POLICY, 1961–1968

In the spring of 1961 a task force developed two proposals addressing the problem of increased Vietcong infiltration in South Vietnam. One recommended an increase in South Vietnamese forces (ARVN), the other suggested a U.S. troop commitment. The final draft incorporated both ideas, but changed the rationale: now U.S. troops were to train the Vietnamese, and the expanded ARVN were to meet an invasion threat, not infiltration. While the troop commitment decision was still deferred, the American advisory buildup simply increased from 685 to 2,285.[7]

In the face of a continually deteriorating situation, the President sent General Maxwell Taylor, his military advisor, to evaluate alternative courses of action on the scene, while the Pentagon was conducting another of its own evaluations. In the Pentagon's analysis of November 7, the alternatives were:

A. An American airlift to Vietnam and increased U.S. logistics support; the introduction of advisors in the ARVN down to battalion level;

B. The "Taylor Plan," which involved the introduction of 8,000–10,000 U.S. troops consisting of engineers with some combat support, into the Mekong Delta;

C. The commitment of 25,000–40,000 U.S. troops, to engage in ground, sea, and air operations against the Viet Cong;

D. A threat of bombing North Vietnam, combined with options A, B, or C.

All these options were marginally different versions of an escalation strategy. The most radically different policy was the "threat" of bombing North Vietnam. The Pentagon's recommendations, proposing a military commitment in sup-

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While this episode took place in one of the educational institutions where organizational ambiguity prevails (March and Olsen, 1976: 8), it, too, took place in a well-defined system of intraorganizational relationships, though we shall see some of the traits of the "organized anarchy" which universities are.

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The main sources for this case, where not stated otherwise, are the Pentagon Papers (1971a: II — 40–68, 102–103, 108–115, 160–162, 165, 241, 443–445, 447; III — 210, 220–231, 237, 246–247; IV — 22–23, 87–91, 262–263, 265–269; 1971b: 102–103, 174, 202, 325, 365, 374, 433, 440, 450–452, 598–604). It has been claimed that considerations not reflected in the internal debates described in the Pentagon Papers affected the ultimate strategy choices (Ullman, 1971; Ellsberg, 1972: 74–76; Gelb, 1972). But the consistency between the published accounts and the policy outputs has not been questioned, and for our purpose the Pentagon Papers offer an unusually rich and detailed source.

port of Vietnam, were almost inevitable given the narrow range of alternatives. The administration, however, avoided the proposed commitment, choosing only to initiate another increase in aid to ARVN and the first escalation in U.S. military "advisory" personnel that exceeded the Geneva Accord ceilings (Pentagon Papers, 1971a: II, 108–116).

From late 1961 to early 1963, various versions of neutralization were proposed by U.S. Ambassador to India, Chester Bowles, Senator Mike Mansfield, and General Charles De Gaulle, but were dismissed by Washington. A fundamental reappraisal of U.S. relations with communism would have been called for, of which the Kennedy administration was not capable. Domestic political considerations, too, precluded a turnabout of this scale (Kalb and Abel, 1971: 178). President Johnson continued his predecessor's policy, but after his own election he initiated an intensive policy review. Limited withdrawal into "enclaves," phased withdrawal, and neutralization were all suggested but rejected as inconsistent with basic U.S. geopolitical goals.

This rejection of "fallback" positions, before they were fully explored, occurred again in late 1964 when a National Security Council (NSC) working group was set up in response to the Vietcong attack on a U.S. airbase at Bienhoa. This group evaluated a limited and clustered set of options:

A. More of the same;

B. Escalate military pressure against North Vietnam, and resist feelers for negotiations except simultaneously with continued bombing ("full squeeze");

C. Option A plus mild pressures against North Vietnam and a declared willingness to negotiate.

As the situation grew more critical and an increased sense of constraint prevailed, these options converged in the following alternatives:

A. More of the same and limited pressure on the North; continuing rejection of negotiations;

B. Option A plus increasing military pressure on North Vietnam — a public position of total inflexibility on negotiations, but a private recognition of their eventual inevitability ("full squeeze");

C. Option A plus graduated moves against military targets in the North ("graduated squeeze") including indicating a willingness to bargain with North Vietnam.

These strategies were all oriented to improve the American posture in eventual negotiations, and to "buy time." A consensus in favor of Option C was based on the assumption that the loss of Vietnam would be more serious than NSC estimates indicated. Finally, the recommendation of Option A, reinforced by the lowest order actions in Option C, was implemented as administration policy.

However, the failure of this policy to retrieve the situation led to a new "trilemma": Massive air strikes against North Vietnam ran the risk of nuclear escalation; a large U.S. troop commitment raised the spectre of a new Asian war; and negotiations evoked an image of national humiliation. The analysis is developed to its logical conclusions:

If the DRV will not "play" the above game, we must be prepared (a) to risk passing some flash points . . . (b) to put more troops into

South Vietnam and/or (c) to reconsider our minimum acceptable outcome. (McNaughton, 1965)

Both (a) and (c) were too radical to enjoy serious consideration. Consequently the predictable result was the "decision to proceed very slowly with ground force involvement." (Pentagon Papers 1971a: II, 448)

A memo from Under Secretary of State George Ball, in July 1965, was the first instance of serious evaluation of a radical alternative to incremental escalation by one of the policy "establishment" (Ball, 1965). Meanwhile, the Secretary of State continued to present the conventional view that incremental escalation, even to the point of hazarding a full-scale war, was still the least risk policy (Pentagon Papers, 1971a: IV, 23).

The next review was sparked by a new Vietnam crisis. On April 9, 1967, Washington's top decision makers generated four options for analysis:

A. More of the same;

B. Combining Option A pressure with pressures for compromise under an optimistic appraisal of the chances of success;

C. Option B, but with a pessimistic slant;

D. Ball's proposal for disengagement.

These options were narrowed to three:

A. Continue as before, in the hope that the setback is only temporary;

B. Ditto, but move more actively to stimulate a negotiated solution;

C. Disengagement (Pentagon Papers, 1971a: 82–91).

The result was a recommendation of Option A, since Option B was unstable, shading into the first if an optimistic view were taken, while with a pessimistic appraisal it began to look like Option C. Given the "establishment's" commitment to the domino theory, which was restated with this recommendation, Option C was never seriously evaluated (Donovan, 1970: 102).

It is striking how few, and how similar, the options were which emerged from the review process at its various iterations. These three or four alternatives were the result of a convergence of views, after non-consensual proposals were eliminated or ignored. Clearly the informal review process was highly constrained by the dominant and universally accepted organizational paradigm of the "domino theory." As a result, the policy establishment repeatedly closed ranks against ideas suggested by what they perceived as a hostile environment, or proposed by establishment mavericks.

The development of alternatives and their informal review also provided an arena for the same relatively uninhibited input of organizational considerations and domestic and bureaucratic politics noted by Allison (1969: 698–718) in the context of the Cuban missile crisis. His "organizational process" model explains the persistence of incremental escalation proposals through repeated Pentagon and NSC policy reviews. His "bureaucratic politics paradigm" may also account for the early elimination of neutralization and with-

drawal proposals. Such alternatives did not respond to the convergence of military establishment interests and domestic political considerations (Gelb, 1971) as the escalation options did.[8]

CASE II: A THIRD LONDON AIRPORT: THE ROSKILL COMMISSION

The problem of serving the projected increases in London's air traffic first arose in the context of national air transportation planning in the late 1950s. A series of inquiries through the 1960s led to the choice of Stanstead, a small existing airport to the northeast of London, as the site for London's third major airport.[9]

Stanstead was a controversial choice and failed to win necessary support. In May 1968 a Commission of Enquiry named for its chairman, Sir Eustace Roskill, was appointed:

> To enquire into the timing of the need for a four-runway airport to cater for the growth of traffic at existing airports serving the London area, to consider the various alternative sites, and to recommend which site should be selected. (McKie, 1973: 167)

Focusing on the site selection process, the Commission decided to apply an extensive cost-benefit analysis to evaluate a short list of selected alternatives.

The generation of this "short list" was recognized as an important part of the decision process, and indeed engaged the best part of the Commission's work. This process took place in four stages. First, 78 "coarse" alternative airport sites were identified, chosen so that the range of locational options should be as wide as possible within a defined overall search area.

The next stage involved reducing the list from 78 to 29, according to three broad criteria: surface access, defense, and noise. The staff also used its "judgment" in applying other planning-oriented criteria, though little factual information on possible impacts was available at this stage.

The criteria used to eliminate alternatives were chosen because they were important, and because they were easy to quantify. This was not the case with respect to the other planning considerations, though their importance was recognized and their assessment later became the largest item in the Commission's research budget.

At the end of this round, 29 sites were left, which were subjected to more detailed cost studies on surface access, defense, air traffic control, site preparation, and noise. The greatest difference among sites was in surface access costs, but these rested on some critical assumptions. One was the distribution of preferred modes of travel: bus, train, or private automobile, to enable the use of a gravity model for allocating passenger journeys to airports by mode. The other was the imputed value of passengers' travel time. Both later proved to be controversial and were hotly contested in the hearings.

These studies led to another round of elimination, resulting in a "reduced medium list" of 15. The Commission finally ranked the contending sites on this list at a full meeting held

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The refusal to consider formally any non-escalation alternatives also persisted long after a CIA evaluation of the "domino theory" in 1963 exploded its validity in terms of realistic U.S. geopolitical interests (Pentagon Papers, 1971b: 126). It is impossible to estimate which motivations were stronger, political or paradigmatic, when Bundy could note in 1967: "An articulate minority . . . may not believe in . . . the domino theory, but most Americans (along with nearly all Asians) know better." (Pentagon Papers, 1971a: IV, 159).

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This case study is based on Perman (1973) for the background leading up to the establishment of the Roskill Commission, and on McKie (1973) for the Commission's terms of reference, its activities and hearings, and the outcome of its recommendations. Lichfield, Kettle, and Whitbread (1975: 271–289) is the source of additional detail on the Commission's development and analysis of alternatives between June 1968 and December 1970.

at Exeter College in December 1968. Not surprisingly the five highest ranked sites were in the Northwest, which had the best access, since accessibility was the most easily quantified indicator and remained the most heavily weighted criterion.

The final "short list" of five options included four of these sites, and Foulness, a coastal site, which was retained as a result of pressure from a commission member. This commissioner was not persuaded that the cost factors outweighed less tangible ecological and social impact considerations, and had the stature, ability, and willingness to mobilize informed public opinion in his support. They therefore retained Foulness under consideration right into the final stage. The Commission also believed that Foulness might offer as yet unquantified advantages on "regional planning grounds," and kept this option to provide a basis of comparison with the four inland sites.

Hearings near each of these sites revealed that opposition of local residents was least at Foulness. Nevertheless, on the basis of its cost-benefit evaluations, the Commission recommeded Cublington, one of the inland sites.[10] The government overturned this selection on a number of considerations. Primary among these was the well-organized political opposition to the implementation of the Commission's recommendations, with the Commission's own lack of unanimity also carrying considerable weight.

Lichfield, Kettle, and Whitbread (1975: 288) ascribe the Commission's ultimate failure to a premature closure of options, noting that already at the first cycle of elimination the Commission was focusing on a narrow band of locations in the north and northeast. The Commission was also attacked for neglecting that part of its charge which was to address the timing and need for a four-runway airport. The reassessment of these factors has had the greatest impact on the outcome, leading to the ultimate suspension of the project.

CASE III: HIGHER EDUCATION RETRENCHMENT: THE UNIVERSITY OF WISCONSIN SYSTEM

In 1975 , after the University of Wisconsin System had experienced several years of budgetary exigencies (Epstein, 1974: 45–46), the Governor asked the system administration to submit its long-run plan for adapting to the prospect of declining enrollments. In response, the University set up the System Advisory Planning Task Force (SATPF), structured into four Study Committees. Three of them were charged with analyzing the impacts of alternative "phase down" or "phase out" options. The fourth was charged with developing other, non-phase down, phase out options, and was told:

> . . . this Committee has the opportunity to invent planning alternatives . . ., its charge is inherently more flexible than that of the other Study Committees. (SAPTF, 1975: B.5.4)

Its first meeting, lasting two days, was given over to an extended brainstorming session, with ideas ranging from the "almost visionary" to the mundane chalked up on two blackboards. One board contained cost-cutting proposals, the

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The dissenting commissioner issued a minority report of his own, although the majority on the Commission thought he had been coopted with the inclusion of Foulness in the short list. He took issue with the Commission's priorities, and proposed the Foulness location on the basis of its much smaller environmental impact.

other ideas for "creative reinvestments." Only suggestions which were patently absurd or obviously infeasible were rejected. The session resulted in 23 proposals for innovative cost reduction and 16 "creative reinvestment" options.[11]

At the end of this meeting, 20 alternatives clustered into nine options were assigned to task force members for review. Seven options were innovative cost reductions, only two from the "creative reinvestment" group. This proportion reflected a prevailing sense, implicitly reinforced by the chairman (a senior administrator), that the latter were impractical under current and projected conditions. Several ideas were also dropped because the committee did not have the time to collect the needed data within its three-month reporting deadline.

Now the committee also began to sense constraints on the content of its proposals: some members of the group started hearing "rumblings from downtown" — the Governor's office and the State Department of Administration — implying that any ideas that were not money saving were a waste of time.

At its next meeting, the committee discussed some options in detail, with particular emphasis on their degree of overlap with other committees. As a result some proposals were transferred to other groups for elaboration and review, and the committee decided which of the remaining alternatives to include in its final report. These ended up in two groups: one group of options for detailed analysis, and those in the other to be wrapped up in short position papers.

Five items made up the first group. Three were basically ways of restructuring incentives to reorganize the system: limiting enrollments, reviewing external cost-per-student ratios, and developing a capacity-funding formula. The last had appeared in the original list of alternatives as "funding formula modifications" and its genesis will be described in more detail below. The other two priority options were to develop two models: one of the "Regional University" concept and one of a campus-center consolidation.

Nine options were included in the second group, probably because of their onerous data requirements. Several alternatives, too, were dropped at this stage; some were passed to the central administration for consideration, others seemed to have limited savings potential, and one more "creative reinvestment" option was abandoned.

A "Task Force Status Report" of February 3, identified only the following alternatives:

— Externally imposed enrollment limits at several campuses;

— Externally imposed cost-per-student targets;

— Establishment of regional universities by consolidation of (a) three campuses, (b) one campus and three centers;

— Development of a capacity funding concept (tied to enrollment limits) which would establish enrollment and funding targets for phasing down programs and institutions. (Smith, 1975: 4)

This report supports the impression that the options for position paper presentation were no longer under serious consideration. The committee had achieved a considerable de-

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This case was researched by the author, and is based primarily on interviews with major participants and primary source documents, including letters and memo (Pelisek, 1975; Percy, 1975; Smith and Percy, 1976), reports (SAPTF, 1975; Weaver, 1975) and the internal memos, minutes, and protocols of the System Advisory Task Force which were kindly made available to the author by the University of Wisconsin administration.

gree of closure in one week, as a result of its perceived constraints. Subsequently the committee elaborated on these options, with groups of members preparing working papers on selected issues. One of these concepts — the idea of targeted capacity funding — has a background which is worth developing in more detail.

The use of a funding formula to regulate the capacity of the University System and optimize its use of resources was not new. The existing enrollment-funding formula, in fact, had been one of the university's major internal incentives to growth. When the administration perceived this in 1974, it undertook a search for an alternative. A memo from the SAPTF chairman criticized the existing formula and referred to a practice he had encountered in Britain, of allocating funds on the basis of "places."

Targeted capacity funding came to the attention of the university system's budgeters just when their frustration at unsuccessful attempts to adapt the old formula to new conditions reached its peak. Tests of several other funding formulas for feasibility and impacts revealed that the proposed formula was the only viable alternative, and minimized potential opposition. As a result, targeted capacity funding became university policy on February 21, 1975, the first (and so far, the only one) of the committee's proposals to be implemented.

The three-volume SAPTF Report became an appendix to the university President's Report to the Regents, an appendix which few, if any, of the relevant decision makers would read. Judging from the President's Report (which, in contrast to the Task Force's, is short: 35 pages, compared to hundreds of pages), the survival rate of the committee's alternatives through the obstacle course of organizational selection was low. Only regional coordination and resource sharing with Wisconsin's system of Vocational and Technical Adult Education were mentioned, and even those were referred to as options worthy of further study rather than as items recommended for action. The "targeted capacity funding" concept was the only one of the committee's recommendations to be implemented, although some lines of inquiry stimulated by this group can be seen in other parts of the Report. We cannot fail to be struck by the high number of fatalities among the 39 alternatives generated in the committee's first sessions.

The lack of any other discernable impacts of the whole SAPTF process on the University of Wisconsin System may seem surprising. The explanation may be found in the changing relations between the university and the legislature. In the expansionist period of the 1960s the state legislators coveted the university administration's power of allocating funds among its various campuses. When a newly merged university system was created by statute, the administrative review of the system was vested in the state and its legislative committees.

Unluckily for the legislature, it "bought in," as it were, when the market was at its high. When choices became limited to options for retrenchment, rather than growth, the state became eager to throw them back to the university administra-

tion. In the President's Report, the university returned these unpopular decisions to the Governor. This was a simulated crisis which the ritual of solutions, it was felt, could avert. The SAPTF reflected a typical use of long-range planning in academic organizations (Cohen and March, 1974: 114–115). So far this strategy seems to have succeeded.

The salient feature of this case is not the generation of the alternatives themselves, though this was the explicit and formal task of the committee. It is the process of informal review and elimination, the "focusing" process through which organizational constraints are brought to bear even before any options are sufficiently elaborated for formal evaluation.

DISCUSSION AND CONCLUSIONS

Alternatives Design, Sources, and Outputs

Search or creation, and sources. In all three cases the sources for policy options were largely accepted ideas within the organizations. Each episode took place in the context of much longer range, continuously ongoing decision making (Mack, 1971) which provided precedent that was the source of the bulk of alternatives proposed for evaluation.

The element of search was predominant in those instances where a wide range of options was generated, as in the Roskill Commission's effort, or where unconventional or innovative proposals emerged. This is not to say that creativity is impossible or ineffective; it only suggests, descriptively, that in these instances, ideas or options have been found or recalled rather than formed or created. This is true even of innovative recombinations, such as the targeted capacity funding concept implemented at the University of Wisconsin.

An obvious implication of this finding is the importance of systematic search in the organization and its immediate environment to elicit unconventional and novel alternatives. We will find that this is far from being a sufficient condition for innovation, but it is clearly a necessary prerequisite.

Number, type, and range of options. In the beginning of the process, the cases vary widely in the number, types, and range of alternatives generated. The Roskill Commission's search netted 78 sites in every possible location, the SAPTF committee developed 29 options, ranging from the conventional to the visionary, and the U.S. national security establishment repeatedly developed three or four options for review, all only incrementally different, while sometimes an unacceptably radical policy also waited in the wings.

Clearly, the three cases have little in common here. But their most salient common feature is the rapid convergence of options, both in number and in range, before the formal evaluation process ever began. Unless they responded to an urgently perceived need (like targeted capacity funding), the more innovative proposals were eliminated in the process of review. This happened in all three cases: the non-escalation alternatives for Vietnam, the coastal sites for the third London airport, and the "creative investment" options for the University of Wisconsin.

Closure in the Decision-Making Process

The rational decision-making model calls for low closure between alternatives design and the preceding goal-articulation or problem-definition phase, while demanding high closure between design and evaluation. Clearly, in these three cases we have observed something very different.

Problem-goal definition and design. In each of the cases we can see the interaction between alternatives development and problem-goal definition. This interaction, however, is not always clear or unambiguous. In none of the three cases was it the ostensible goal which bounded the field of possible alternatives, but a more limited, more concrete objective. This was sometimes set in quite a different institutional context than the original goals, but it was much more powerful in determining eventual policy.

In the Vietnam case, for example, the objective was specified by the national security establishment: to prevent Vietnam from falling to the communists during the term of the incumbent administration and at minimal cost to the U.S. While this objective determined national policy by constraining the search for acceptable solutions to the Vietnam problem, it was only relatively late in the course of events that this goal became manifest and subject to intensive national debate.

The Roskill Commission's goals were given in its terms of reference, but both the Commission and its staff chose to focus on a particular subset in setting its priorities. Consequently, the alternatives-development and -evaluation process undertaken by the Commission turned into a site selection process, rather than an exploration of the broader policy options as intended by Parliament. In the Wisconsin case, too, the study committee's actual terms of reference were effectively more limited than its formal charge, so that the "creative reinvestment" options were all short-lived.

In none of these cases, then, do we observe the free interplay between ends and means, between goal definition and alternatives design, that is prescribed for rational decision making. Rather, goal or problem definition was foreclosed, and design was preempted by perceptual, ideological, or organizational considerations which became the most limiting constraint on the ultimate range of possible solutions.

Alternatives' review and evaluation. The rational decision-making process envisages a separate phase of alternatives development, followed by a distinct stage of formal evaluation and selection. What appears in each of these cases is something quite different: a review and selection process in the context of alternatives' development, which is quite distinct from, and often largely preempts, the systematic evaluation process.

This review process consisted of the elimination of alternatives from further consideration and later evaluation by applying criteria (of differing degrees of formalization) which are the result of intuitively perceived and nonformalized constraints. This informal review process is distinct from formal evaluation, it was applied before any of the alternatives were elaborated to any extent which would enable formal evaluation of their prospective impacts or outcomes.

As a result, review becomes inextricably interlinked with design. Only those options were designed which survived a process of blending or elimination. Blending is apparent when more "extreme" options are subtly changed to narrow the range of alternatives into the domain of the acceptable, as happened repeatedly in Vietnam policy reviews. Elimination is observed when some options are dropped while others are retained for elaboration, a process consciously applied by the Roskill Commission. The University of Wisconsin Task Force identified the surviving alternatives by a process which combined both blending and elimination.

A number of factors account for the constraints which form the review process, including characteristics of the decision-making process itself. Because the decision process commands limited time and resources, easily applied criteria without cumbersome data needs or complex judgmental demands get more weight. Clear examples are the surface-access criterion applied by the Roskill Commission, and the elimination or downplaying of options requiring extensive data, by the Wisconsin SAPTF.

In some of the cases, alternatives were eliminated almost intuitively, applying informal selection criteria. Some criteria related to the character and perceptions of the participants, others reflected strongly held organizational paradigms or were a response to intuitively perceived organizational or environmental constraints. For example, in the evolution of Vietnam policy, non-escalation alternatives were dismissed without formal evaluation by a rigid application of the "domino theory," the dominant ideological paradigm in the U.S. policy establishment. In selecting an airport site, the quantitative propensities of the Roskill Commission's staff led to an undervaluing of factors requiring judgmental, rather than purely analytic, decisions. And in the case of the University of Wisconsin study committee, perceived system demands — an emphasis on cost saving and the apparent infeasibility of any non-saving options — led to the early elimination of the "creative reinvestments."

As a result of these factors we do not observe a process of uninhibited alternatives development generating a broad range of options for formal evaluation. Rather, we have discovered an intuitive, informal, or semiformalized evaluation process which occurs before formal evaluation even begins. Unlike formal evaluation techniques, this process is not based on a formal tradeoff of weighted criteria, but is more a series of decisions based on a single important value. In this sense, it demonstrates an infusion of what Steinbruner (1974) has called the "cybernetic" decision process into even the most designedly rational and analytic organizational choices. The review of alternatives, then, seems to be an integral part of their development, and an indispensable "focusing" process which narrows down the range of options long before they are forwarded for systematic evaluation.

An Analytic Model

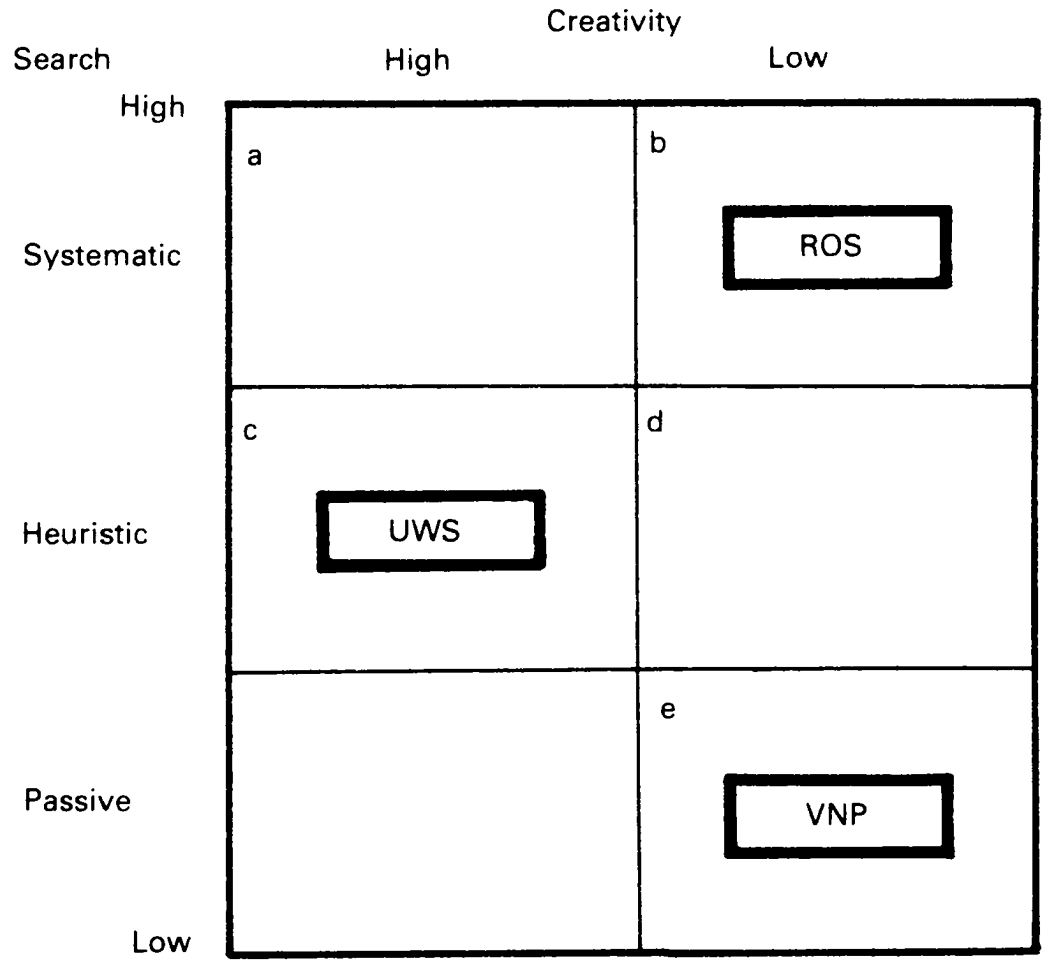
The systematic comparison of these cases uses an analytic model which is based on the dimensions of the design process discussed above. This model had to be developed in

two stages, since the categories that were proposed earlier are all nominal, and subsume several components. Two hypotheses informed the research agenda, one concerning the relations between the creativity-search mix and the other relating the type of closure of the alternatives-design process and its decision outcomes. Now the components of each of these dimensions will be explored to develop a framework for the ordinal comparison of our cases.

Creativity-search. The interest displayed in creativity and in search approaches to problem solving has been based on the assumption that more or superior types of creativity and search will produce better options. The hypothesis here, then, is that wider ranges of alternatives, and more innovative options, will result from higher types of search and creativity.

To test this hypothesis I disaggregated the creativity-search mix dimension into its components as shown in Figure 2 below. One component is the degree and quality of creativity displayed in a design process that is articulated for convenience into a dichotomy of "high" and "low." The other is the type of search, ranked from systematic search through heuristic search to "passive" search or precedent retrieval. Cells *a* through *e* represent a range of possible creativity-search combinations. On the basis of the above hypothesis, we can rank them in terms of their likelihood to elicit a broad and innovative range of alternatives.

As suggested by the analysis of its search-creativity mix, the Roskill Commission displays a combination of low creativity (in the sense that no "new" proposals were synthesized,



VNP: Vietnam Policy
ROS: Roskill Commission
UWS: University of Wisconsin System

Alternatives innovation range ranking: a>b≈c>d>e.[12]

Figure 2. The creativity-search mix dimension.

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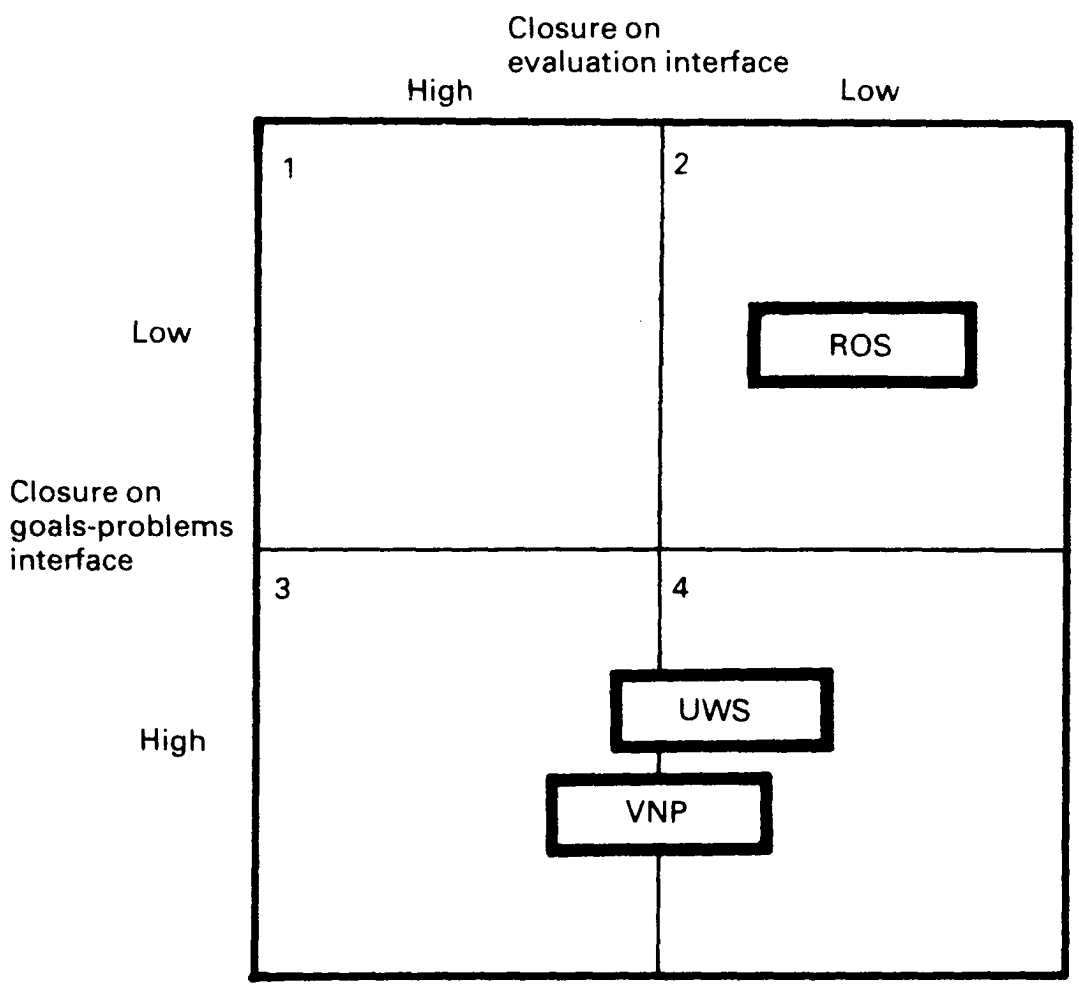
The combination of high creativity and passive search seems so unlikely that it has been treated as an empty set.

and no creative processes were deliberately encouraged) and systematic search. The University of Wisconsin's study committee applied a mixture of high creativity (brainstorming) and heuristic search, while Vietnam policy options were all retrieved from precedent in a process where passive search predominated.

Closure. Figure 3 below is a more formal presentation of the closure dimension. This presentation enables us to explore the relations between variations in closure and different types of constrained alternatives design.

The four cells that result from an arbitrary dichotomy between high and low closure on each of the interfaces of alternatives design can be ranked in terms of the degree to which we would expect closure to preempt the uninhibited design of alternatives. We find the ideal "rational" type (1) the highest: it ensures the most open decision process and limits preempting by either political or ideological factors predetermining problem or goal formulations or the same factors constituting the parameters of preformal evaluation and alternatives elimination. Alternating evaluation with design in an iterative integrated process (2) is only slightly inferior to this ideal, but does involve the risk that preliminary, though formalized, evaluation criteria may lead to the premature elimination of an optimal option.

Of the four types shown here, "limited design" (3) and "preformal elimination" (4) display dysfunctional types of closure: the first, high closure on the interface with goal-problem formulation, the second, low closure toward the



Preemption ranking: 3=4>2>1.

VNP: Vietnam Policy
ROS: Roskill Commission
UWS: University of Wisconsin System

Figure 3. The closure dimension.

evaluation stage. Consequently, both are likely to be associated with a high degree of preemption. Figure 3 below shows the Roskill Commission adopting a deliberate integrated evaluation process, while both the Vietnam policy makers and the University of Wisconsin task force combined limited design and preformal elimination in differing degrees.

Range and innovativeness of alternatives. Figure 4 below shows how quality of the alternatives-design process is a function of two competing factors, which may affect the range and innovativeness of the options which emerge. The type and mix of search and creativity tends to enhance the generation of alternatives, and the degree of preemption brought about by the type and degree of closure will inhibit the design process.

The cases analyzed here offer some support to these hypotheses, though the differences among them are not, perhaps, so great as might have been supposed on the basis of theory. Both the Roskill Commission and the University of Wisconsin SAPTF developed a large number of options, while the number of alternatives under consideration for Vietnam policy never exceeded four. The first two groups also developed some innovative proposals in the design stage, innovative in the sense that they differed significantly from other ideas current in the same organizational contexts.

But when discussing the range and types of alternatives, we must distinguish between the repertoire of options which emerge during the design process and the set of alternatives that are ultimately evaluated. In all our cases, these two are different, though to varying degrees. It is the latter

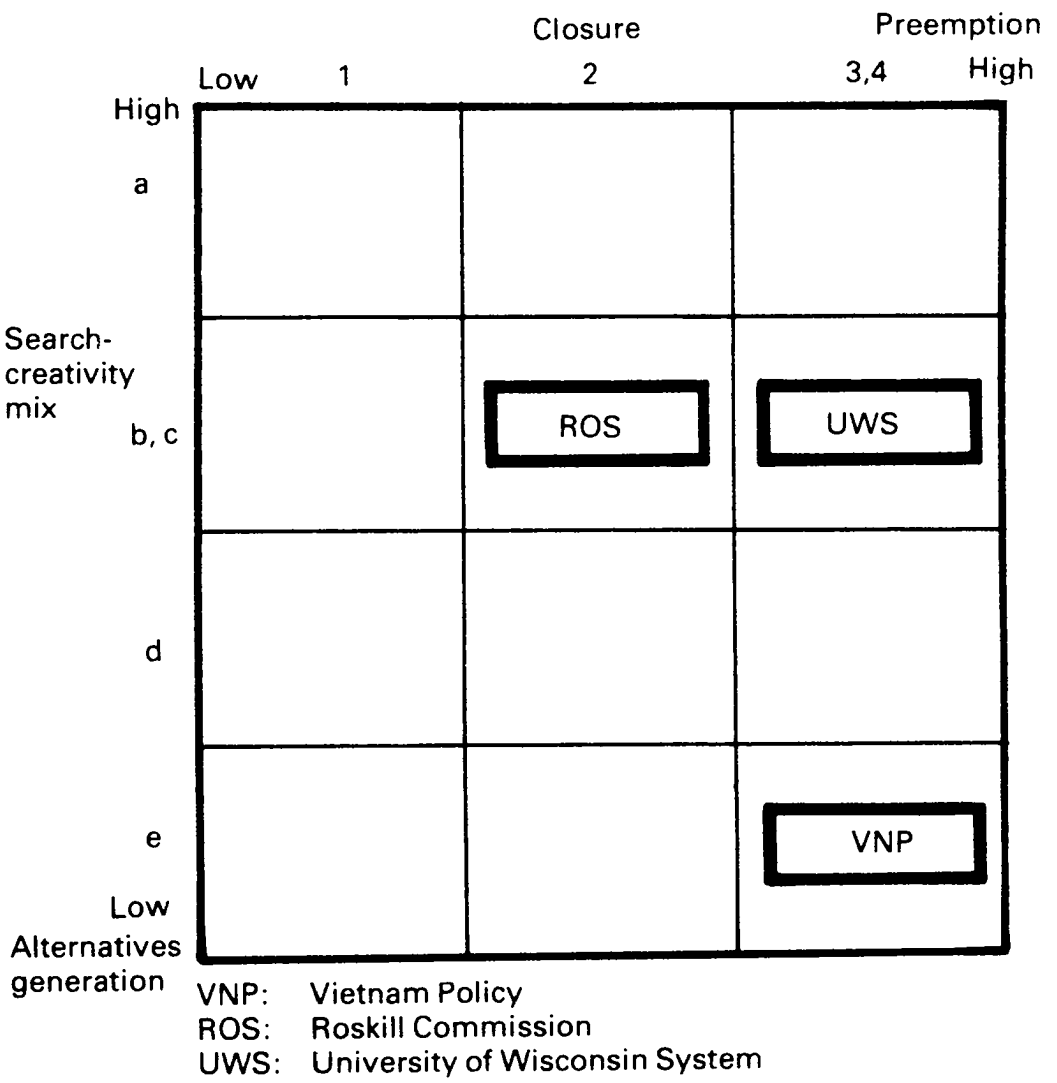


Figure 4. Analysis of the alternatives design process.

that limits which alternative may be chosen for implementation, and thus determines decision outcomes.

Relation to Outcomes

In these three cases, alternatives were generated primarily through a process of search and discovery, rather than creation or invention. It is too speculative to suppose that another process might have resulted in a significantly different range of options. Although the search process itself must have an effect, the initial process of alternatives design yielded a wide range of options, so this phase cannot account for the quality of the ultimate choices.

It is the range and quality of the options that emerged from informal review in the design process that had a powerful effect on outcomes in each of the three cases. In the Vietnam policy-making case, the options which were formally evaluated were repeatedly so similar that their convergence was inevitable. The selection of an inland site by the Roskill Commission was a foregone conclusion, in the view of informed observers, before the final evaluation process ever began. And in the Wisconsin case, only a limited range of cost-saving options remained for more extended analysis and inclusion in the President's Report.

We can only speculate on the substitution relationship between alternatives genesis through creativity and search on the one hand, and the preemption of alternatives design by closure of the decision-making process on the other. But in the cases analyzed here, the process of limiting alternatives by inhibiting their design, by "blending" options, and by their early informal elimination, seems to be the most powerful factor in deciding which options were evaluated, and in affecting the ultimate outcomes. Indeed, we cannot avoid the conclusion that in all three cases outcomes were even more affected by this process than by the subsequent stage of formal evaluation itself.

If this conclusion is true for a wider range of organizational decision making than can be generalized from this limited sample, the normative implications would be profound. Perhaps all the efforts which are devoted to refining evaluative methods and to applying ever more sophisticated techniques of evaluative analysis are misdirected. If the choices which determine outcomes in organizational contexts are made informally and intuitively before the evaluation phase begins, then attempts at formalizing and rationalizing evaluation, however praiseworthy, are made in vain.

The process of alternatives development in organizational contexts warrants further study. Even this limited analysis, however, suggests that alternatives design is a stage in the decision process whose neglect is unjustified in terms of its possible effect on decision outcomes. The investigation into design methods, and the development of simple, almost intuitively applicable methods of comparison and evaluation, could make a significant contribution toward improving the quality of organizational decisions.

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