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## Policy

### Appearance and Reality<sup>1</sup>

#### *Overview of “Problems” and “Solutions”*

“Gracious me! I’ve been talking prose for the last 40 years and have never known it.” That exclamation was by M. Jourdain in Molière’s *Le Bourgeois Gentilhomme*. I and my fellow applied social scientists, with no notable exceptions, would have to confess the same ignorance, with regard to policy, not prose, for the last 40 years. We have been that way since Lerner and Lasswell announced the emergence of the “policy sciences” in 1951 in a book with that title. In policy situations, we have gone on doing what we know best to do as social scientists. We have consistently evaded the question what it is about the policy sciences that makes them different from the other social sciences. We have been successful in that evasion, I suggest, because we have been sensitive to, and responded appropriately to, changes in context as we move from private to public organizations and from executive to administrative levels. In attributing the reasons for different practices to these contextual differences, we have been guilty, I further suggest, of the fallacy of misplaced concreteness. In what follows I argue that the significant differences are conceptual, not merely contextual. I go on to suggest how we might now try to realize Lasswell’s vision that

the policy science orientation . . . will be directed toward the knowledge needed to improve the practice of democracy . . . to affirm the dignity of man, not the superiority of one set of men. (Lerner and Lasswell, 1951 : 10)

That next step takes us beyond what we mean by policy to challenge what is meant by science when people talk of policy, or economics, as a science.

<sup>1</sup>From *A Systems-Based Approach to Policymaking*, edited by Kenyon B. De Greene. Dordrecht: Kluwer Academic Press, 1993.

### *Concepts and Definitions of Policy*

Policy *formulation* must reflect the complexity and uncertainty of the environment within which choices are being made. We are not here referring to the choices that are made with respect to which goal or objective one should pursue; that is the domain of strategic planning and mission formulation. Our concern here is with forming policies. We are referring to a bias that an organization wishes to introduce with respect to a whole range of choice of means that might be made by those acting as agents of the organization; or by persons and organizations that are to some degree dependent on that organization. What is common to formulation of both strategies and policies is that both involve choices made by purposeful individuals or organizations.

*Adoption* of a policy should presuppose that viable plans have been made to enable the "bias" to operate in relevant areas of decision making. Unless ways can be identified so that the agents have to make choices that conform to organizational policy, e.g., follow-ups and inspections, the policy is no more than wishful thinking or window dressing. With respect to independent parties, adoption presupposes that their life-spaces have been modified in ways that lead them more often than not to make the desired choices. In this latter case, there often is no clear cut measure of effective adoption. To continually insist that there is a public policy in the absence of such evidence of adoption is to invite the so-called boomerang effect—as with many inhibitory policies, e.g., anti-smoking.

The above two statements presuppose a view of policy making that is not commonly held. A "good" policy statement would normally be held to be one which is simple and unambiguous with a clearly stated purpose that obviously serves some higher social or organizational good. The implementation of such a good policy statement could then be left to any person of common sense to work out. "Policy adoption" is simply not a problem if the policy is straightforward and stated "loudly and clearly." In this view, policy formulation is very much like formulating an advertising theme, and this may be why governmental and corporate policy making is so frequently associated with large public relations and media budgets. We shall try to explore the differences between these two views of policy. Unfortunately, we run into difficulties when we ask the first and obvious question of what makes a statement a policy statement.

In fact, the striking feature about the whole field of policy studies is the lack of definition of what it is that distinguishes policy studies ("policy sciences!") from political science, economics and applied social sciences. A common practice is to provide a simple postulate of what a policy is and then, without analysis or justification, proceed to attribute whatever meanings suit the matters under discussion. Equally common is the practice of simply ignoring the issue on the assumption that, if the author says he is writing about policy issues, then

they are policy issues (see Meehan's critique, 1985). Wildavsky, at least, in his classic study of *The Art and Craft of Policy Analysis* (1979), tried to confront the issue and admits that he and faculty colleagues have failed to resolve the matter:

How can you teach (or write a book about) a subject if you can't say what it is?

At the Graduate School of Public Policy in Berkeley, I discouraged discussions on the meaning of policy analysis. Hundreds of conversations on this slippery subject had proven futile, even exasperating, possibly dangerous. . . . Yet . . . students did learn to do (policy) analysis. . . . What was it, then, that could be learned but not explained, that all of us could sometimes do but that none of us could ever define (at least to anybody else's satisfaction?) (1971: 2)

Their teaching experiences led them to conclude that this is a subject that is "better taught backward" (p. 3).

For the moment, let us just suggest that the success of "teaching backward" is probably due to the same factors that made the case-study method of Harvard Business School so attractive when we knew so little about what constituted good management. The case-study method, insofar as it works, can do so not from inductive generalizations but only in that some general principles are intuited that can then be put to the test. We hope, in what follows, to spell out what it is that might be so intuited. Hence our primary interest, for the moment, is in the definition of policy; its conceptualization. Table 1 provides some dictionary definitions.

If the leading practitioners and scholars cannot define policy, can some help be gained from the way the word is used in society at large? This is not an unrealistic ploy as in everyday life, as distinct from academia, it is often permissible to call a spade a spade.

In the last two sets of dictionary definitions, the most modern, the repeated reference is to "a course of action," even a "definitive course of action." These references blur the distinction between policy and means-end planning, strategy and problem solving. Each of these last three terms can be taken to imply a course of action that is adopted or pursued. However, the Oxford English Dictionary (OED) reference to prudent procedures seems to group together courses of action in terms of the qualities they have as means, as such, rather than their qualities as means to an end. The OED definitions abjure terms like efficacy and efficiency which would better describe courses of action as means to an end.

The apparent confusion in public usage of the term "policy" does not, however, appear in the definitions provided by Webster. It will be noted that the definitions in Webster's, original 1898 International edition, are focused on the

TABLE I Some Dictionary Definitions of Policy

*Webster's International*, 1898

- The settled method by which the government and affairs of a nation are, or may be, administered.
- The method by which any institution is administered.
- Management or administration based on temporal or material interests, rather than on principles of equity or honour; hence worldly wisdom; dexterity of management; cunning; stratagem.
- Prudence or wisdom in the management of public and private affairs; wisdom; sagacity; wit.

*Webster's International*, 1964

- A definite course or method of action selected (as by a government, institution, group or individual) from among alternatives and in the light of given conditions to guide and usually determine present and future decisions.
- A specific decision or set of decisions designed to carry out such a chosen course of action.
- Such a specific decision or set of decisions together with the related actions designed to implement them.
- A projected program consisting of desired objectives and the means to achieve them (formulation of policy).

*Oxford English Dictionary, Compact Edition*, 1971

- In reference to conduct or action generally: Prudent, expedient, or advantageous procedure; prudent or politic course of action.
- A course of action adopted and pursued by a government, party, ruler, statesman, etc.: any course of action adopted as advantageous or expedient (the chief living sense of "policy").

*Macquarie Dictionary*, 1981

- A definite course of action adopted as expedient or from other considerations.
- A course or line of action adopted and pursued by a government, ruler, political party or the like.

quality of means (methods) not ends, and that the criteria for judging the selection of means are notions of prudence, wisdom, sagacity and wit. (The explicit exclusion of equity and honor as criteria possibly reflects the decades of corruption of public policy formulation in late nineteenth century U.S. by the "robber barons" and their ilk.) Webster's 1964 International edition reflects the massive growth in the twentieth century of the "administration of people." It distinguishes between policies as potential guides to "present and future decisions," plans for implementation and formulated policy (program) as the combination of both features.

It is necessary to merge Webster's 1898 and 1964 definitions:

- A policy is a principle which is intended to guide the choice of means (methods) in the pursuit of objectives.

- A formulated policy is one which specifies how that principle will be implemented in given conditions.

### *Policy Compared to Strategy*

It will be noted that a policy is not what is usually understood to be a strategic plan. Four distinctions need to be made.

A *strategic plan* typically depicts a strategic objective, to be achieved within a specified period, and a hierarchy of subgoals whose achievement will ensure the achievement of the objective, e.g., to land a man on the moon by year X, to seize x percent market shares in the next financial year, to graduate in law in five years. A *policy*, however, is typically one step removed from direct pursuit of an objective. A policy typically seeks to produce a change in the social environment such that certain kinds of ends are more or less easier to achieve, e.g., that there is less discrimination against female employees, that there is more equity in educational opportunities or that fewer people are motivated to violence. The benchmark for judging the worth of a policy is already given by the existing levels of such phenomena and has only to be pointed to by the policy-maker, not invented as in goal setting; past social experience indicates the rate of change in the occurrence of such phenomena that might be expected from policy interventions and thus serves to measure progress in the implementation of policy.

A strategy is expected to create both the *necessary AND sufficient* conditions for the achievement of the objective. At best a policy can only establish some of the *necessary* conditions for the pursuit of some strategic objectives—a producer-product relation not an analog of cause-effect relation (Ackoff and Emery, 1972).

With the achievement of its strategic objective an organization has usually managed to move itself to a more propitious place in its environment. By contrast, a policy typically seeks to change the environment or organizational culture within which objectives are pursued. By such changes it seeks to establish conditions that are necessary, although not in themselves sufficient, for the achievement of other objectives.

In pursuit of strategic objectives we see an interdependent set of activities that are convergent on the objective. The objective acts as the system principle and the relation between the parts tends to be multiplicative. Failure in one step may undermine the whole, while success may make the other steps easier. In the implementation of a policy we see a divergent set of activities. Those activities add up to determine the extent of implementation but are largely subject to local determination rather than system determination. Failure in one area does not have any necessary implications for success or failure in other areas.

The distinction between strategy and policies appears to be the same distinction as that we make in military affairs between strategy and doctrine. The military have had no problem in distinguishing strategy from doctrine; for example, doctrines for the employment of armor from the strategies which those indoctrinated forces implemented. In civil affairs the distinction was less apparent as government administrators concerned themselves with how policies evolved, and corporate leaders concerned themselves with corporate strategies. The professionals advising these two worlds have tended to live in separate professional communities. Selznick (1957) tried to bridge the gap with his book, *Leadership in Administration*. He was ahead of his time.

### *Distinctive Problems of Policy Formulation*

The differences between the formulation of strategy and the formulation of policy are not trivial differences: different concepts are required to explain or predict the different dynamics. And evaluation must be done in different ways.

Governing bodies are typically involved in both strategic planning and policy formulation and often, in practice, the activities will overlap. Thus, strategic planning may indicate a need for new policies in some areas, and the simultaneous failure of several policies may lead to the formulation of new strategies. Nevertheless, the distinctive problems of policy formulation need to be borne in mind with respect to conceptualization, construction, critical criteria and institutional supports (Meehan, 1985).

#### CONCEPTUALIZATION

It is wishful thinking to imagine that realistic policies can be arrived at by either deduction or induction. No social science—including economics—offers a theory that adequately represents social reality. Deductions from the theories that we have can only give our arguments a spurious rigor. Similarly, there is no inductive methodology that can be cranked up to yield reliable policies automatically, whether it be survey sampling, experimentation or computer simulation. We can only proceed in the way that scientific discovery usually proceeds, that is, by retrodution. Given the issue that happens to concern us—traffic accidents, child poverty or whatever—we can only study it from as many angles as possible until it occurs to us that the phenomenon might be a consequence of some general principle. Thus, for instance, we might be concerned with the dissatisfaction expressed by a particular workforce. However we look at it, the dissatisfaction seems very real and persistent. Then we call to mind the general proposition that “alienation causes dissatisfaction” and ten-

tatively entertain the hypothesis that these workers may be alienated and that that is what is causing the dissatisfaction that we observe. With this hunch we have begun to define a problem and a direction in which a solution might be found. If we find that there is no way in which these workers can be described as alienated, then the hypothesis has to be discarded and we are back at square one without a problem that a policy might solve.

In our search for hypotheses we have to remain “domain oriented.” That is, we have to take the phenomenon as it presents itself and search for whatever principle appears to fit the phenomenon regardless of how that phenomenon might be defined by disciplines or professions.

We are typically looking for policies that can be effective for social groupings that are multinodal and heterogeneous and we cannot assume the level of authority that can pertain to uninodal, homogeneous groups (Ackoff and Emery, 1972:227–29).

#### CONSTRUCTION OF ADEQUATE POLICY STATEMENTS

The most important consideration in the construction of policy statements is precision. Whether rewards or sanctions are used to induce compliance with a policy, the most important consideration is that there should be no fuzziness about what is being rewarded or sanctioned, and no more behaviors should be covered than is essential for the purposes of the policy. Thus, if there is a policy to protect a particular fish population, it should specify that only fish over  $x$  inches long should be taken, not that only “mature” fish be taken or that “under-sized” fish should be returned to the water. The underlying aim is that introduction of a new policy should make the least possible change in existing conditions of life and the least possible demands on—or threats to—those it is hoped will observe the policy. If an explicit policy is needed, it is because sufficient people have not already seen the sense of behaving in the desired fashion. However, it is rarely the case that people act as they do without some reason. Hence, it should always be assumed that a new policy will arouse opposition and some measures must be planned to minimize this opposition. An “unfreezing” of existing habits is a prelude to change of habits.

#### CRITICAL CRITERIA

At the very least, a policy should meet the criteria of specifying what actions should follow from observing the policy, of identifying the target population(s) and of producing a measurable change for individuals (not just some superficial change in the behavior of aggregates or institutions).

## INSTITUTIONAL SUPPORTS

Inducing a change in behavior is not enough in itself. Steps need to be taken to support the continuance of the new behavior. Policy-makers have been quick to take advantage of the marketing potential of television. They need to take a further leaf from the book of modern marketers. Those people know that a successful launch has to be prepared for with careful organization of continued support from branding, pricing and distribution outlets. Similarly, with policies there needs to be careful consideration of what institutional supports are going to be needed to sustain the changes in behavior once they have been induced. The social field needs to be "frozen" again so that the new behaviors resulting from the policy come to be seen to be as natural as the previous behaviors (e.g., wearing car seat belts, not smoking in aircraft).

## IN BRIEF SUMMARY

The points made about these four issues were meant as serious comment on the practice of policy making. However, the main point was to illustrate that the concerns of the policy-makers draw them into a universe of discourse that is demonstrably different from that of the strategic planners. We did not speak above of identifying strategic objectives, formulating mission-type orders, allocating resources to subgoal attainment or of operational, as distinct from tactical, planning.

*A Systems-Theoretic Interpretation*

Enough has been said here, I think, to justify a more formal statement about the differences between policy making and strategic planning. I shall try to state the differences in systems-theoretical terms because, as I shall try to show later, this links policy making to some well established and powerful lines of thought. I shall have to take this carefully as, in the past three decades, we have generated great confusion about what is a "systems-theoretical" statement; and we have generated a corresponding cynicism that such that such statements are just the traditional arguments dressed up in the new "buzz words."

First, if we take  $L_{11}$  to represent the system (or set of systems) with which we are concerned and let  $L_{22}$  represent the environment, then  $L_{12}$  and  $L_{21}$  can be taken to represent the effects of each on the other. To represent a total system-environment situation at any given time, there must be some lawful statements ( $L$ ) for each one of the sets (11, 12, 21, 22).  $L_{22}$  can range from placid, randomized environments to turbulent-field environments and pos-

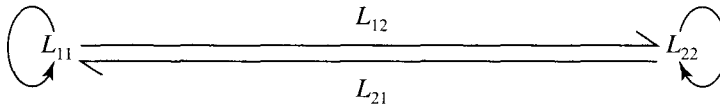


Figure 1. Parameters of the system-environment situation. Circular arrows represent lawful determining relations between parts of  $L_{11}$  and  $L_{22}$ .

sibly, in extremes, to Type V, vortical environments (Babüroğlu, 1988/Vol. III; Emery and Trist, 1972).

Figure 1 is an approximate representation of what I take to be the fundamental theorem of systems theory. Von Bertalanffy's (1950) concept of the "open system" totally ignored  $L_{22}$ ; and Prigogine's (1980) concept allowed for only a minimal specification of  $L_{22}$  as random and hence with random bursts of relatively high energy in-flows. The position I took in the early 1960s was that changes in  $L_{21}$  are not all random but can sometimes be determined from changes taking place in  $L_{22}$ . Hence the concept, implied in Figure 1, that *a system can be fully characterized only if we can characterize its environment*. Either way, the testable assumption is that  $L_{12}$  and  $L_{21}$  are both greater than zero. With this formulation, the environment for living systems is much less than the universe of the physical scientists and much more than the world of the closed systems social scientists (e.g., Parsons's [1937] or Lewin's [1936] "perceived life space"). Two of the hoary problems of systems thinking just drop away; that is, what, apart from complexity, distinguishes a system from an aggregate of elements and how do boundary properties determine the system-environment relation.

In 1956 Hall and Fagan distilled out the classic definition of "system" as "a set of objects, conceptual or material, with their interrelations." This definition, like the sources from which it was distilled, blithely ignored the point that Angyal had made in 1941. Angyal argued that defining a system requires identification of the system principle which alone explains why these particular items enter into these particular relations; and which alone explains why we can confidently speak of systems as incomplete or having elements or relations that are redundant and alone explains why, if we find more than one system principle, we always find two or more entangled systems. The concept of a "system principle" is unacceptable to scientists if this is construed as "autopoiesis," a sort of Aristotelian essence inherent in the system. Thus Maturana and Varela (1980) define the organism as a self-regulating system and give the name autopoiesis to the self-regulating process. That is acceptable, but they go beyond that to assert that this is some sort of entelechy, within the organism, that drives the system. For them  $L_{22}$  is merely a source of perturbations. The metaphor they give (p. 51) is of a pilot flying blind on instruments without ever

knowing what it is that is outside and reflected, presumably accurately, on the instrument panel. Using their assumption, the scientific study of organism-environment relations is ruled out. A scientist would insist that only the study of organism-environment relations could lead one to entertain such an hypothesis. It is not a matter to be determined on a priori grounds. In line with the formulation of system-environment relations presented above, we are asserting that the system principle, as with system goals, is to be found in the special forms of interdependence that exist between the system and its environment. These interdependencies are open to scientific study; they are not speculations about untestable essences. It is this concept that is embodied in the dictum that any organization that seeks to influence its future must first ask itself, "What business are we actually in?" Get this wrong, then the organization's offers of dependency will not be reciprocated; there will be no interdependence and no future.

The argument represented by Figure 1 also does away with the hoary concept of "system boundary" as a third type of thing—like a fence or a wall—that mediates between system and environment. Instead, the boundary is represented as a process involving the *interaction* of  $L_{12}$  and  $L_{21}$ . It is a negative reflection on systems thinkers that they should have reified the concept of boundary for so long. Militaries long ago recognized that physical obstacles did not constitute boundaries between social systems (armies). The dynamic property of a boundary is that any uninvited crossing has the potential of invoking purposeful reaction. Obstacles covered by a reaction force can become a boundary, but without such covering defensive fire they are simply physical obstacles.

The theorem represented in Figure 1 can be better represented as shown in Figure 2. This representation has the advantage of highlighting

- that purposefulness is the result of the imbrication of two or more causal strands (we do not resile from causal relations within each strand, and we do not resort to teleology).
- that time is intrinsic to the transactional relation defined by the four terms. The emergent—and unpredictable—characteristics of the event at  $t_2$  de-

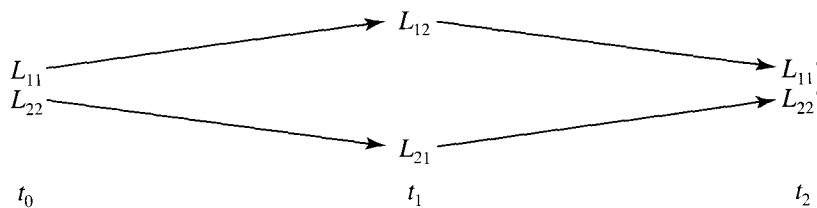


Figure 2. Temporal relation of the parameters of the system-environment situation.

fine it as later in time than the events at  $t_0$  (time is extrinsic to the two-term interactions that can fully characterize any mechanism. Interactions define only a change in the arrangement of parts; the change could take place in either direction. Hence, only some external criteria can establish which was the prior arrangement). The period  $t_0 - t_2$  constitutes "the present" for the temporal gestalt defined by the transformation of  $L_{11}, L_{22}$  to  $L_{11}', L_{22}'$ .

- that change and novelty are inherent in the transaction because the interaction of the independently determined processes  $L_{12}$  and  $L_{21}$  at  $t_1$  and  $t_2$  is a unique, one-off event.

SYSTEMS DEFINITIONS OF POLICY-MAKING AND STRATEGIC PLANNING

Having laid this groundwork, we are in a position to give a more rigorous, formal definition of strategic planning and policy making.

If, in *strategic planning*, an appreciation of  $L_{22}$  and the capabilities of the system  $L_{11}$  has revealed that new and more desirable forms of interdependencies are possible, then the plan for implementation is typically as shown in Figure 3.

If, in *policy making*, it is considered desirable to change the behaviors of the system, or set of systems, from  $L_{12}$  to  $L_{12}'$ , then the plan for implementation is typically as shown in Figure 4.

Naturally, both strategic planning and policy making are working within the same model of system-environment relations but, aiming for different kinds of changes, they start from different places and work in different directions. The end result may not appear very different.

This presents us with two theoretical extremes. In practice strategic plan-

1.  $(L_{11}, t_0 \longrightarrow L_{11}', t_1) \longrightarrow (L_{12}, t_0 \longrightarrow L_{12}', t_1)$
2.  $(L_{12}, t_0 \longrightarrow L_{12}', t_1) \longrightarrow (L_{21}, t_0 \longrightarrow L_{21}', t_2)$
3. to give at  $t_2$  a new steady state level of

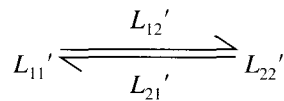


Figure 3. Formal definition of strategic planning.

1.  $(L_{22}, t_0 \longrightarrow L_{22}', t_1) \longrightarrow \frac{(L_{21}, t_0 \longrightarrow L_{21}', t_1)}{\hspace{1.5cm}}$
2.  $\frac{(L_{21}, t_0 \longrightarrow L_{21}', t_1)}{\hspace{1.5cm}} \longrightarrow (L_{12}, t_0 \longrightarrow L_{12}', t_2)$
3. to give at  $t_2$  a new steady state level of:

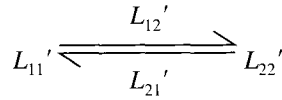


Figure 4. Formal definition of policy formation.

ning and policy making are not always such exclusive concerns. I shall return to this point but for the moment another matter should be considered.

### Four World Hypotheses

The theoretical position outlined above corresponds with Pepper's (1942) world hypothesis of *contextualism*. No apologies are needed for that "coincidence." The leading theorists concerned with policy making (Lasswell, 1971; Meehan, 1982; Wildavsky, 1979) have unanimously stressed that any scientifically guided policy making must accept the rich diversity of interests, concerns and understandings of the contexts within which need for policy emerges and within which policy, once implemented, must find a home.

Granted that we have no place for policy making that is derived from interpretation of sacred texts or the whims of autocrats, there are only three alternatives to proceeding from contextualism. These are organicism, mechanism and formism.

We could proceed from the world hypothesis of *organicism*, that is, that the state is a living organism, like one big family. Under the influence of Hegel much of the welfare system of Bismarck's Germany appears to have evolved as a form of paternalism. In a family it is usual for the welfare of one member to be positively correlated with the welfare of the other members. In a modern society it is usual to find that at any given time (but not always) the welfare of some members is negatively correlated with the welfare of other members. This is Karl Marx's thesis of class conflict. Much more prevalent these days, and just as deep-seated, is "dissociation," the perceived lack of any relation between one's own welfare and the welfare of others (Emery and Emery, 1976:64-71, 109-14/Vol. III). The other side of the modern coin of social

exchange is the widespread sensitivity of age, gender and ethnic groups to anything that vaguely smells of paternalism. Whatever other faults the organicist world hypothesis has (Pepper, 1942: 295–304) it does not adequately describe modern societies and for a policy-maker to presume otherwise is to enter a political minefield.

The *mechanist* world hypothesis has much more relevance to policy-makers. If they have had any tertiary education in the physical or the social sciences (not including economics), they will be deeply steeped in the categories and methodologies that have, since René Descartes and Isaac Newton, been associated with this model. In the public eye the quintessential scientific activity is the experimental demonstration in the laboratory of what causes what. When policy experts seek help from these sciences, it is likely to come in the forms suggested by this world hypothesis. If the policy experts consult the scientists about Problem *B*, the answer will take the form “*A* causes *B*” (more or less); therefore, if you change *A*, then *B* will change. Despite the usual passing reference to “multiplicity of other causes,” this model seems always to encourage tunnel vision and single issue politics. More importantly, the logic of causes and effects seems more relevant to the pursuit of strategic objectives than the formation of policies. The logic of the policy expert is not usually “if *A*, then *B*.” The logic of the policy expert is more appropriately that of “not *A*, therefore not *B*.” A policy is argued on the grounds that if the policy is not in place, then *B* will not occur; if it is in place, it is possible that *B* will occur, but still possible, for other reasons, that it will not.

At the practical level it might seem that policy experts need not give much attention to advice from the mechanistic schools in the social sciences as they have produced so little knowledge that matches the rigor of the physical sciences. This is not so. There are many social scientists who will argue forcefully and persuasively that their sciences can achieve this stature if only they are given enough resources and encouragement. It is obvious that the policy-makers of the Western democracies are not impervious to such persuasion. Often the support given to social scientists is cynical window dressing. Exercises like the massive U.S. Congress support for James Coleman’s (1966) study *Equality of Educational Opportunity* suggests that sometimes the policy-makers do believe that social science can deliver the goods. Or, at least, give that impression to the electorate.

The kind of promise that is held out to policy-makers is well illustrated by two of the textbooks on systems theory for social scientists:

If we have a full description of the input signals and a full description of the system, it IS possible to derive a full description of the output system. Thus dynamic system analysis remains a determinate discipline. Perhaps it is even