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ABSTRACT

In contrast to science and technology, public policymaking systems lack knowledge about the design and operation of overall social control. Policy sciences contribute to the understanding and improvement of large-scale control systems, especially in their attempt to give rationality to policymaking and decisionmaking activities. The most important implication of policy sciences is that they provide man with the ability to direct and control his future. (RA)

POLICY SCIENCES: DEVELOPMENTS AND IMPLICATIONS

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THE NEED FOR POLICY SCIENCES

From the point of view of human action, scientific knowledge can be divided into three main levels: knowledge relevant to the control[1] of the environment; knowledge relevant to the control of society and individuals; and knowledge on the control of the controls themselves, that is, on *meta-control*.

Knowledge on control of the environment, as supplied by rapid progress in the physical sciences, is the most highly developed one. Knowledge on control of society and individuals is much less advanced, but at least the social sciences and psychology constitute recognized components of science, receive significant support, and do show some signs of progress. Least developed of all and scarcely recognized as a distinct focus for research and study are meta-control knowledge,

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[1]I am using the term "control" in the sense of regulating, governing, shaping, directing,,and influencing. "Monitoring" is one sub-element of "control," in the broad sense in which I use the latter.

that is, knowledge on the design and operation of the control system itself.

Scarcity of knowledge on design and operation of the social overall control system -- which I call the public policymaking system[2] -- accompanies humanity since its beginnings. While some progress has taken place in the mechanics of control and micro-control systems of some social components (such as corporations), the essential features of the public policymaking system continue to be beyond penetrating understanding and even more so, beyond conscious and deliberate design.

This blind area in human knowledge has always caused suffering and tragedy, in terms of human values. But, from a longer time perspective, the weaknesses of the public policymaking system did not matter very much as long as the operations of that system did not constitute an important variable in shaping human destiny. When most variables shaping human and social fate were beyond influence by the public policymaking system because of the absence of powerful policy instruments, bad decisions on the use of the few available instruments (or, to be more exact, "instrument images") had only very limited impact on basic reality and therefore could not cause long-range harm.

It is this insignificance of public policymaking systems for the long-range fate of humanity which is changing, thanks to rapid progress in knowledge on policy instruments which permits control of environment, society, and individuals. New knowledge supplies

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[2]Comparable terms are "central guidance cluster" as used by Bertram Gross and "societal control centers" as used by Amitai Etzioni. See Bertram M. Gross, *The State of the Nation: Social Systems Accounting*, London: Tavistock Publications, 1966, pp. 72-73, and Amitai Etzioni, *The Active Society*, New York: Basic Books, 1968, p. 112.

increasingly potent instruments for use by humanity. The nuclear bomb and ecology poisoning techniques and materials are but weak illustrations of the powerful policy instruments supplied by modern science. Upsetting of the gender of children, weather control, genetic engineering, stimulation of altered states of consciousness and emotion controls -- these are only some illustrations of the more powerful capacities for controlling the environment, society, and individuals which the progress of science is sure to supply in the foreseeable future.[3]

It is the growing gulf between capacity to control the environment, society, and individuals on one hand, and knowledge on how to design and operate policymaking systems so they can use these capacities on the other hand which constitutes the major danger to the survival and development of humanity. The emergence of *controlling man*, who exerts dominance over his environment, over social institutions and over the very nature of human beings, makes it absolutely essential to improve policymaking systems so as to use wisely the powerful instruments at his disposal.

I use on purpose the term "wisely" to emphasize the multidimensionality of required changes in public policymaking systems. Urgently needed are, for instance, new values and belief systems which meet the

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[3]For a careful discussion, see John McHale, *The Future of the Future*, New York: George Braziller, 1969. For longer range and more speculative explorations, see Gordon Rattnay Taylor, *The Biological Time Bomb*, New York: Signet Books, 1968, and Burnham Putnam Beckwith, *The Next 500 Years*, New York: Exposition Press, 1967.

new global role of *controlling man*. Scientific knowledge cannot supply new values and belief systems,[4] though perhaps some of the conditions of value innovation can be studied and consciously encouraged. But science can and should supply knowledge on preferable designs and patterns for the rationality components of public policymaking systems, including rational means for improving the designs and patterns of the essential extra-rationality components.[5]

In short, a main problem faced by humanity can, I think, be summed up in what I aphoristically call the Second Dror Law:[6]

While human capacities to shape the environment, society, and human beings are rapidly increasing, policymaking capabilities to use those capacities remain the same.

A large number of dispersed efforts to develop knowledge relevant to policymaking improvement do take place. These include work under

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[4]For somewhat different and stimulating views, see Hazan Ozbekhan, "Toward a General Theory of Planning," in Erich Jantsch, ed., *Perspectives of Planning* Paris: OECD, 1969, and Erich Jantsch, "From Forecasting and Planning to Policy Sciences," *Policy Sciences*, Vol.1, No. 1, Spring 1970, in press. Completely unacceptable, in my opinion, are the naive proposals made from time to time by physical scientists to achieve deliberate and systematic value innovations aimed at the long-range future through quasi-rational mass movements. See, for instance, Gerald Feinberg, *The Prometheus Project*, Garden City, New York: Doubleday, 1969.

[5]For an extensive discussion of the roles of rationality and extra rationality components in preferable policymaking, see Yehezkel Dror, *Public Policymaking Reexamined*, San Francisco: Chandler Publishing Company, 1968, pp. 154-196.

[6]The First Dror Law states: *While the difficulties and dangers of problems tend to increase at a geometric rate, the knowledge and manpower qualified to deal with these problems tend to increase at an arithmetic rate.*

the auspices of a number of new disciplines, approaches, and inter-disciplines, such as: operations research, praxeology, systems analysis, organization theory cybernetics, information theory, theory of games, organizational development approaches, strategic analysis, future studies, systems engineering, decision theory, and general systems theory. Also important is some work in new directions within more traditional disciplines, especially economics, some branches of psychology, and some parts of political science.[7] This work supplies important insights, promising concepts, and stimulating ideas. But, in general, present endeavors to develop scientific knowledge relevant to the improvement of policymaking tend to suffer from the following weaknesses:[8]

1. Micro approach, with applications to some types of decisions, but very limited relevance to the policymaking system as a whole.

2. Disjointedness, resulting in fragmented views limited to single dimensions of policymaking. Thus, systems analysis is quite isolated from organization theory, operation research from psychology of judgment, and decision theory from general systems theory.

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[7] For selected bibliographic references to relevant work until 1967, see "Bibliographic Essay" in Yehezkel Dror, *Public Policymaking Reexamined*, *ibid.*, pp. 327-356. For a survey of more recent relevant literature, see Yehezkel Dror, "Recent Literature in Policy Sciences," *Policy Sciences*, Vol. 1, No. 3, 1970, forthcoming.

[8] For an extensive discussion of such weaknesses of applied social sciences and of analytical decision approaches, see Yehezkel Dror, "Systems Analysis and Applied Social Sciences," to be published in the proceedings of the Rutgers University and *Trans-Action* Magazine Conference on Public Policy and Social Science (Carpender Conference Center, Rutgers University, New Brunswick, New Jersey, November 23-26, 1969), edited by Irving L. Horowitz.

3. Preoccupation with the rationality components of policymaking, with little attention to the fusion of rationality with extrarationality and the improvement of the latter.

4. Incrementalism, with nearly complete neglect of the problems of policymaking systems nova-design (i.e., design anew), as distinguished from slight redesign.

5. Narrow domain of concern, which neglects consideration of possible improvement needs and improvement possibilities of some critical elements of the policymaking system, such as politicians.

6. Sharp dichotomy between the behavioral approaches which study some segments of policymaking reality, and the normative approaches, which design abstract rationality-based micro-decision models. Therefore, no comprehensive approach to understanding and improvement of the policymaking system as a whole.

7. In the normative approaches: strong dependence on metric quantification and therefore inability to handle "qualitative" variables.

8. In the behavioral approaches: lack of interest in prescriptive methodology and jumps between lack of interest in application and partisan advocacy.

9. Fixation on conventional research methods and therefore inability to utilize important sources of knowledge (such as tacit knowledge of policy practitioners) and difficulties in designing new research methods to meet the special problems of policymaking study and improvement (e.g., social experimentation).

I could go on adding additional items to the list of inadequacies of most contemporary efforts to build up policymaking knowledge. But I think the problem goes beyond a shorter or longer list of discrete weaknesses. The problem is not one of accidental omissions which can be easily corrected. Rather, I think that the overall lack of saliency of contemporary scientific endeavors to the improvement of policymaking reflects a basic discongruency between the paradigms of contemporary sciences in all their heterogeneity and the paradigms necessary for building up policymaking relevant scientific knowledge.

To put my opinion into a positive form, it seems to me that in order to build up a science of policymaking, we need a new type of science based on a new set of paradigms.[9] Following the pioneering suggestion of Harold D. Lasswell,[10] I propose to call this new area of study, research, teaching, professional activity and application "policy sciences"; but the name does not really matter.

As a matter of fact, policy sciences are at present in *status nascendi* and hopefully approach a taking-off stage. Among the signs of their emergence, let me mention the following:

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[9] My terminology follows Thomas S. Kuhn, *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press, 1962.

[10] The concept of "policy sciences" was first proposed in 1951 by Harold D. Lasswell, in Daniel Lerner and Harold D. Lasswell, eds., *The Policy Sciences: Recent Developments in Scope and Methods*, Stanford: Stanford University Press, 1951. For recent versions of Lasswell's views, see Harold D. Lasswell, "Policy Sciences" in *International Encyclopedia of Social Sciences*, Vol. 12, pp. 181-189, and Harold D. Lasswell, "The Emerging Conceptions of the Policy Sciences," *Policy Sciences*, Vol. 1, No. 1, 1970, in press. The subject will be extensively treated in a forthcoming book by Harold D. Lasswell, *A Preview of Policy Sciences*.

1. The already mentioned proliferation of research and study of various policymaking issues within new and traditional disciplines. This testifies to widespread interest and serves to build up important, though disjointed, subcomponents of policy sciences.

2. The invention and development of new types of policy research organizations which in effect engage in the development and application of policy sciences. The Hudson Institute, the Urban Institute, parts of the Brookings Institution, the new Woodrow Wilson Foundation, the Institute for the Future, The Rand Corporation, and the New York-Rand Institute illustrate this trend in the United States.

3. The self-education of outstanding individual policy scientists who, thanks to personal multidisciplinary background, accidents of opportunity, and interest in application of scientific methods to acute problems, got into the pioneering of policy sciences and thus demonstrate the feasibility of policy sciences and its promises.

5. The recent establishment of new university programs devoted to policy sciences, with or without use of that term. In the United States alone, more than ten such programs were initiated during the last two or three years.[11]

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[11]The graduate university programs about which I happen to know include, in no particular order: The program in public policy at the John F. Kennedy School at Harvard University; the Doctoral Program in Policy Sciences at the State University of New York at Buffalo; the Graduate School of Public Affairs at the University of California, Berkeley; the Doctorate Program in Social Policy Planning, also at the University of California, Berkeley; the Graduate Program in Planning at the University of Puerto Rico; the Institute for Public Policy Studies at the University of Michigan; the School of Urban and Public Affairs at Carnegie-Mellon University; the Doctorate Program in Public Policy Analysis at the Fels Institute of Local and State Government at

6. The rapidly increasing number of conferences, books, periodicals, "invisible colleges," and similar expressions of professional activity and interest devoted in effect to the advancement of policy sciences as a whole or of some of its major aspects.[12]

These are some of the signs of search, concern, experimentation, and interest which, I think, indicate the emergence of policy sciences. Nevertheless, at best, we are only in the first stages of the required scientific revolution and there is no assurance that it will be successful in bringing forth a viable and significant new kind of science. The challenge may be beyond our intellectual abilities, charletans may discredit the idea of policy sciences before it really gets started, political culture may inhibit the efforts, or the conservatism of "normal" scientists may choke it. Even if policy sciences do emerge as a new type of scientific endeavor, it is doubtful inhowfar one can predict now their future characteristics and implications. Therefore, the following exploration of the new paradigms of policy sciences and of their applied implications should be regarded as a normative forecast, directed at least as much at shaping the future as at foreseeing it.

Subject to this qualification, I think that preliminary examination of some of the unique paradigms of policy sciences, as I see them,

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the University of Pennsylvania; the Program in Planning and Policy Sciences, also at the University of Pennsylvania. Also moving in the same direction seem to be the Lyndon B. Johnson School of Public Affairs at the University of Texas, a proposed Center for the Policy Sciences at Brown University, and a proposed new school at the University of Hawaii.

[12]To illustrate, let me mention some relevant recently founded periodicals: *Futures, Long-Range Planning, Policy Sciences, The Public Interest, Public Policy, Socio-Economic Planning Sciences, and Technological Forecasting.*

will serve to illuminate both the current effort and the urgent need. It will also serve as a basis for examining some applied implications. As our analysis is a rough one, mistakes in some specifications do not matter. It is the overall *gestalt* of policy sciences in which we are interested.

SOME NEW PARADIGMS OF POLICY SCIENCES[13]

It seems to me that the main paradigmatic innovations to be required of and expected from policy sciences can be summed up as follows:

1. The main concern of policy sciences is with understanding and improvement of macro control systems: that is, public policymaking systems. In addition to overall improvement-oriented study of such systems, main foci of policy sciences include, for example: (a) policy analysis, which provides heuristic methods for identification of preferable policy alternatives; (b) alternative innovation, which deals with the invention of new designs and possibilities to be considered in policymaking; (c) master policies, which provide guidelines, postures, assumptions, strategies, and main guidelines to be followed by specific policies; (d) evaluation and feedback, including, for instance, social indicators, social experimentation, and organizational learning; and (e) improvement of the policymaking structure through redesign and novadesign of its organizational components, selection and training of its personnel, and reconstruction of its communication

[13] This and the following section lean in part on Yehezkel Dror, "Prolegomenon to Policy Sciences," *Policy Sciences*, Vol. 1, No. 1, Spring 1970, in press. (Earlier version, The Rand Corporation, P-4283, January 1970.)

and information network. While the main test of policy sciences is better achievement of considered goals through more effective and efficient policies, policy sciences as such is in the main not directly concerned with the substantive contents of discreet policy problems (which should be dealt with by the relevant normal sciences), but rather with improved methods, knowledge and systems for better policy-making.

2. Breakdown of traditional boundaries between disciplines, and especially between the various social sciences and decision disciplines. Policy sciences must integrate knowledge from a variety of branches of knowledge and build it up into a supradiscipline focusing on public policymaking. In particular, policy sciences is based upon a fusion between social sciences and analytical decision approaches. But it also absorbs many elements from decision theory, general systems theory, organization theory, operations research, strategic analysis, systems engineering, and similar modern areas of study. Physical and life sciences are also relied upon, insofar as they are relevant.

3. Bridging of the usual dichotomy between "pure" and "applied" research. In policy sciences integration between pure and applied research is achieved by acceptance of the improvement of public policy-making as its ultimate goal. As a result, the real world becomes a main laboratory of policy sciences and the test of the most abstract theory is in its application (directly or indirectly) to problems of policymaking.

4. Acceptance of tacit knowledge and personal experience as important sources of knowledge, in addition to more conventional methods

of research and study. Efforts to distill the tacit knowledge of policy practitioners and to involve high-quality policymakers as partners in the up-building of policy sciences are among the important characteristics distinguishing between policy sciences and contemporary "normal" sciences.

5. Policy sciences shares with normal sciences main involvement with instrumental-normative knowledge, in the sense of being directed at means and intermediate goals rather than absolute values. But policy sciences is sensitive to the difficulties of achieving "value-free sciences" and tries to contribute to value choice by exploring value implications, value consistencies, value costs, and the behavioral foundations of value commitments. Also, parts of policy sciences are involved in invention of different "alternative futures," including their value contents. Furthermore, "organized creativity" -- including value invention -- constitute important inputs into parts of policy sciences (such as policymaking-system novadesign and redesign, policy design and policy analysis), and encouragement and stimulation of organized creativity is therefore a subject for policy sciences. As a result, policy sciences should break a breach in the tight wall separating contemporary sciences from ethics and philosophy of values and build up an operational theory of values (including value morphology, taxonomy, measurement, etc., but not the substantive absolute norms themselves) as a part of policy sciences.

6. Policy sciences are very time-sensitive, regarding the present as a "bridge between the past and the future." Consequently, it rejects the a-historic approach of much of contemporary social sciences

and analytical approaches. Instead, it emphasizes historic developments on one hand and future dimensions on the other hand as central contexts for improved policymaking.[14]

7. Policy sciences does not accept the "take it or leave it" attitude of much of contemporary social sciences, neither does it regard petition signing and similar "direct action" involvements as a main form of policy sciences contributions as such (in distinction from scientists acting as citizens) to better policymaking. Instead, it is committed to striving for increased utilization of policy sciences in actual policymaking and to preparation of professionals to serve in policy sciences positions throughout the macro control system (without letting this sense of mission interfere with a clinical and rational-analytical orientation to policy issues).

8. Policy sciences deals with the contribution of systematic knowledge and structured rationality to the design and operation of macro control systems. But policy sciences clearly recognizes the important roles both of extra-rational processes (such as creativity, "intuition," charisma, and value judgment) and of irrational processes (such as depth motivation). The search for ways to improve these processes for better policymaking is an integral part of policy sciences, including, for instance, possible policymaking implications of altered states of consciousness. (In other words, policy sciences faces the already mentioned paradoxical problem of how to improve extra-rational and even irrational processes through rational means.)

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[14] On the relations between future studies and policy sciences, see Yehezkel Dror, "A Policy Sciences View of Future Studies: Alternative Futures and Present Action," The Rand Corporation, P-4305, February 1970.

Some Implications of Policy Sciences

Any policy sciences the *gestalt* of which resembles the image conveyed by the proffered policy sciences paradigms will have fargoing implications. Of relatively minor importance are various implications for the organization of science, its research and its teaching. These include, for instance, transfer of some major research and teaching functions from universities to policy research organizations; participation of experienced politicians, executives, and similar policy practitioners in scientific activities; novel teaching designs;[15] and new career patterns involving transitions between abstract policy sciences research, long-range policy research, and policy analysis of pressing issues -- accompanied by movement between universities, policy research organizations, and a variety of new roles in various branches of government and in public, quasi-public, and private organizations.

Those are implications of much importance for academia. But from an overall social point of view the critical significance of policy sciences is in basic changes which it brings about in the age-old dilemma of *scienta et potentia*, knowledge and power. These, in turn, have fargoing implications for the exercise and structure of social power; that is, for politics.

The relevant unique feature of policy sciences is that policy sciences presumes to deal with the internal processes of policymaking

[15]For an illustration, see Yehezkel Dror, "Teaching of Policy Sciences: Design for a Doctrinate University Program," *Social Science Information* (1971, forthcoming). Earlier version, The Rand Corporation, P-4128-1, November 1969.

and presumes to tell the policymakers how to arrive at decisions. This is a degree of penetration into the innermost processes of politics removed by a step-level function from the contributions of contemporary "normal" sciences to policymaking. Contemporary "normal" sciences supply inputs to be taken into account in policymaking and sometimes propose solutions as stipulated outputs of policymaking; but contemporary "normal" sciences do not open up the black box of how policy decisions are made and do not claim to develop scientific models for rewiring the box.[16]

In blunt language, the more policy sciences indeed does develop, the more should the policymaking system be redesigned to avail itself of policy sciences knowledge and the more should politics be reformed to permit full symbiosis between political power and policy sciences knowledge. The basic roles of elected politicians in a democratic society will not be impaired. Indeed, the critical functions of

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[16]Some exceptions are provided by political science and public administration, both classic and modern. But the relevant work in political sciences tends to suffer from one or more of the following characteristics, which make them inadequate surrogates for policy sciences: (1) mainly ideological orientation; or (2) mainly technical orientation, dealing with "administrative efficiency"; (3) focus on specific components of the policymaking system, without an overall systems view; (4) absence of empiric basis; or (5) absence of decision theory basis.

For discussions of administrative reforms which clearly bring out these and additional weaknesses of administrative reforms theory and reform practice alike, see: Ralph Braibanti, ed., *Politics and Administrative Development*, Durham, North Carolina: Duke University Press, 1969; Gerald E. Caiden, *Administrative Reform*, Chicago: Aldine Publishing Company, 1969; and the still unique Dwight Waldo, *The Administrative State*, New York: The Ronald Press, 1948.

value judgment, interest presentation, consensus maintenance, and trans-scientific judgment will not only not be weakened, but will be strengthened thanks to clearer presentation of alternatives, better control of implementation, more reliable feedback, fuller explication of tacit theories, and similar contributions of policy analysis. But essential are policymaking arrangements which will assure that policy sciences knowledge will be correctly appreciated and taken into account and that both its underutilization and its overutilization will be avoided.

Somewhat to concretize this general idea, let me present some implications for changes in the policymaking system which seem to result from initial work in policy sciences.[17] To provide some variety in my illustrations, some of them are presented as a short enumeration while some others, which are less technical, are discussed at some length:

1. Pervasive utilization of policy analysis for consideration of issues, exploration of alternatives, and clarification of goals.[18]

2. Encouragement of explicit policy strategy decisions, in distinction from discrete policy determinations. Explicit strategy decisions (including mixed strategies) are needed on the following issues, among others: degrees and locations of acceptable innovations in policies; extent of risk to be accepted in policies and choice between

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[17] For a detailed discussion of some of these recommendations and their policy sciences theoretic bases, see Yehezkel Dror, *Public Policymaking Reexamined*, op. cit., esp. Part V, pp. 217 ff.

[18] See Yehezkel Dror, "Policy Analysis: A Theoretic Framework and Some Basic Concepts," The Rand Corporation, P-4156, July 1969.

a maximax strategy or/and maximin strategy and/or minimin-avoidance strategy;[19] preferable mix between comprehensive policies, narrow-issue oriented policies, and shock-policies (which aim at breakthroughs accompanied by temporary disequilibration); and preferable mix between policies oriented towards concrete goals, towards a number of defined future options, and/or towards building up resources better to achieve as yet undefined goals in the future.

3. Encouragement of comprehensive master policies, in which discrete policy issues are considered within a broader context of basic goals, postures, and directives.[20]

4. Systematic evaluation of past policies in order to learn from them for the future. For instance, every fixed period methods and institutions should be established to provide an independent audit of the results of legislation.

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[19] I use the term "minimin-avoidance" to refer to policies directed at avoiding the worst of all possible situations. One important advantage of such a strategy concerns support recruitment: it is often much easier to achieve agreement on ills to be avoided than on operational positive formulations of "good life" to be realized.

Some success in minimin-avoidance would constitute a significant improvement over reality. However simple this may sound, human capacities to approximate minimin are amazing. Still well worth reading in this connection is Walter B. Pitkin, *A Short Introduction to the History of Human Stupidity*, New York: Simon and Schuster, 1932. Recent policies around the world could provide a long second volume for such a history.

[20] President Nixon's First Annual Foreign Affairs Message, *United States Foreign Policy for the 1970s: A New Strategy for Peace*, well illustrates such an effort. It is relevant to observe that this innovation in comprehensive master policies is closely related to the existence of a new type of policymaking improvement-oriented policy analysis unit in the White House, namely, Dr. Kissinger's staff.

Preparation of similar master policies for, say, urban problems would require more than establishment of a parallel urban policy analysis unit in the White House. The basic concept package and integrative framework have first to be developed. Among the urgent tasks awaiting policy sciences is work on overall policy concept packages, on integrative problem mappings and on issue taxonomies.

5. Better consideration of the future. Special structures and processes should be designed to encourage better consideration of the future in contemporary policymaking.[21] This includes, for instance, dispersal of various kinds of "look-out" organizations, units, and staff throughout the policymaking system and utilization of alternative images of the future and scenarios in all policy considerations.

6. Search for methods and means to encourage creativity and invention in respect to policy issues. This may involve, for instance, no-strings-attached support to individuals and organizations engaging in adventurous thinking and "organized dreaming"; avoidance of their becoming committed to present policies and establishments; and opening up channels of access for unconventional ideas to high-level policymakers and to the public at large. Creativity and invention may also be influenced within policymaking organizations by institutionally protecting innovative thinkers from organizational conformity pressures. Requiring careful study also are creativity-amplifying devices and chemicals, and arrangements for their possible use in policymaking.

7. Establishment of a multiplicity of policy research organizations to work on main policy issues. Some of these policy research organizations would work for the central government, some for the legislature, and some for the public at large -- diffusing their findings through the mass media of communications.

8. Development of extensive social experimentation designs and of institutions able to engage in social experimentation (including

[21] The recently established National Goals Research Staff in the White House is an interesting step in this direction.

reconsideration of involved ethical problems). It seems quite clear that social experimentation is essential for finding solutions to present and emerging social issues. For instance, new experimental cities may be needed to develop suitable habitations for the 100 million additional Americans expected by the year 2000. Careful social experimentation requires invention of new research designs and of new legal-political arrangements. Also important and very difficult is the requirement for a political and social climate in which careful research and experimentation on social institutions is encouraged. (To take a United States illustration: A change is needed in attitudes which expressed themselves, for instance, in the legislative prohibition of studies on the operation of juries.)

9. Institutional arrangements to encourage "heresy" and consideration of taboo policy issues, such as the possibilities of long-range advancement of humanity through genetic policies and of changes in basic social institutions, such as the family.

10. Improvement of one-person-centered high-level decisionmaking. Even though of very high and sometimes critical importance, one-person-centered high-level decisionmaking is very neglected by both contemporary research and improvement attempts. This in part is due to difficulties of access, on one hand, and dependence of such decisionmaking on the personal characteristics and tastes of the individual occupying the central position, and the consequent difficulties in improving such situations, on the other hand. Thus, neglect of the study and improvement of one-person-centered high-level decisionmaking is illustrated in the lack of suitable research methods, conceptual

frameworks, and instrumental-normative models in contemporary normal sciences. With the help of the novel approaches of policy sciences, one-person-centered high-level decisionmaking can be improved. Many conditions of better decisionmaking can be satisfied by a variety of means, some of which may often fit the desires of any particular decisionmaker, e.g., information inputs, access of unconventional opinions, feedback from past decisions, and alternative predictions can be provided by different channels, staff structures, mechanical devices, communication media, etc. This multiplicity of useful arrangements provides sufficient elasticity to fit the needs, tastes, preferences, and idiosyncrasies of most, if not all, top decision-makers.

11. Development of politicians. The idea of developing the qualifications of politicians is regarded as "taboo" in Western democratic societies. But this is not justified. The qualifications of politicians can be improved within the basic democratic tenets of free elections and must be improved so as to permit the required new symbiosis between power and knowledge. Thus, for instance, politicians need an appreciation of longer range political, social, and technological trends, need capacities to determine policy strategies, and should be able to critically handle complex policy analysis studies. One possible approach to the problem is to encourage entrance into politics of suitably qualified persons and to vary the rules of presentation of candidates to permit better judgment by the voter. Other less radical proposals are to establish policy sciences programs in schools where many future politicians study (such as law schools),

and to grant to elected politicians (e.g., members of a state legislature) a sabbatical to be spent in self-developing activities, such as studying and writing. Suitable policy sciences programs can be established at universities and at special centers for active politicians to spend their sabbaticals in a productive and attractive way.

12. Advancement of citizen participation in public policymaking.[22] Here, modern technology may be very helpful by providing tools for much better presentation of policy issues before the public (e.g., policy analyses of controversial issues on T.V. and citizen involvement through active participation in policy games through cable T.V.) and for more intense participation of the public in decisionmaking (e.g., systematic opinion polling with the help of computer home consoles).

13. Education of adults for more active roles in public policymaking. I just mentioned the intensification of citizen participation in public policymaking as one of the possible policy sciences recommended improvement. But in order for increasing citizen participation to constitute in fact an improvement, changes in the quality of that participation are needed. At the very least, needed are: more knowledge on policy problems; better understanding of interrelations between different issues and various resolutions; and fuller realization of longer range consequences of different alternatives. Also highly desirable are better value explication and sensitivity to value trade-offs; increased propensities to innovate; and capacities to face uncertainty.

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[22] For elaboration of this and the next two points with specific reference to urban problems, see Yehezkel Dror, "Urban Metapolicy and Urban Education," *Educational Technology* (1970, forthcoming). Earlier version, The Rand Corporation P-4314, February 1970.

The slogan of "enlightened citizen" as a requisite of democracy has been with us for too long to be taken seriously. Nevertheless, increasing demands for citizen participation based both on ideological reasons and functional needs do combine and make "citizen enlightenment" a hard necessity. Indeed, because of the growing complexity of policy issues, increased quality of citizen contributions to public policymaking is essential in order to preserve the present level of citizen participation in public policymaking. In other words, if the quality of citizen inputs into public policymaking remains as it is now, meritocracy may well become the only chance for survival. Therefore, building up the policy contribution capacity of citizens is essential for continuous viability of democracy.

This is the challenge facing adult education from the point of view of public policymaking improvement. To meet this challenge, radical novadesign of adult education is required.

To concretize, let me mention these main policy sciences-related directions of novadesign of adult education:

a. Policy sciences must develop new formats for presenting and analyzing public issues in the mass media of communication in ways conductive for informed individual opinions formation. For instance, policy issues should be presented in the form of policy analysis networks, with clear alternatives, explicit sensitivity analysis, uncertainty explication and assumption visibility. Techniques are required for presentation of such programs on T.V. in ways which combine audience appeal with improvement of citizen comprehensions of complex issues.

b. Training tools which are simultaneously interesting and beneficial must be developed. Such tools include, for instance, cases, projects, policy games, and individual policy exploration programs. In particular, policy games and individual policy exploration programs are very promising. Based on computers and brought to each house through cable T.V. and home computer consoles, suitable games and policy exploration programs should be able to combine education for better policymaking with inputs into ongoing policymaking.[23]

c. Incentives for participation in policy-oriented educational activities must be provided. Hopefully, increased opportunities to participate in public policymaking together with availability of clearly relevant learning opportunities will provide basic motivation. This may be the case all the more because of the possibility -- illustrated by the proposed techniques -- to combine the useful with the attractive. But additional incentives may be necessary. Competitive games and exercises may provide one set of incentives; public attention and dramatization may provide a second set of incentives. If this does not work out, reservation of some special opportunities to participate in public policymaking (other than the basic rights of voting, expression of opinion, etc., reserved of course for all) for those who do undergo a set of learning activities might prove necessary in some circumstances in the longer run. But adoption of suitable programs in schools -- as soon discussed -- should make such distasteful distinctions unnecessary.

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[23] E.g., see Stuart Umpleby, "Citizen Sampling Simulation: A Method for Involving the Public in Social Planning," Paper to be presented at the International Future Research Conference, Kyoto, Japan, April 10-16, 1970.

These are only some illustrations which do point out possibility for redesign of education to serve, *inter alia,* the needs of increasing citizen participation in public policymaking. This is a problem in need of much research and creativity.

14. Preparation of children for future roles in public policymaking. On a more fundamental level, preparation for increased participation in public policymaking must take place before maturation. The best location to prepare the citizen for increased policymaking roles is in school, when the necessary knowledge and capacities should be developed as a basic part of the equipment needed by every citizen in a modern urban democratic society.

The necessary knowledge and capacities to be conveyed and developed at school do include, among others: some knowledge and understanding of the social system and of social dynamics; a feel for alternative social futures; abilities to handle uncertainty and probabilities; basic skills in logic and semantics; understanding of the elements of policy analysis and capacity to handle problems with the help of policy analysis networks; tolerance of ambiguity; appreciation of main concepts of social sciences, economics, and decision theory and their application of policy issues; and ability to search for information on new problems and issues and absorb that information within one's frame of appreciation.

This is a formidable list which may look prohibitive, unless we bear in mind that no technical skills and professional knowledge are aimed at. Some familiarity with fundamental concepts, some appreciation of their use and -- most important of all -- some skill in

application of the knowledge and concepts to concrete issues as a main mode for making up one's mind, this is all that is aimed at.

Even so, this is an ambitious program which can only be approximated through fargoing changes in school teaching. Much of the required knowledge and capacity should be developed through new approaches and novel teaching methods in traditional subjects. Thus, the study of history should include the history of policy issues, should be problem oriented, and should be supplemented by treatment of alternative futures. To add another illustration: mathematics should be taught as a problem-solving approach, with emphasis on probability theory, Boolean algebra, and theory of games. Some new subjects also have to be added, devoted explicitly to policy problems and policy analyses. In the new subjects and in the new contents of the traditional subjects, new teaching methods play a major role. Such new teaching methods include, for instance, gaming, computer interaction, and internships. Existing methods such as projects and essays can also be very useful, if suitably adjusted.

All this depends on the development of policy sciences knowledge, which can serve as a basis for suitable teaching material and teaching methods. Here we meet another innovative facet of policy sciences: it should not constitute esoteric knowledge monopolized by a few initiated; instead, conscious and intense efforts must be made to transform at least the basics of policy sciences knowledge into forms that can be widely communicated to different policymaking actors, to the interested broad public, and even to school children.

Lest the impression created by these illustrative policy sciences implications for redesign of policymaking is that most of the burden

of change lies on politics, the public, and education, let me add a word on implications for the scientific community which goes beyond the earlier mentioned reorganization of research, teaching, and career patterns.

The emergence of policy sciences leads not only to many requirements for repatterning politics, education, etc., but also for repatterning the contributions of scientists to policymaking. At present, many of the pronouncements of scientists on policy issues suffer from serious defects, as can easily be illustrated from the debates on issues such as pollution, the nuclear test ban[24] and ABM.[25] These defects are related to failure to distinguish -- first of all, for oneself, and then in one's pronouncements -- between highly reliable scientific facts within the professional competence of the actor; doubtful scientific facts within the area of competence of the actor; issues which belong to science, but are not within the competence of the actor; and issues which are outside the domain of science, such as judgment of values to be pursued and of value priorities, judgment in risks to be taken, and judgment on time preferences and metaphysical assumptions.

As a result of the failure to make these distinctions, recommendations are often presented "in the name of science" which in fact are based on assumptions and preferences in large part outside the domain of competence of the actor.

Even with present very limited policy sciences knowledge this state of affairs is not only regrettable, but inexcusable: knowledge in policy

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[24] Cf. Robert Gilpin, *American Scientists and Nuclear Weapons Policy* (Princeton, N.J.: Princeton University Press, 1962) and Robert A. Levine, *The Arms Debate* (Cambridge, Mass.: Harvard University Press, 1963).

[25] See Yehezkel Dror, "A Policy Analysis of the ABM Controversy," 1970 (forthcoming).

analysis already available permits presentation of recommendations by scientists in formats which clearly distinguish between the different bases of their recommendations. Such formats would enable those entitled to it -- whether the elected politicians or the public at large -- to exercise their judgment in respect to those issues not included within the area of competence of the recommending scientist; therefore they should be widely used even now. When policy sciences are more developed, the demand upon scientists to be self-sophisticated and self-restrained in their contributions to policymaking becomes more than a recommendation; it becomes, I think, a moral absolute imperative, deviation from which may well destroy democracy, science or both. Thus, the emergence of policy sciences will be accompanied by very strict and in some respects, restrictive, demands upon scientists, not less so and perhaps even more so than upon politicians and other actors in the public policymaking system.[26]

Conclusion

Policy sciences holds forth the hope of improving the most backward of all human institutions and habits -- policymaking and decisionmaking. It constitutes a major attempt to assert and achieve a central role for rationality and intellectualism in human affairs and to increase by jumps the capacity of humanity to direct its futures. Important first steps to build up policy sciences are being attempted now. There is no assuranc

[26]Especially vexing are the moral issues facing policy scientists. While all knowledge can be used for "good" and for "bad," the high potentials of policy sciences require special safeguards to reduce the probabilities of misuse. This problem is beyond the confines of this paper, but I want explicitly to point it out.

that these steps will lead anywhere and that the endeavor to build up policy sciences will succeed. But the expected benefits of policy sciences, and -- even more so -- the gloomy results of failure to advance policy sciences, make this endeavor into one of the more critical challenges ever faced by science. It is also one of the most difficult challenges because of the intrinsic difficulties of the subject, because of the needed revolution in scientific paradigms, and because of the far-going and in many respects radical implications. Therefore policy sciences needs and deserves all the help it can get, including first of all strong support and intense personal commitment from the scientific community.