

THE ANATOMY OF PUBLIC PROBLEMS,
BUILDING A METHODOLOGY OF POLICY ANALYSIS

by

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Public policy analysis is rich in methods and poor in methodology. As the number and sophistication of methods continue to increase, the failure to build an integral mode of analysis becomes the more apparent. A wealth of technique does not yield a systematic way of proceeding with the analysis of a problem--a theory of how to proceed and why. The missing ingredient is methodological: a logic-of-doing policy analysis.

Wildavsky (1979: 2, 15), certainly a leading practitioner and teacher in the field, concludes that he can neither say what policy analysis is nor how it is possible to do it. While embracing a variety of methods as useful, he seems to reject the possibility of methodological development (1979: 3):

What tools does the policy analyst use? Qualitative political theory, for refining our picture of where we want to go; quantitative modeling, for systematizing guesswork on how to get there; microeconomics, for disciplining desire with limited resources, and macro-organization theory, for instilling the will to correct errors: each has its place. Policy analysis, however, is one activity for which there can be no fixed program, for policy analysis is synonymous with creativity, which may be stimulated by theory and sharpened by practice, which can be learned but not taught. [Emphasis supplied]

Doing policy analysis, he argues, is akin to "discovery" and exhibits little structure or pattern. Rather than a logic of inquiry, Wildavsky proposes a logic of appraisal or "justification" (1979: 387-88). He recommends giving attention to the development of systematic criteria for evaluating the work of policy analysts (1979: 397-98), but not an attempt to give more

structure to the process of doing policy analysis, which must remain a "private affair" (1979: 15).

If, as Wildavsky says, policy analysis can be viewed as both art and craft, the "material" of policy analysis consists of public problems. The relevance of methodology depends upon the nature of the material. If the salient features of public problems are characterized more by uniqueness than by similarity or congruency, then an integral mode of analysis cannot be developed. When one focuses on "solutions," or at least "recommended courses of action," as the product of policy analysis, this view of public problems as basically idiosyncratic may appear to be valid. A successful course of action may often depend on details that are unique to a situation. Policy prescriptions, however, also depend upon an understanding of the problem in terms of its sustaining relationships. This is more than "definitions" it is diagnosis. Diagnostic assessment is fundamental to problem-solving and can be viewed as the core of analysis. Here policy analysts can take a lesson from mechanics and physicians. Without a proper diagnosis, prescriptions are mere guess-work. Moreover, it is possible--in any applied science--to agree on the diagnosis, yet disagree as to a prescription. Prescription necessarily deals with particulars, whereas diagnosis is based upon characteristics or indicators broadly shared within some fairly large class of cases. A methodology, or systematic way of proceeding, can be derived from the common attributes of a set of problems. For public policy analysis, the question is whether there are general properties of public problems which can be used to develop a general diagnostic capability? Furthermore, can these general properties be expressed as sets of variables which assume different values in various problematic

situations? If so, cumulative methodological development in policy analysis is a possibility. If not, Wildavsky is correct that creativity rather than methodology is our basic intellectual resource, not only for inventing "solutions" to problems, but also for the conceptualization of problems to be solved. He comes to this conclusion (1979: 388): "That problems have the same status as solutions. . . is the basis for creativity in analysis (and the cause for anomie within the profession)."

To pursue a discussion of the alternative possibility one can turn to the work of Vincent Ostrom (1974) on political theory and public administration. Ostrom challenged the preoccupation of scholarship in American public administration with (1) descriptive work focused upon singular "organizations" based on hierarchical principles and (2) prescriptive work advocating the perfection of hierarchy as a universal approach to solving public problems. Drawing upon both modern political economists and classic political theorists, he went on to sketch an alternative paradigm of public administration, taking account of the limits and possibilities of various organizational arrangements. Rather than dichotomizing policy and administration, as in the orthodox view, Ostrom treats various forms of organization as alternative instruments of public policy. In this context the essential problem of organization theory, he writes (1974: 55), is to

- 1) anticipate the consequences which follow when
- 2) self-interested individuals choose maximizing strategies within
- 3) particular organizational arrangements when applied
- to 4) particular structures of events.

These are the basic elements and relationships involved in the use of organization as an instrument of policy. Ostrom's principal concerns in this piece of work are to demonstrate both the potential variety of organizational arrangements and the necessary conditions of general democratic organization

to realize the full advantage of that potential variety. This leads to a reconsideration of the principles of constitutionalism and federalism, as developed both by Madison and Hamilton and by Tocqueville, viewed now as a theory of "democratic administration," in contrast to the tenets of "bureaucratic administration" which have come to dominate American administrative thought in this century.

Ostrom's basic conception of policy and organization also contains the rudiments of a methodology of policy analysis. Viewed in this light, his four-part characterization of organization theory can be elaborated as a general model of public problems, from which a logic-of-doing policy analysis can be derived. Ostrom's choice of deductive reasoning as a mode of discourse reflects his predominant concern with the development and use of theory as a systematic guide to empirical inquiry and analysis. The important question is whether the work of policy analysts can be organized in a way that allows for cumulative methodological development. If not, our discourse will be limited to swapping stories and offering up the occasional gem of wisdom. In this sense Wildavsky's work assuredly glitters as he links ideas and insights together as so many pearls on a strand. Many of those ideas, however, may also contribute important elements to a methodology of policy analysis.

The Basic Model

Methodologically, applied policy analysis is a problem of selecting, collecting, sorting, sifting, and otherwise organizing bits and pieces of information in order to reconstruct the logic of a situation. Public problems, like all genuine problems, are surrounded by confusion. To develop an understanding of a problem--to make sense out of it--requires that one deal with a situation on its own terms. Thus information, as the empirical

component of analysis, is essential. Yet information is more than data. As Wildavsky (1974: 231) has made the distinction, information is "data collected according to a theory. . . ." The empirical component depends upon a theoretical component. "Analysis" denotes the use of theory to interpret data in order to produce information.

The basic tool, therefore, in a methodology of policy analysis is a model which facilitates this information-building process. Ostrom identified the four basic elements of such a model: (1) the structure of events, (2) decision making (or organizational) arrangements, (3) individual choice of strategies, and (4) outcomes or consequences. The model is depicted in Figure 1. It consists of four sets of variables to be understood as mutually exclusive and exhaustive categories for arraying the data pertinent to an analysis of any public problem.

[Figure 1 about here]

The model begins by considering two sources of constraint and opportunity inherent in any public problem. The first set of variables--the structure of events--can be understood as the "raw material" of a problem or policy. It may be a river or a bridge, a city or a sidewalk, a school or a classroom. It includes both nature and technology, both man-made and natural environments. To this raw material human beings add a set of decision making arrangements, establishing new constraints and opportunities of a different order. This set exists entirely in the realm of language and consists of formal decision rules which specify, broadly or narrowly, who may decide what in relation to whom. Decision making arrangements must be understood to encompass all those decision makers, both public and private, who are relevant to some problematic situation, including the

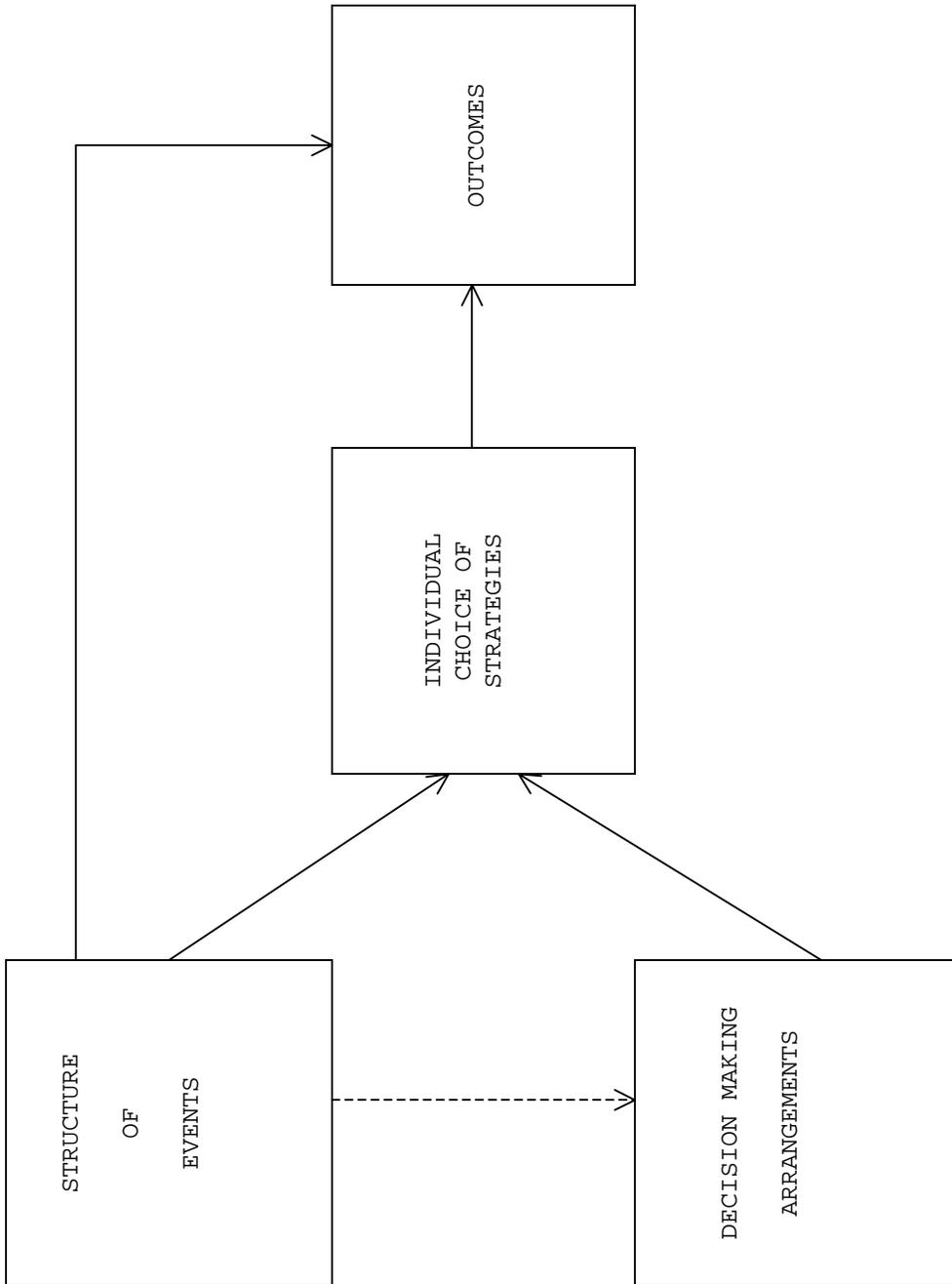


Figure 1. A Model of Public Problems.

citizen-consumers of public goods and/or bads, as well as officials. In a democratic polity individuals always have access in some degree to alternative organizational structures, so that the set of decision making arrangements relevant to a public problem is always interorganizational. This adds complexity in diagnosis, but much greater flexibility in institutional design.

The first two sets combine to form the independent variables in a policy analysis and the last two sets, dependent variables. The second set identifies a group of decision makers, each of whom can choose and act subject to the constraints and opportunities found within the structure of events and decision making arrangements. In the third set of variables, the model focuses, not upon discrete choices, but upon choices of strategy. A strategic choice is a basic decision of how to relate to (1) a structure of events and (2) other decision makers given an expectation of how these two elements of a policy milieu will behave. Outcomes, the fourth set of variables, follow upon the combined choices of all relevant decision makers. If the strategies-set is considered as a dependent variable, the model is not deterministic; but if strategies are treated as independent variables, outcomes follow in a deterministic fashion. The combined choices of all relevant decision makers together with the structure of events determine outcomes. From a policy perspective, however, it is much more useful to work with indeterminate relationships and attempt to predict individual choice of strategies even though the results can never be subjected to a simple falsification criterion of validity.

Both the structure of events and decision making arrangements affect individual choice of strategies, but in a different way. Those constraints found in a structure of events might be thought of as "hard" constraints.

The structure of events affects outcomes independently of individual choice (as shown in Figure 1). If decision makers ignore, or are unaware of, hard constraints, outcomes will not follow as anticipated. (If human beings choose not to act, the structure of events is simply reproduced as a set of outcomes.) Decision making arrangements, however, do not have an independent impact on outcomes. Formal organizational structure affects outcomes only through its impact on individual choice. The choice of strategies can be viewed as an intervening variable in this sense. The "soft" constraints inherent in a language system can structure individual expectations and thus create a structure of incentives and disincentives; but apart from the way in which individuals choose to act, decision making arrangements have no operational meaning.

Four Sets of Variables

The basic model identifies four related sets of variables as a conceptual device for reconstructing the logic of a situation and arraying information into meaningful sets. Each set of variables must be further elaborated and modeled in order to provide the conceptual tools for identifying relevant information and assigning it to the proper set. Many members of the "family of models" popular in policy analysis find a place in this methodological structure, perhaps enabling us to go much beyond the "family" metaphor in clarifying the relationships among models developed independently in different social sciences and pointing the way to a fundamental unity of practice and application. The four sets of variables are discussed in turn.

Structure of Events

All public policy operates in the context of some more or less specifiable structure of events. In physics, an event is any coincidence of

two or more objects at a point in time in some particular spatial configuration. Events thus defined can be random or non-random with respect to patterns of recurrence. Non-random events exhibit regularities over time. A "structure of events" refers, then, to events which recur in an identifiable pattern.

In human experience, various structures of events often acquire high degrees of differentiation, which enables us to distinguish one from another on the basis of boundary conditions. Ostrom, Tiebout, and Warren (1961: 835) comment as follows:

Events are not uniformly distributed in space; rather, they occur as sets under conditions such that boundaries can be defined with more or less precision. Rivers flow in watershed basins, for example. Patterns of social interaction are also differentially distributed in space and boundaries can generally be defined for them too. In other words, all phenomena can be described in relation to specifiable boundary conditions. . . .

Yet the various structures of events which can be pertinent to public policy analysis are extremely diverse, e.g., a city or a wilderness, an ocean or a prairie. Vast differences also occur in the relevant scale of a structure of events--from global to household proportions.

The following questions must be addressed. First, are there common attributes among the large set of events relevant to policy analysis? Second, do these common attributes or variables assume different values in various structures of events? Third, do these different values assumed by common variables serve as key indicators for discriminating among diverse structures of events so as to explain significant variation in individual choice of strategies and outcomes? Immediate answers are clearly not available, but certain possibilities can be explored.

John Dewey (1927) followed this path of inquiry in his effort to formulate an empirical, experimental foundation for public policy and organization. His definition of a "public" as a set of persons "indirectly" affected by the transactions of others (Dewey, 1927: 15, 16) identifies a broad pattern of relationships as linked to (1) the perception of public problems and (2) organizational response. Those indirectly affected do not participate in a transaction and are thus unable to control outcomes in the absence of political organization. Ostrom, Tiebout, and Warren (1961: 834-35) further broaden Dewey's conception by substituting the more inclusive set, "events," for the subset, "transactions." This recognizes that indirect effects arise from patterns in natural phenomena as well as social phenomena. Dewey himself characterizes the set of indirect effects as arising apart from any pattern of public organization.

One minor problem with Dewey's formulation is that it evokes an image of asymmetry, i.e., some persons engage in private transactions which affect others called a public. Although public problems frequently involve asymmetrical relationships, the appropriate model is probably symmetrical: each and every person who is a member of some community can act in ways that indirectly affect all others. Elements of asymmetry can then be introduced from case to case as deviations from the more abstract model. The set of events relevant to public policy is then defined in terms of a general condition of interdependency, where each person necessarily depends indirectly on others for some part of his welfare.

Public policy analysis, or the diagnosis of public problems, requires a careful modeling of the relevant structure of events to reveal the sources of interdependency. For example, Ostrom, who has worked extensively in the

area of water resource policy and organization (1968, 1971b), explicitly considers the physical nature of water as a fluid or flow-resource, to be fundamental to understanding patterns of interaction among the diverse users and suppliers of water. In a similar fashion, David Howard Davis (1978) emphasizes the physical properties of various forms of energy (fossil fuels, nuclear power, and electricity) as independent variables which tend to sort the politics of energy into relatively distinct policy arenas. In the large field of urban policy, Jane Jacobs (1961) is unique for having developed a systematic model of how cities work as a structure of events composed of various patterns of interdependency. Efforts such as these are the more remarkable for being rare.

The methodological problem is to develop means of discrimination which enable policy analysts to distinguish among various structures of interdependency, identify salient features, and specify consequences. For this capability, Ostrom (1974: 52-54) turns to the theory of public goods as developed by modern political economists. Some scholars may view this sort of material as standard fare given the last two or three decades of intellectual development. Yet the theory of public goods has usually been confined to explaining shifts of resources between private and public sectors considered as aggregates. Thus restricted, such a theory may be useful as background knowledge for a policy analyst but does not provide workable tools of analysis once the locus of activity has been settled. So it is that policy analysis can often begin by "saluting" the theory of public goods, then proceed with an analysis without substantially using the theory. If, on the other hand, the theory of public goods can provide intellectual tools for modeling a specific structure of events, or pattern of

interdependency, its usefulness is extended considerably beyond the standard application.

To draw upon the theory of public goods in this way, it is necessary to sort out those elements of the theory that identify independent attributes of some structure of events, i.e., variables that can take on independent values and thus be variously- combined and recombined. Any structure of events can then be represented in terms of these attributes. Three independent attributes can be distinguished (1) jointness of use or consumption, (2) non-exclusion, and (3) the domain of indivisibility inherent in supply and/or consumption. A brief introduction to each attribute follows.

Jointness. This variable measures the degree to which more than one person can derive benefits simultaneously from the elements of value in a structure of events. Samuelson (1954) identified jointness as the defining characteristic of public goods. The obverse of jointness is "subtractibility" (Ostrom and Ostrom, 1978: 11), i.e., the degree to which individuals subtract from the welfare potential of others. In the limiting case of perfect jointness there are no subtractive effects among individuals. At the opposing limit--full subtractibility--one person fully precludes enjoyment by others. Most cases of interest in public policy fall in the intermediate range, where individual effects are partially subtractive, but jointness is possible within limits which circumscribe the number and behavior of those individuals. The classic case of the "commons" (Hardin, 1968) describes a situation of imperfect jointness.

If a structure of events lies somewhere in this intermediate range, a policy analysis must be able to take account of more than that simple fact. The problem is to determine, as precisely as possible, the limiting

conditions within which jointness is feasible. This requires giving close attention to patterns of subtractibility among diverse uses and especially to the sensitive relationship between more-subtractive and less-subtractive users. These patterns have a direct impact on individual choice of strategies and are therefore an essential consideration in the design of decision making arrangements.

Non-exclusion. The "exclusion principle," used by Musgrave (1959: 9) to define public goods, refers generally in economics to the ability of sellers to exclude potential consumers from goods and services offered for sale. Non-exclusion, broadening the concept somewhat, can be considered the inability to control access to a structure of events. Various degrees of excludability reflect successive levels of difficulty in practicing exclusion. Exclusion is always costly and the greater the cost, the more likely that exclusion will become infeasible. In the limiting case of non-exclusion, the practice of exclusion is technically infeasible. New technology, e.g., the development of barbed wire in the case of range lands, can shift the conditions of exclusion rapidly.

Difficulty with exclusion, rather than absolute non-exclusion, seems to be the typical case in public policy (E. Ostrom, 1967). A policy analyst must therefore be able to do more than simply classify goods and services in terms of exclusion and non-exclusion. A number of questions occur. What precisely are the difficulties with exclusion? What is necessary to attain exclusion? How do conditions of exclusion vary with conditions of demand and supply? Is partial exclusion feasible? To choose the proper tools of public policy in a given situation may depend upon these considerations.

Domain of Indivisibility. Buchanan (1968: 173-177) distinguishes the degree of indivisibility, characteristic of some structure of events, from the extent or range of indivisibility. Varying degrees of indivisibility are equivalent to varying degrees of excludability, with the intermediate range corresponding to externalities--partially divisible events with limited indivisible (external) effects. The nature of the externality, whether positive or negative, can be that of a spill-out (pollution) or a spill-in (trespassers). The domain of indivisibility refers to the extent of the population and events affected, whether the indivisibility in terms of degree is complete or partial. The purpose in referring to indivisibility as distinct from non-exclusion is to deal with the affected domain as an independently variable property of a structure of interdependency.

Orthodox indivisibility in the economics literature refers to "lumpiness" in production, i.e., an inability to vary quantity continuously. In an analogous fashion, indivisibility in the supply of public goods can be thought of as lumpiness in supply, i.e., an inability to differentiate supply in relation to individual consumers. The question raised by the presence of indivisibility in supply is one of scale: what are the boundaries of the affected domain? In terms of domain, indivisibility is never absolute, but always limited. The task of a policy analyst, once again, is not simply to classify events in terms of a dichotomous variable, but to determine the precise limiting conditions which apply in a specific situation. Only on this basis can supply properly be proportioned to demand. The presence of an indivisibility does not eliminate a need to deal with consumers in a discriminating way; it does change the level of discrimination and makes the task more difficult.

The domain of indivisibility may derive from natural occurrence, as in the case of resource-systems, from production technology, or from patterns of consumption. The latter deserves special mention as a somewhat unorthodox consideration. Where supply is not differentiated on an individual basis, patterns of consumption may acquire an importance parallel to patterns of production. The feasible domain of production can differ from the feasible domain of consumption. Patterns of consumption may be indivisible relative to units of production. Both production and consumption may have technical requirements which need to be taken into account in an assessment of the boundary conditions which help to define a structure of events.

Each one of these attributes--jointness, non-exclusion, and domain of indivisibility--is independent of the other. Taken together, these are conceptual tools to be used to construct a working model of the structure of events relevant to some public problem or policy. Other tools may also be appropriate for dealing with certain types of problems; but these are perhaps the most broadly applicable tools of analysis which can be drawn out of the theory of public goods. The primary usefulness of the theory of public goods in policy analysis is to provide these tools.

Decision Making Arrangements

Political science is traditionally associated with the study of "institutions." Conventionally, the unit of analysis is "an institution," i.e., a decision structure or organization capable of taking collective decisions and in some sense acting as a social unit. In public policy analysis, however, the basic unit of analysis is an individual who participates in a variety of decision structures relevant to a public problem. "Decision making arrangements" refer broadly to an allocation of authority among some

relevant set of individuals, where the authority to act is derived from a number of functionally separate decision structures. The focus of analysis, therefore, is not upon discrete "institutions," but upon the rule-ordered relationships which govern individuals in an interorganizational context.

V. Ostrom suggests (1968:) that the "base rule" in a democratic society is willing consent. Full equality among decision makers is possible only so far as willing consent is allowed to govern. Various forms of voluntary association, including market exchange, are fundamental and ubiquitous in a democratic society. To maintain agreeable relationships on the basis of willing consent, however, implies a capability of managing disagreements. This necessarily involves relaxing the rule of willing consent to allow an element of coercion, at least potentially. A second order of decision making--one based on inequality--must be introduced to allow some to impose sanctions on others. Both sets of relationships can pose difficulties for public policy.

Critical scrutiny should be given to four basic types of authority relationships: (1) the capacity of individual decision makers to act solely on the basis of individual discretion in matters of concern to others, perhaps preempting action by others or initiating an action which creates costs of opposition for others; (2) the availability of potential sources of remedy to individuals affected adversely by the actions of others; (3) the capacity of an affected population to take collective action where the rule of willing consent can be relaxed; and (4) potential veto positions in any process for taking collective action. Decision making arrangements will commonly include decision points of each type with the possibility of institutional weakness arising at any point.

Provisions of both private and public law may be relevant to mapping a set of decision making arrangements. Relationships based upon willing consent are always conditioned by potential recourse to compulsory third party determinations, relying perhaps on the law of contracts or torts. By the same token, the exercise of official power is always conditioned by potential recourse to various sources of public law. The relevance of substantive provisions of law depends upon procedural elements, especially who (whether singular or plural) has authority to formulate, invoke, and apply a rule of law. Authority to invoke some provision of law, for example, is subject to wide variation--sometimes highly concentrated and sometimes highly diffused--with much different results for the differential authority positions of various decision makers.

A multifaceted structure of events is normally associated with an equally complex set of decision making arrangements. Consider, for purpose of illustration, the organization of highways. The instruments of highway organization include a number of specialized decision making capabilities, and make use of many different institutional facilities, derived in each case from a distinct attribute of the structure of events inherent in highways. To begin with, the land-use decisions involved in highway development entail a high degree of indivisibility among the owners of separate parcels of property and are therefore organized with potential recourse to eminent domain proceedings. Revenue decisions in the provision of highways encounter difficulties with exclusion, but the power of taxation (as applied in this case) makes use of partial excludability by taxing the sale of gasoline, a commodity highly correlated with highway use. An even higher degree of exclusion can be attained with respect to more specialized sets of users,

as in the application of ton-mile taxes to heavy trucks. Demand and supply decisions are affected by a varying domain of indivisibility associated with different types of highways; and, as a result, there is an effort to distribute these decisions among various jurisdictions which differ in scale. Production decisions, again, involve technical indivisibilities (i.e., there are limits to the division of responsibility for production) and are usually vested in a public bureaucracy supplemented by private contracting. Once highways are supplied, the problem of public organization is not ended. A highway is a common property facility subject to varying degrees of subtractibility among a diverse set of users. Various rules of the road are used, drawing upon the police power, to sustain an optimal level of jointness among highway users. Finally, highways do not exist in isolation: they have neighbors. The potential external effects of highways upon abutting property owners are recognized in the common law of highways, which affords protection from various forms of private nuisance and unreasonable curtailment of access.

In this fashion a complex structure of events can involve many different sets of decision makers and a great variety of authority relationships. As long as decision making arrangements work smoothly, and problems do not develop, the underlying complexity may escape notice. When something goes wrong, however, several decision points may be implicated. The entire system of relationships must then be sorted out in order to make a proper diagnosis of the problem. Possible solutions may also involve adjustments at numerous points. All this requires a model of decision making arrangements that can enable a policy analyst to identify the salient features and relate them to other facets of the problem.

Individual Choice of Strategies

The structure of events, together with the decision making arrangements chosen to govern that structure, represent the parameters of a public problem. Decision makers regard both sets of variables as fixed (though perhaps only for the short-run time frame of the model). These parameters provide decision makers with a structure of constraints and opportunities within which individual choice is exercised. These choices can be more or less constrained--and thus exhibit more or less diversity in a given situation--but are never fully determinate. It is assumed that individuals have real choices to make.

Economists represent the process of individual choice as a cost calculus in which alternatives are evaluated in terms of opportunities foregone. This conception underlies the tradition of indifference-curve analysis. The terms of choice--those opportunities which must be foregone as a result of choosing any single alternative--are determined by the parameters of a situation. To this situation, however, an individual brings preferences, enabling one to weigh alternative courses of action and thus to choose. The opportunity cost attached to any given choice is therefore a result of two considerations: (1) a decision maker's assessment of his situation (his perception of the terms of choice) and (2) one's valuation of each alternative as weighted by his preferences. Information is assumed to be more or less costly to obtain and perceptions, more or less imperfect (as represented by information/perception screens in Figure 2).

To reconstruct a process of individual choice requires some mapping of opportunity costs. Buchanan observes (1969: 42-50) that costs which influence choice are always future-oriented, i.e., based upon expectations

of future events. In this sense he suggests that cost is experienced subjectively as a mental obstacle to some decision (1969: 42). Conversely, benefit (which is simply the obverse of cost) might be conceptualized as an inducement to choice. Each individual, then, possesses a value-image (Boulding,) of the world around him which consists of a structure of obstacles and inducements. These are essential data to be considered in a policy analysis.

A basic assumption is that individuals choose the least-cost alternative (or, equivalently, maximize net benefit) as measured subjectively by one's expectations and preferences (V. Ostrom, 1974: 52). Except where costs and benefits are easily quantifiable in money-terms, however, this assumption does not lead directly to interesting predictions. Preference-structures are subject to great variability from one individual to another. Further simplifying assumptions may be necessary to develop a model of individual choice in some context. Gordon Tullock (1965) assumes in modeling bureaucratic choice, for example, that bureaucrats want to advance. Similarly, one might assume that politicians want to be reelected. Sometimes it may be useful to posit partially conflicting preferences. For example, one might assume that a police officer wants both to be a "good cop" and to keep his job or advance; yet the parameters of the situation may require a trade-off between these two values. In a policy analysis, these are tentative assumptions used to guide a process of inquiry but subject to rejection on the basis of evidence.

Both the structure of events inherent in some public problem and the related set of decision making arrangements tend to produce high levels of interdependency among decision makers, i.e., outcomes for one are linked to outcomes for others. In this circumstance, what one decides to do depends

on what others may decide to do. This leads to important, perhaps paramount, considerations of strategy guiding individual choice. Strategic considerations, as in game theory, consist of expectations about how others will decide and act. Given a structure of events, these expectations are shaped primarily by decision making arrangements.

As long as the parameters of a situation remain fairly stable, the configuration of strategies chosen by relevant decision makers should also exhibit stability. Strategies do not have to be recalculated with each discrete decision, but reflect basic choices as to how to relate to others. If the parameters of a situation change, there may be a period of adjustment as individuals test out various strategies, before a stable set of strategies can emerge. During this period of disequilibrium, learning occurs. Once an equilibrium has been achieved, however, no individual can do better by changing his choice of strategy (Schelling, 1978: 25-27). Further modification in the configuration of strategies (and associated outcomes) depends upon a change of parameters.

The full configuration of strategies can be characterized, in Wildavsky's terms (1979: 11-12, 17), as a pattern of "social interaction." It is a map of the way people choose to relate to one another as individual decision makers pursuing their (subjective) interests. Exchange is one pattern which emerges from a structure of events consisting of private goods (divisible, subtractible goods to which the exclusion principle applies) and a structure of market institutions. In the public realm, an optimal pattern of social interaction consists of reciprocity (Boulding, 1972; Oakerson, 1978: 33-38). A pattern of reciprocity can be defined as one in which individuals take account of the interests of others in calculating their own separate choice

of strategy. Reciprocity need not imply altruism and may result from strategic considerations of self-interest; but neither is an element of altruism to be foreclosed as a likely possibility. Individuals depart from a pattern of reciprocity when, in the language of collective inaction, they choose to act as holdouts or freeriders. If a pattern of reciprocity is fully abandoned, individuals may tend to adopt mutually preemptive strategies which begin to resemble a war of each against all. The degree of reciprocity attained in social relationships is the principal measure of what might be called "political productivity" in a society. By the same token, abandonment of reciprocity is the primary indicator of nonmarket failure.

In any pattern of reciprocity each individual receives only a fractional benefit from his own contribution to a set of values shared at least in part with others; likewise, the greater part of his own benefit is derived from that contributed by others. As Olson (1965) and others have pointed out, fractional benefits create incentives to shirk. The maintenance of reciprocity as a pattern of social interaction depends upon a parallel pattern of social monitoring, so that individuals can call one another to account when necessary. Force alone, however, can never restore reciprocity in the absence of mutual benefit and equitable cost-sharing. To provide the decision making arrangements which enable a community of people to work out their relationships on the basis of reciprocity is the delicate task of public policy.

The diagnostic assessment of a public problem depends upon an accurate reconstruction of the individual choice of strategies which leads to an abandonment of reciprocity. To identify critical points of weakness in the

relationships among decision makers the data needed are subjective and consist of the obstacles and inducements to choice which individuals recognize in choosing strategies. This structure of subjective costs and benefits will vary with the patterns of mutual expectation among decision makers.

Outcomes

Outcomes or consequences exist in the realm of value, or perhaps more precisely, in the intersection of fact and value. That fact and value are intersecting sets has been generally overlooked in the age of positivism. In an effort to disentangle two strands for some purposes of analysis, we forget that in human experience facts and values are interwoven. Policy outcomes are a product of human action (and interaction) and therefore consist of facts ordered according to a set of values, or of artifacts (V, Ostrom, 1980). To attempt to specify outcomes without the constraining and ordering effect of values is to engage in unselective and unending description. Any discussion of outcomes is in practice selective and therefore necessarily value-laden. Evaluative criteria enable us not only to render an assessment once outcomes have been identified, but also to perceive those outcomes relevant to an assessment.

Methodologically, two problems appear: (1) the creation and choice of evaluative criteria and (2) the detection and measurement of relevant effects. A new subdiscipline of "evaluation research" in the social sciences is beginning to give systematic attention to these issues. E. Ostrom (1977) has stressed the need for "multiple indicators" in the measurement and evaluation of public services. The argument can be extended to include all policy

outcomes. The normative problem of public policy is not the maximization of value on a single indicator, but rather the proportioning of values in such a way that numerous indicators are held within tolerable limits. The appropriate set of limits for any single value can only be judged on the basis of other evaluative criteria. There is no "ultimate" standard of value available for performing this task.

Value-based inquiry faces two fundamental difficulties: (1) how to judge consequences experienced by others; and (2) how to aggregate individual effects to arrive at some judgment of social welfare. If we assume that individuals are the best judge of their own interest (V. Ostrom, 1971a: 45), then some procedure for allowing those affected to indicate their individual valuations is preferred to "expert" appraisal. Statistical aggregation of survey responses may be considered appropriate if the effects across the entire population are comparable and the basic direction of these effects, in the sense of being made worse off or better off, is the same for everyone concerned (or nearly everyone, allowing for measurement error). Otherwise, important differences would be disregarded, unless statistical aggregation is confined to sub-groups where effects are comparable.

As long as individual effects lie in the same basic direction for all concerned, a general assessment can be made on the basis of individual valuations. If, however, the direction of effect is not the same, there may be serious conflicts of interest among those affected. If we assume that no one is a fit judge of his own cause (V. Ostrom, 1971a:46), then individual expressions of interest cannot serve as a satisfactory indicator of value. Some reference to interpersonal norms becomes necessary in order to arrive at an aggregate value judgment.

A useful approach is to look for Paretian inefficiencies, i.e., to identify those made worse off by the transformation which occurs within the structure of a problematic situation. Any change which results in some persons being left worse off can be viewed as Pareto non-optimal. All governmental relationships, however, involve circumstances where persons are left worse off, e.g., the use of coercive sanctions. Any judgment of Pareto efficiency depends upon a distribution of entitlements in order to distinguish legitimate and non-legitimate deprivations. It may often be the case that there are legal entitlements in a substantive sense where circumstances preclude enforcement. In this case, general rules of law can serve as normative criteria for identifying non-legitimate deprivations which indicate a politically relevant inefficiency. Where substantive legal entitlements are unclear, or not plainly valid, a policy analyst must rely upon his own moral reasoning and be prepared to defend his conclusions in moral discourse. The classical political theorists recognized this prerequisite and gave considerable attention to articulating a process of moral reasoning in order to render an assessment of political outcomes.

Policy Analysis as Applied Political Science

Having dissected the model and examined it in terms of its four basic components, we return to a discussion of relationships among those four parts to explore uses and implications. An elaborated version of the model is depicted in Figure 2.

[Figure 2 about here]

The model is developed on an assumption that public problems occur as repeated plays of highly similar games. Unique situations that occur once,

Long-Term Change

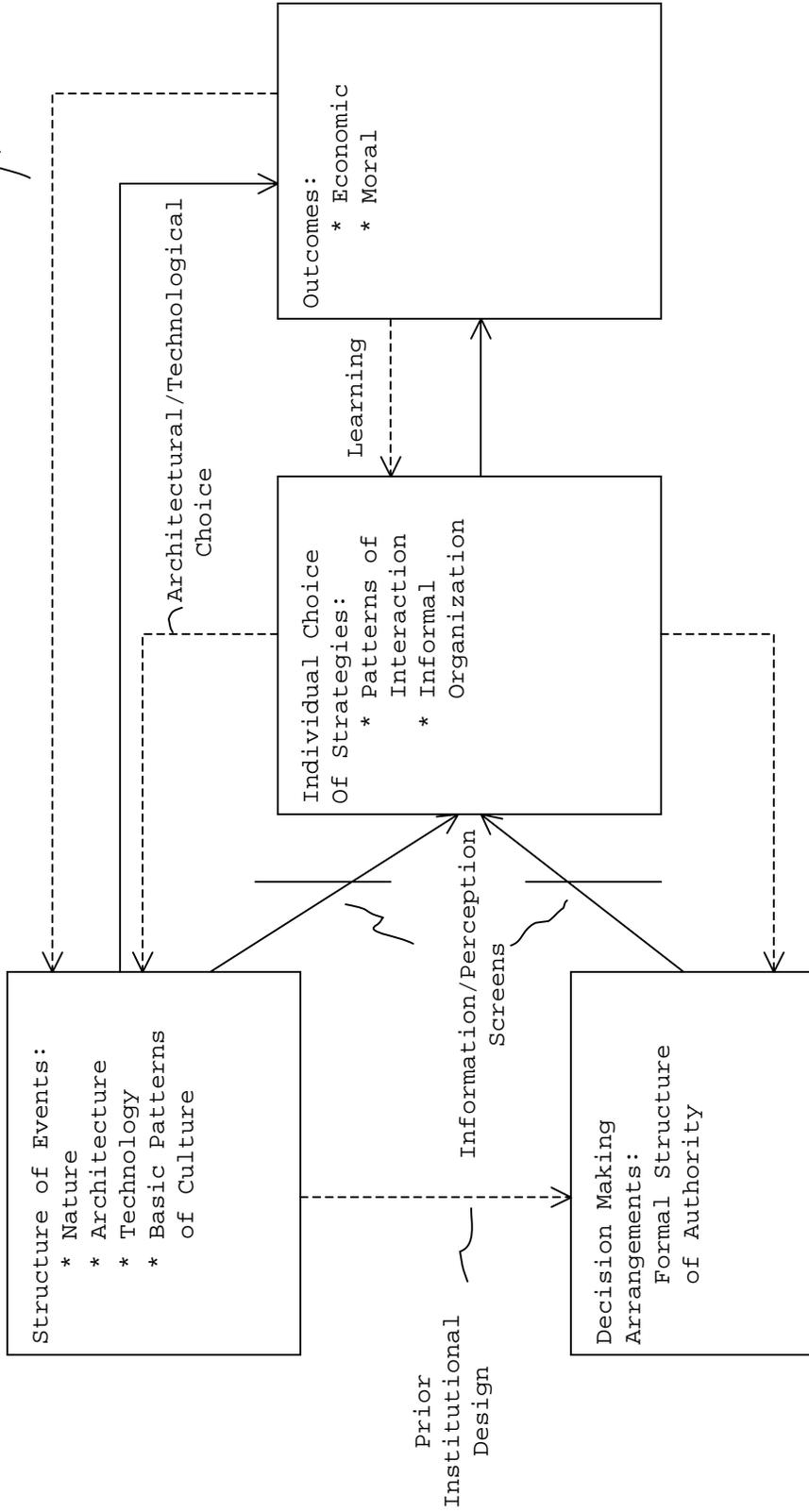


Figure 2. Elaborated Model of Public Problems and Policy Response

or which in some sense "self-destruct," are excluded. It is also assumed that a problem under analysis has acquired at least a temporary stability. Equilibrating processes have occurred and the "dust has settled." Various strategies have been tested and individuals have arrived at the best they can do within the parameters of a situation. Public problems are here represented as those intractable situations which find individuals repeatedly acting (and interacting) in ways that produce undesirable consequences.

Each repeated play of the game-like situation constituting a public problem should be viewed as a transformation of events within the parameters of the situation. The basic structure of events as one set of parameters is unchanged by any single play of the game. Events have a structure within which transformations occur, yielding a set of outcomes. Individual decision makers are the agents of transformation, as conditioned by the other set of parameters--decision making arrangements. The model as a whole therefore represents a transformation which occurs repeatedly within a stable set of parameters.

Situations are, of course, never completely static. Individuals may make idiosyncratic choices which cause at least temporary disequilibrium. A state of equilibrium can also be dynamic, moving from one state to another in some pattern. Another possibility is that a public problem may have more than one possible state of equilibrium and thus acquire stability only within certain thresholds. This type of situation might be viewed as fundamentally unstable. Still another is the possibility that repeated plays of the game may produce long-term changes in the structure of events, indicated in Figure 2 by a dashed arrow.

The latter possibility is especially interesting as a way of dealing with the phenomenon of "political culture." Elements of culture enter into the model as independent variables which form part of the underlying structure of events. Yet culture consists of patterns of interaction which have acquired a long-term stability transcending particular public problems or situations. As changes occur in the parameters of situations, individuals may choose different strategies for relating to one another. Over time, these new patterns of interaction may come to modify basic patterns of culture. The possibility for long-term cultural transformation certainly exists; but in the short term, culture is treated as a constraining factor.

There is no parallel possibility of direct feedback from outcomes to decision making arrangements. Rather, it is assumed that decision making arrangements are always a product of deliberate choice. A further assumption is made, indicated by a dashed arrow linking the structure of events to decision making arrangements in Figures 1 and 2, that some prior process of institutional design has endeavored to shape decision making arrangements to the existing structure of events. Maintaining an appropriate fit between these two sets of variables is a fundamental task of public policy.

Decision making arrangements are modified only by individual choices acting through a special set of decision structures for making "constitutional" choices. Constitutional choice (V. Ostrom, 1974: 66) is any choice of decision rules which assign formal capabilities and limitations to decision makers for the purpose of making future choices. A great variety of decision structures may be used as arenas of constitutional choice in this broad sense-- legislatures, courts, administrative agencies--as well as those decision structures specialized to constitutional choice, e.g., constitutional

conventions and amendment procedures. If the structure of events is taken as given, the only possibility for intervening in the stabilized play of a game is by changing the rules of the game, i.e., by modifying decision making arrangements through a process of constitutional choice. This implies a basic shift in individual choice of strategies and in the locus of decision making. Existing decision making arrangements are no longer taken as given. Yet these efforts to modify decision making arrangements take place even as repeated plays of the game--the problematical situation--continue as before. Different decision making capabilities, other than those involved in the immediate problem, must be drawn upon in order to invoke procedures of constitutional choice.

The use of the model as a diagnostic tool depends upon an ability to differentiate decision making arrangements from resultant patterns of human interaction. One exists in the realm of language, the other in the realm of behavior. The relationship between these two distinct sets of variables has long been obscured in political and administrative science by a meaningless debate between formal and informal structure as competing influences on behavior. The failure of formal structure to translate directly and simply into patterns of social interaction gave rise to a theory of informal structure as the posited source of patterned relationships among people. This so-called theory is equivalent to explaining a phenomenon by renaming it. That is, informal structure is simply another name for patterned human interaction. To the extent that individual choice of strategies acquires stability there will be a "structure" that appears to be controlling; and new entrants into the decision making arena will be well advised to study that structure or else learn by hard experience that a single decision maker

is seldom able to cause major disequilibrium or, even less, create a new equilibrium.

The theoretical problem, however, is how to account for this structure of relationships--this pattern of interaction or informal structure. Given a structure of events, the formal structure of decision making arrangements becomes the critical independent variable. Yet formal structure does not produce informal structure as a mirror image. All that formal structure can do is to introduce a bias toward some pattern of interaction by adjusting the terms of choice. The relationship between formal structure and informal structure is not straightforward; it is problematical. To appreciate the problematical nature of this relationship is perhaps the principal contribution of game theory to political science.

To change the transformation associated with a public problem requires a new pattern of social interaction among decision makers--a basic shift in individual choice of strategies. The problem is that new patterns of interaction cannot be directly prescribed. Wildavsky (1979: 264-70) recognizes this difficulty in his discussion of a "criterion of change" he identifies with the acronym "PROD": "personal relationships whose outcomes differ." Meaningful change occurs only when patterns of interaction are altered in such a way that outcomes are different. For such change to occur, individuals must choose different strategies for relating to one another. Given a structure of events, the only instruments available to effect a PROD change are rules--decision making arrangements. Yet the use of rules in this way depends upon a knowledge of how rules affect choice.

There is another possibility for intervening in the realm of human interaction, if crucial elements in the structure of events are not given in

nature, but represent constraints and opportunities supplied by human artifacts. The structures of events which characterize cities or housing projects or schools, for example, are in part man-made. Physical design decisions also offer the potential for modifying patterns of social interaction. A choice of architecture, or technology, may therefore be "constitutional" in effect and implication. The pathbreaking study of this type of relationship is Oscar Newman's Defensible Space (1972), where he demonstrates that different architectural designs (the structure of events) applied to public housing (decision making arrangements) variously affect patterns of interaction among residents (individual choice of strategies) which, in turn, produce different levels of crime (outcomes). By the same token, the choice of technologies, perhaps in policing or education, may depend on one pattern of interaction to produce favorable outcomes, yet result in different patterns of interaction producing unfavorable outcomes. "Political" considerations become relevant to the choice of technologies (Winner, 1980).

The purpose of policy analysis, in this model, is to inform the process of constitutional choice, broadly construed. Three basic uses of the model are implied: (1) diagnostic, (2) prescriptive, and (3) knowledge-building or scientific. The diagnostic capability is a necessary foundation for both prescriptive work and scientific work, both reasoned intervention and reasoned inquiry. It is the fundamental skill of policy analysts.

Diagnostic work should begin by modeling the structure of events. This may require some level of technical proficiency in the system under investigation and thus bring the policy analyst to scientists, engineers, or other technocrats for information. The skill of the analyst lies in knowing what

questions to ask and what to make of the answers. Once the boundaries of a problem-situation have been determined, the analysis can move on to decision making arrangements, that is, to those decision making arrangements relevant to a bounded structure of events. Some skill in legal research and a comparable skill (for which there is no good name) in institutional research are essential. In addition to examining the text of a set of rules, it is imperative to inquire into the way those rules are commonly understood by relevant decision makers. Although both the structure of events and decision making arrangements affect individual choice of strategies through information/perception screens (see Figure 2), in the case of decision making arrangements a common misconception becomes reality.

Individual understanding of rules, as well as individual choice of strategies, can only be determined by asking people. In-depth interviewing of carefully selected informants can be supplemented by survey research. Patterns of interaction can be described in behavioral terms, but investigating the obstacles and inducements to choice requires subjective data. The same is true of outcomes. Use of the more sophisticated tools of cost-benefit analysis must be tempered by a reliance on individual valuations as the empirical basis for assessment. One can also turn for guidance to the moral reasoning of individuals affected when interpersonal comparisons are needed to build an aggregate evaluation.

This methodological approach for the most part leaves open the choice of theory needed to guide each step of the analysis and, especially, to put it all together. Except for specifying, broadly, the independent and dependent variables, the model contains no theoretical statements. More to the point, there are no propositions which link particular characteristics of a structure

of events and/or decision making arrangements with particular patterns of interaction and outcomes. Precisely how particular sets of parameters affect the transformation which occurs is left unanswered. Policy analysis simply cannot proceed, however, without the use of theory in this sense.

To be useful, the methodological skeleton presented in this paper must be clothed with theory. The problem of using theory to guide the analysis of a problem amounts to selecting, what Bruner (1968: 71) has called, a "puzzle form." Bruner, who borrowed the idea from T. D. Weldon (1953: 75-83), writes as follows:

There are troubles which we do not know how to handle; then there are puzzles with their clear conditions and unique solutions, marvelously elegant; and then there are problems--and these we invent by finding an appropriate puzzle form to impose upon a trouble.

Theory is needed to reduce reliance on trial and error in the course of inquiry by providing puzzle forms which indicate what to look for in the midst of a confused and troubled situation. Trial and error--and in Wildavsky's terms creativity--cannot, however, be eliminated. A puzzle form initially selected may eventually be rejected as the inquiry proceeds. Moreover, no problem exactly conforms to an abstract puzzle. A policy analysis simply draws upon a puzzle form to create a "theory of the problem" which involves adapting the puzzle to fit the specific situation.

In terms of the methodology developed here, useful puzzle forms would represent typical problematic transformations. V. Ostrom (1974: 56-58) develops one such puzzle form--the tragedy of the commons--in terms of the four sets of variables. A closely related, but somewhat narrower, puzzle form is the "erosion of public goods" (Buchanan: 1970; Oakerson, 1978, 1980), relating to public goods which take on many of the characteristics of a

commons once supplied. Schelling (1978: 91-124) discusses a number of models which can serve as puzzle forms, including critical mass and tipping models, self-fulfilling expectations, and self-enforcing conventions. The further development of intermediate-level theory in the form of puzzles which relate to broad classes of public problems is an important theoretical task in policy analysis and one that may be stimulated by systematic attention to methodology.

To shift from diagnostic work to prescription requires a further infusion of theory into the analysis. A more general theory of institutional design, relating specific modifications in decision making arrangements (or perhaps the structure of events) to anticipated changes in patterns of interaction and outcomes, is needed. A choice of theory at this level involves choosing among broad theories of politics and government. V. Ostrom (1974) devotes much of his discussion to a paradigm-level choice between monocentric and polycentric approaches to institutional design. Furthermore, unless one chooses a paradigm of revolution, the application of institutional theory to the resolution of a particular problem would depend upon the use of available institutional capital, which presumes an understanding of the policy instruments afforded by a particular political system, the logic of that system, and how the system has developed in related areas.

Whatever the choice of theory at this level, the model of public problems and methodology of policy analysis presented here can be useful in organizing the discourse of policy analysts. Only by agreeing upon common terms of discourse can theorists of diverse persuasions clarify their differences and engage in useful dialogue. It may then be possible to design empirical research which puts critical points of difference to a test. Only then can political

science offer reliable political knowledge, in addition to intelligent speculation, to guide the prescriptive work of policy analysts.

A third use of the model of public problems is as a methodology of political inquiry with policy relevance. Propositions linking the four sets of variables can be tested empirically. For example, E. Ostrom and colleagues (1973, 1976) have explored the relationship between size of police jurisdiction (an element of decision making arrangements) and outcomes as measured by citizen-consumer evaluations, while controlling for both the structure of events (type of service and conditions of service delivery) and other elements of decision making arrangements. Individual choice of strategies was initially treated as an unmeasured intervening variable, but subsequent research (Parks, 1979) has gone further to examine both the choice of production strategies by police departments and self-protective strategies by citizens. The results of this research cast great doubt on a long tradition of policy prescription advocating consolidation of small and medium size police agencies.

The meaning of policy has been especially elusive for political scientists. Is policy a set of objectives--a declaration of intent and purpose? Or is policy the set of actions taken and consequences produced? Should policy analysis focus on "process" or on "content?" What do we mean by the "content" of a policy? If the focus is on process, what is the relationship between policy "development" and policy "implementation?" Wildavsky (1979: 2) comments that "hundreds of conversations on this slippery subject have proved futile, even exasperating, possibly dangerous. . . ."

The problem is not simply definitional, though part of the problem is with language: policy is a noun without a verb form. We can talk easily about

"making" policy and "implementing" policy, but this creates a seriously misleading dichotomy. Policy is not usefully viewed as a declaration that is then subject to implementation. Policy instead needs to be viewed as an activity, a process, a system of relationships. Policy makers use policy instruments which attempt to shape patterns of interaction among decision makers, some of whom might be considered "implementers," some not. (When citizens sue an agency to invoke enforcement of a statute, who are the implementers?) The policy instruments available are mostly institutional--variously distributed decision making capabilities and limitations--and to some extent physical--as in the choice of architecture or technology. All public programs entail a set of decision making arrangements used as instruments of policy to affect patterns of interaction and outcomes. The effect of budgetary decisions is greatly dependent upon the prevailing distribution of authority.

The model of public problems presented here is equivalent to a model of policy. No public problem occurs in a policy vacuum, political rhetoric notwithstanding. The transformation of events represented in the model can be viewed as a policy transformation. The content of policy is a process; but descriptive studies of policy making and implementation miss the point. The focus of study should be on the instrumental relationships of policy--the use of structure to shape process and outcomes. Any decision making arrangement, however great or small, can be viewed as an instrument of policy. To do so is to see the potential for political science as an applied discipline.

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