

ELITE TRANSFORMATION IN ADVANCED INDUSTRIAL SOCIETIES

An Empirical Assessment of the Theory of Technocracy

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Who will rule tomorrow, as our societies move into the advanced stages of industrialism and beyond? How, if at all, will tomorrow's decision makers differ from today's? For more than a century the most influential theory of elite transformation in advanced industrial society has posited the emergence of "technocracy," defined by Webster's with admirable simplicity as "government by technicians." At a moment when both America and the Soviet Union are led by men trained as engineers, and the two major European powers, Germany and France, are led by men trained as economists, it may be especially appropriate to explore this theory of technocracy.

Some have hailed technocracy as the wise and disinterested rule of philosopher-kings, whereas others have fulminated against technocrats as despots of a new and peculiarly inhuman sort. Yet these grand theoretical debates have evoked surprisingly little empirical investigation, so that many central tenets of the theory remain untested. In this paper I shall confront one of these tenets with evidence from a recent survey of European administrative elites. These data will by no means resolve all unanswered questions about technocratic rule, but I hope that the findings, striking and in some respects unexpected, will challenge other students of technocracy to hone their theories, tempered in the fires of polemic, against the abrasive whetstone of empirical evidence.

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THE IMPORTANCE OF BEING EXPERT

The first theorist of technocracy was the nineteenth-century Frenchman, Henri de Saint-Simon. In a famous pair of mental experiments, he imagined, first, the disappearance of France's nobles, ministers, public officials, clergy, and wealthy rentiers, and, second, the elimination of her leading scientists, engineers, economic managers, and technicians. An industrial society could survive the first of these experiments, he argued, but hardly the second. Thus, the future belonged to the experts (Saint-Simon, 1952: 72-75).

More recent versions of this theory have been articulated by such writers as Burnham, Galbraith, Meynaud, and Bell.¹ Bell, for example, the most eloquent herald of postindustrial society, argues that "if the dominant figures of the past hundred years have been the entrepreneur, the businessman, and the industrial executive, the 'new men' are the scientists, the mathematicians, the economists, and the engineers of the new intellectual technology" (Bell, 1973: 344).

The conjectures of these theorists differ in important respects, but they are agreed that technical expertise is the defining characteristic of the technocrat, and that technical training is an increasingly important credential for contemporary elite recruitment. "The technocrat is one who exercises authority by virtue of his technical competence. . . . In the post-industrial society, technical skill becomes the base of and education the mode of access to power" (Bell, 1973: 348, 358). Technocracy is defined as "the rise to power of those who possess technical knowledge or ability, to the detriment of the traditional type of politician" (Meynaud, 1969: 31), or, somewhat more cynically, as "that society in which those who govern justify themselves by appeal to technical experts who, in turn, justify themselves by appeal to scientific forms of knowledge" (Roszak, 1969: 7-8, as cited in Baylis, 1974: 2). Of course, "expertise" might refer to any specialized skill, from Latin versification to self-taught cookery, but the theory of technocracy normally refers more specifically to the growing power of the figure whom the French term *technicien*—"a trained expert in the applied sciences" (Meynaud, 1969: 9).

In fact, one of the most striking and consistent features of contemporary elite transformation in both the capitalist and communist worlds is the increasing importance of advanced educational credentials. In nearly every industrial society in recent decades, educational levels have risen sharply among elected officials, party leaders, administrative elites, and economic managers. Moreover, in many instances it is specifically a degree in a technical field that has become increasingly crucial for making it to the top. Studying cabinet and subcabinet

members of recent American administrations, Prewitt and McAllister (1976: 119) found that, while advanced degrees were common throughout the period, the ratio of law degrees to Ph. D.s (the latter typically in one of the natural, social, or applied sciences) fell steadily from 7:1 in 1930 to less than 2:1 in 1970. Similarly, in the Soviet Union and Eastern Europe the education of newer elite recruits is heavily concentrated in technical fields, particularly agronomy and engineering.

Less systematic evidence is available on shifts in the structure of power itself, on "what Meynaud [1969: 30] calls the 'slipping sideways of power,' the quiet absorption of decision-making functions by men ostensibly in advisory roles or the subtle alteration in the balance of 'policy' and 'administration' so as to expand the discretion of those charged with the latter" (Baylis, 1974: 14). In general, Berger's conclusion (1973: 426) about France probably applies to policy-making in most advanced industrial societies: "In most areas of policy . . . case studies of decisions made fifteen years ago and today suggest that the power of the technocrats has increased relative to that of the politicians."

More systematic confirmation of these trends is needed.² Yet all the available evidence suggests that monks, mistresses, and seers, prominent among the privy counsellors of rulers in a simpler age, are being succeeded everywhere by scientists, economists, and management consultants. No sinister conspiracy is implicit in this transformation. "Technicians are not conspiring to seize power, but technical skill has increased its standing" (Meynaud, 1969: 182).

The next question asks itself: so what? How, if at all, do the political orientations and behavior of technicians differ from the orientations and behavior of more traditional decision makers?

THE TECHNOCRATIC MENTALITY: SOME HYPOTHESES

The ethos and the decision-making style of technically trained experts are widely assumed to differ markedly from the outlook and style of more conventional leaders. Indeed, a clear, consistent, and comprehensive description of this "technocratic mentality" emerges from the work of theorists of technocracy.

1. Above all, the technocrat believes that "*technics must replace politics*" (Ridley, 1966: 43) *and defines his own role in apolitical terms*. "The technocrats' education has taught him that the public interest is best served by rational, coherent policy making, and so he is likely to regard processes of negotiation and compromise among interests with a certain contempt" (Berger, 1973: 426). "In his reactions, thought

and action, and above all, in his inmost conviction, he is free from all political attachment. He behaves according to his conscience and especially his competence" (Meynaud, 1969: 219). "The technocrat is a rationalist. . . . He has great confidence in the possibility of solving the problems of society by a scientific approach. . . . [He believes that] he alone has no sectional interests to promote (political or economic) and is thus the only person capable of taking an unbiased, overall view of social problems. . . . [P]rogress can be achieved only by the 'depoliticization' of problems" (Ridley, 1966: 43; see also Straussman, 1976: 153-154).

2. For these reasons, *the technocrat is skeptical and even hostile toward politicians and political institutions*. He believes that "politics can and ought to be reduced to a matter of technique, that is, that political decisions should be made on the basis of technical knowledge, not the parochial interests or untutored value preferences of politicians" (Baylis, 1974: 2). "A marked characteristic of the technocratic world [is] a latent anti-parliamentarianism and concern that the technician preserve his independence with regard to politics" (Meynaud, 1969: 219). Technocrats are said to view politicians as "venal, incompetent or impotent . . . by the nature of things, committed either to an ideology or to a sectional interest. . . . Interests are the great enemy of the rational organization of society. Insofar as politics is the play of interests and democracy is the adjustment of interests, [technocrats] are anti-political and anti-democratic" (Ridley, 1966: 43-44).

3. As just suggested, *the technocrat is fundamentally unsympathetic to the openness and equality of political democracy*. "The argument that political decisions can, and ought to, be made on rationally calculable grounds and thus should be placed in the hands of the specialist carries as its corollary the belief that popular election, the pulling and tugging of pressure groups, and backroom bargaining are out of place in an orderly society. . . . Rational 'technocratic' policy making would indeed seem to be able to function well only in an authoritarian framework, free from the conflicting pressures of a sundry multitude of political petitioners" (Baylis, 1974: 269-270). Decision-making demands expertise, and, unfortunately, democracy does not weight votes by expertise. "Convinced of his infallibility, the technocrat is a skilled hand at closed politics. . . . He tends toward authoritarianism and absolutism (the 'technocratic dictatorship')" (Meynaud, 1969: 59, 185).

4. As a further corollary, *the technocrat believes that social and political conflict is, at best, misguided, and, at worst, contrived*. "One of the most important components of the technician's mentality,"

says Meynaud (1969: 209), "is his belief that rational analysis and interpretation of facts are liable to bring about unanimity, at least among men of good will. The technician who believes that he has arrived at a full understanding of a question is always surprised and often grieved when he encounters opposition to his theories; inevitably, he is tempted to attribute this to ignorance or ill-will." "The fundamental assumption is that disagreements occur not because people are bound to differ but because they are misinformed" (Ridley and Blondel, 1964, as cited in Baylis, 1974: 2; see also Straussman, 153-154).

5. In analyzing public issues, *the technocrat rejects ideological or moralistic criteria, preferring to debate policy in practical, "pragmatic" terms.* He "is a pragmatist, hostile to political ideologies or, indeed, to any theoretical systems. . . . Problems must be solved in a rational, scientific manner as they arise" (Ridley, 1966: 43). Technocrats "treat ideological arguments with condescending indifference, sometimes with impatience and scorn. . . . At the center of their system of beliefs is the conviction that social problems are susceptible to technical solutions" (Cohen, 1969: 46, as cited in Suleiman, 1974: 377). "[S]ocial problems are seen less as the consequence of deliberate evil and more as the unintended by-products of both complexity and ignorance; solutions are not sought in emotional simplifications but in the use of man's accumulated social and scientific knowledge" (Brzezinski, 1970, as cited in Bell, 1973: 77-78; see also Meynaud, 1969: 228-235, and Lerner and Gorden, 1969: 205-206). Not "Is it right (morally or doctrinally)?" but rather "Will it work?"—that is the question the technocrat poses about policy options.³

6. In terms of values, *the technocrat is strongly committed to technological progress and material productivity; he is less concerned about distributive questions of social justice.* "The technocrat . . . attributes prime importance to the economic aspects of society, and especially to productivity" (Meynaud, 1969: 201). "In the technocratic mode, the ends have become simply efficiency and output" (Bell, 1973: 354). Technocrats are "far more concerned with raising the level of production than with equalizing its distribution" (Cohen, 1969: 50, as cited in Suleiman, 1974: 377).⁴

Such values might seem to place the technocrat in the rightist sector of the familiar ideological continuum between socialism and individualism. However, at least one student of the technocratic mentality (Ridley, 1966: 44, 37) offers a different interpretation: the technocrat's very antipathy to politics and conflict "leads [him] to emphasize the role of the state. Only the state can provide the leadership that is necessary, because only the state stands above interests. . . . [Techno-

crats] believe that [the state] has a positive, indeed dominant, responsibility for economic development and social progress."

The most reasonable reconciliation of this ambiguity is to recognize that there can be both leftist and rightist technocrats, that technocrats as a group may have no common position on many specific issues (Ridley, 1966: 44). But to concede that some technocrats may be more reformist or more conservative than others on the substance of policy is not to deny that they may share certain fundamental similarities in their approach to the policy-making process.

The image of the technocratic mentality just outlined seems so self-evident that one is tempted to assume that the several propositions are true by definition—that they simply describe what we *mean* by "technocrat." However, one should beware of rendering one's theories tautological. Buried in most discussions of technocracy, it seems to me, is an important, but hardly self-evident, hypothesis: that "technicians" (in the sense of technically trained decision makers) are in fact "technocratic" in their approach to decision-making. Obviously, one need not be technically trained in order to hold one or more of the views ascribed to technocrats. The issue is an empirical one: are technical training and expertise disproportionately associated with such views?

THE TECHNOCRATIC MENTALITY: SOME EVIDENCE

In 1970-1971 I interviewed samples of approximately 100 high-ranking national civil servants in Britain, Germany, and Italy as part of a broader study of bureaucratic and political elites in seven parliamentary democracies.⁵ Our bureaucratic respondents were sampled randomly from the highest two grades in each domestic ministry; virtually all are career civil servants.⁶ The topics covered in each interview included the respondent's background and career, his interpretation of the respective roles of politician and civil servant, his views on contemporary policy issues, his perspectives on political and social relations, his commitment to certain fundamental norms such as political liberty and equality, and his hopes for his country's future. (For additional methodological details, as well as preliminary comparisons across political systems and between politicians and bureaucrats, see Putnam, 1973 and 1975).

Data from this study are particularly useful for assessing propositions about the technocratic mentality. By any reasonable measure, these respondents rank among the most influential public decision

makers in their countries. The inclusion of Britain, Germany, and Italy allows us to test our hypotheses in three advanced industrial societies to which the theory of technocracy ought to apply, yet societies with distinctive political and bureaucratic traditions and contrasting systems of parliamentary and administrative recruitment.⁷ Finally, the interviews yield reasonable measures of each of the themes in our sketch of the technocratic mentality. These data reveal dramatic cross-national differences, but our focus here will be instead on intra-national comparisons. Our fundamental question is this: what correlation, if any, exists between the training and expertise of a policy maker, on the one hand, and his political outlook and behavior, on the other?

TECHNICAL TRAINING: CONTOURS OF AN INDEPENDENT VARIABLE

As discussed earlier, nearly all theorists, at least in the first instance, identify a technocrat in terms of technical training. With that in mind, let us examine the educational backgrounds of bureaucratic elites in these three nations. Table 1 shows, first, that with the exception of a small number of British officials promoted from the lower grades of the civil service, virtually all of our respondents are university graduates. (The handful of nongraduates will be ignored for the rest of this analysis.) Second, although officials trained in the humanistic disciplines, including law, continue to dominate these bureaucracies both numerically and culturally, significant minorities have backgrounds in the hard and soft sciences. Overall, natural scientists and technologists—engineers, agronomists, physicians, and physical scientists—comprise roughly one in six of these elites.⁸ Officials trained in the social sciences, primarily economics, constitute approximately another one in five. The continental humanists are almost exclusively lawyers, while in Britain we find the traditional arts graduates in history, classics, and other humanities.

Given the curricular specialization characteristic of most European universities, a university degree represents considerable disciplinary commitment and expertise. However, most of our respondents left university three or four decades ago, so it is important to confirm that this variable in fact measures continuing features of their professional identity. Table 2 shows striking differences in the professional reading patterns of each of these groups. Officials trained in the sciences continue to concentrate their attention on journals in their respective disciplines. The reading of humanists is more scattered, though it reflects the prevalence of legal training on the continent and the less

TABLE 1
The Training of Administrative Elites

	Britain	Germany	Italy
Natural Science and Technology			
Engineering; architecture	9	4	3
Agronomy; veterinary science	1	7	2
Medicine	2	1	3
Mathematics	9	0	0
Physical science	3	1	0
Subtotal	24(26%)	13(14%)	8(10%)
Social Science			
Economics	6	11	26
Political Science	3	1	4
Other social science	2	4	0
Subtotal	11(12%)	16(17%)	30(36%)
Law and Humanities			
Law	3	62	44
History	16	1	0
Classics	13	0	0
Languages	4	1	0
Other humanities	3	0	0
Subtotal	39(41%)	64(67%)	44(53%)
Major field unknown	7(7%)	2(2%)	1(1%)
University graduates (total)	81(86%)	95(99%)	83(100%)
Secondary education only	13(14%)	1(1%)	-
Total	94(100%)	96(100%)	83(100%)

professional orientation of British arts graduates. Overlaid on this pattern common to all three countries are tendencies for disciplinary boundaries to be clearest in Germany and to be rather blurred between social scientists and humanists in Italy. (Significantly, the Italians here labeled "social scientists" are in fact predominantly graduates in "economia e commercio," a curriculum perhaps more properly classified as business education.)

If our respondents' reading habits reveal the continuing effects of disciplinary training, evidence in Table 3 on their professional identification (as judged by coders from the interviews as a whole) suggests that disciplinary loyalties have been attenuated, though not erased, by later organizational loyalties.⁹ (Note, however, that once again the differences between "social scientists" and "humanists"

TABLE 2
Professional Reading by Type of Training

	Britain			Germany			Italy		
	Nat	Law	Soc	Nat	Law	Soc	Nat	Law	Soc
	Sci	Hum	Sci	Sci	Hum	Sci	Sci	Hum	Sci
In what field do you read technical-professional journals most often?									
Engineering; natural science; medicine; math; agronomy	65%	23%	22%	100%	17%	7%	83%	3%	8%
Economics; social science; social policy	10	17	56	0	17	93	0	43	56
Management; administration planning	10	10	11	0	11	0	17	11	12
Law	0	3	0	0	49	0	0	32	4
None	15	47	11	0	6	0	0	11	20
	100%	100%	100%	100%	100%	100%	100%	100%	100%

in Italy are negligible.) Not surprisingly, many civil servants trained in engineering, economics, or law, for example, identify themselves primarily in terms of their affiliation with the ministry of power or the treasury, rather than in terms of their educational backgrounds, for their careers have been defined largely in organizational rather than professional terms. To the extent that this career socialization has affected political attitudes and behavior, any linkages between training and outlook, as postulated in our propositions about technocratic mentality, should be weakened. On the other hand, the reading habits of our respondents (and their broader strategies of information-gathering for which these habits are a surrogate measure) continue to betray their distinctive professional proclivities.

Thus, although most civil servants in these three countries are not technically trained, distinct minorities have special expertise in, and continuing exposure to, the pure and applied natural and social sciences. At least in educational terms, these officials can be classified as technicians. Are they also technocratic in outlook? In the analysis to this point I have distinguished social scientists from natural scientists and technologists, although I know of no suggestion in the literature on technocracy that social scientific technocrats should differ from natural scientific technocrats. Nevertheless, this distinction will turn out to be important, as we move now to test our six hypotheses about the political orientations of technically trained decision makers.

TABLE 3
Professional Identification by Type of Training

	Britain			Germany			Italy		
	Nat Sci	Law Hum	Soc Sci	Nat Sci	Law Hum	Soc Sci	Nat Sci	Law Hum	Soc Sci
What is the respondent's overall professional identification?									
Civil service in general	4%	54%	18%	17%	30%	6%	25%	39%	57%
Respondent's own agency	39	33	36	33	46	31	25	37	39
Lawyers	1	5	0	0	10	0	0	7	0
Economists; social planners	17	0	36	0	5	38	0	2	0
Engineers; scientists; physicians; technicians	39	3	0	42	0	0	50	0	0
None	0	5	9	8	10	25	0	15	4
	100%	100%	99%	100%	101%	100%	100%	100%	100%

TECHNICAL TRAINING AND ROLE CONCEPTIONS

Bureaucrats so near the pinnacles of national power as our respondents can hardly avoid exposure to politics. Yet their reactions to the political side of the work are astonishingly diverse. This point can best be illustrated by interviews with two senior officials working on literally the same corridor in the same ministry on roughly the same range of public problems. The first official clearly evinces a broadly political conception of his job:

[What aspect of your professional work do you find most satisfying?]

This field is a lot of fun because here law and politics are closely meshed with one another. It is a field in which the whole of political and social life is reflected.

[How do you see the role of a higher civil servant?]

Your first task is to give loyal, expert advice to the Minister. The second is to work with parliament and other official bodies, so that you can reach your goal. Then, too, you have to inspire your subordinates so that they recognize that they share a political responsibility in their work. [One has to] make the political implications clear, not the party-political implications, but [the fact that] problems arise in our society that must be overcome and that the civil service has a very important task to fulfill.

The second official assesses the relationship between politics and his job quite differently.

[What aspect of your work do you find most satisfying?]

A large part of the work consists in telling other people that laws they think are in need of change in reality don't need to be changed. [But sometimes] on reflection one agrees [with a suggested change] and then tries to fit it into the current law, [keeping in mind] that the general principle for us is to maintain the inner harmony of the law. It is a kind of watch-repair work, you see: how does the [new] piece fit into the gears, so that they don't seize up? That's the kind of work we do here, and obviously it has a strongly scientific aspect to it.

[What is the other side of the coin—what are the negative aspects of the work?]

Every ministry is led by a minister, and the minister is not a civil servant, but a politician. He naturally has an entirely different set of ideas and different goals from those of us who work here permanently. We can at most say, "Well, this minister won't be here terribly long, and if we don't work so fast, then soon another will be here who will think differently, and it may be better." I would rather see a constitutional system in which at the top is a minister who is an independent expert who stays at his post and whose concerns are essentially the same concerns as ours, namely that the law isn't so much something that is independent of the will of individual men and as much as possible independent of party currents. In the domain of housing tenancy, for example, for ten years now we've made first one law and then another, reversing the first, and so on. That's politics. That is not because it was technically or objectively justified. It was done with the idea that one could please certain groups in the electorate that way, and naturally that is very close to the thoughts of politicians. Those are the negative aspects.

By their contrasting reactions to the same political environment, these two lawyers illustrate the range of perspectives on politics held by our respondents. Scientists and technicians, too, expressed differing views on this issue, as illustrated by two divergent answers to one of our standard queries: "Do you like the political side of your work or not?"

I personally don't like it too much. A statistician's job is most worth doing in bringing to bear, as far as one can, the objective numerate facts and aspects of the issues. And insofar as political aspects very often tend either to push these objective aspects out, or to argue against them, and even on occasion, of course,

require one to try to find reasons to back up a particular political thing, this doesn't make me very happy.

Oh, I enjoy it. Because I'm interested in public affairs, and originally went into the job for that reason, I am as interested in the political side of it as I am in the non-political side of it. For me, the two things go together. One of the rewards as you get up the tree is the greater access to ministers, the greater ability to work at the interface of administration and politics.

Thus, these interviews allow us to distinguish officials whose concept of their role is essentially political from those whose orientation is apolitical or even antipolitical. Is the latter view peculiarly associated with training and expertise in a technical field, as implied in theories of technocracy? Table 4 shows that it all depends on what one means by a "technical field."

In each of our three countries, officials trained in natural science and technology are distinctively more allergic to politics than conventionally educated officials. But, at least in Britain and Germany, those trained in the social sciences find politics more congenial than either of the other groups. (Italians trained in social science, whom we have already seen to be less distinctive in professional terms, are here less distinctive in outlook, as well; this pattern will recur throughout our analyses.) There are, it seems, technocrats and technocrats.

Another polarity that emerges from discussions of the role of the civil servant is relevant here. Some officials maintain that a civil servant should remain neutral and disinterested with respect to the social and political implications of his work, while others emphasize the need for commitment and even advocacy. Here are two examples of officials who emphasize the need for dispassion:

My task as a civil servant is, in spite of the politics of my minister, to submit technical, objective decisions. In everything he submits to the head of the department, the civil servant must be completely neutral, impartial, and objective. The politician, then, can grandly make the [final] decision.

The job of the professional civil servant is, to some extent, curbing the enthusiasms of the politicians, and showing them how far they can go in certain fields and the effects on the country and the economy as a whole if they pursue certain policies. But, of course, having made the point, if the politicians nevertheless decide at the end of the day that this is what the Government wants to do, then it is our job to do it to the best of our ability.

By contrast, other respondents stress the importance of intellectual and political initiative:

TABLE 4
Attitude to Politics by Type of Training

	Britain			Germany			Italy		
	Nat	Law	Soc	Nat	Law	Soc	Nat	Law	Soc
	Sci	Hum	Sci	Sci	Hum	Sci	Sci	Hum	Sci
What is the respondent's general attitude to the world of politics?									
Positive	25%	36%	45%	38%	66%	88%	0%	27%	21%
Neutral; mixed	38	51	55	38	20	12	50	49	55
Negative	38	13	0	23	14	0	50	24	24
	101%	100%	100%	99%	100%	100%	100%	100%	100%

One must know enough about one's field to be able to think to oneself what areas of this deserve some concentration of energy—thinking of new ways, for instance, for distributing the amount of money that the government makes available in one way or another for, let's say, housing. You have to know what will run, know how far you can go within the limitations within which you will be backed by your minister. You've got to try and make the right decision, and you've got to make sure that it's also a decision that you can make stick.

A senior official who obstinately limits himself to handling routine business—that's like an automat where you put in a coin, and the coin is processed, and something comes out. If no one puts anything in, nothing comes out. In reality, [the job] requires fantasy and creativity.

These two role conceptions, the neutral "tool" and the committed advocate, imply different relations between political and administrative officials and different patterns of governance. One would expect the former type of official to commit fewer acts of outrageous partisanship. On the other hand, in a world of complex problems and inert bureaucracies, the advocate is probably more effective in attacking and (occasionally) solving public problems.

An official's position on the implicit continuum between these two polar role conceptions is closely related to his disciplinary background, as the data in Table 5 show. In each country, natural scientists and technologists, obsessed by the need to preserve their apolitical objectivity, tend to disavow any role as political advocates. On the other hand, officials trained in the social sciences are skeptical about "neutrality." They are inclined to recognize that civil servants share policy-making responsibilities with politicians, and they accept that with those responsibilities must go a greater degree of political commit-

ment. In response to a related question, over half of the hard scientists deny any similarity whatsoever between the role of the politician and that of the civil servant, a view taken by fewer than one social scientist in three—only one in seven among German and British social scientists.

The distinction here is not between administrative activism and administrative passivity. Many officials trained in the natural sciences are intensely committed to improving the technical efficiency of public policies. Rather, the distinction turns on their relative indifference to the broader social and political implications of their work. The contrast is well captured in the comments of two officials, both responsible for industrial policy.

An official trained as a chemist reflected on the traits of his fellow technologists:

We're happier with figures and with facts. We're happier weighing up probabilities to which we can attach a number than we are in dealing with less tangible outcomes.

To which a colleague trained in social science replied:

A senior official has to have a political awareness. He has to have a certain earthy realism about his advice, and not just the purely intellectual, academic, stratospheric approach, which doesn't get you anywhere in terms of getting things done.

What, then, are we to make of the first of our hypotheses, suggesting that technocrats claim for themselves a role of apolitical purity? The answer is clear, if nuanced: decision makers trained in the hard sciences do evince this central trait of the technocratic mentality, but it is disclaimed with equal vehemence by decision makers trained in social science, at least in those two countries where their training has left a detectable residue of professional commitment. Natural scientists and technologists see their stock-in-trade as antiseptic, technical expertise and are offended by the intrusion of political factors into public decision-making. Social scientists, on the other hand, recognize and even welcome the need for civil servants to carry out their responsibilities in a world of political pressures.

TECHNICAL TRAINING AND ATTITUDES TO PLURALIST POLITICS

These conclusions are reinforced by evidence on our respondents' attitudes toward politicians and political institutions. The most

TABLE 5
Political Neutrality Versus Political Advocacy by
Type of Training

	<u>Britain</u>			<u>Germany</u>			<u>Italy</u>		
	Nat Sci	Law Hum	Soc Sci	Nat Sci	Law Hum	Soc Sci	Nat Sci	Law Hum	Soc Sci
The appropriate stance for a civil servant in his work is:									
Strict political neutrality	38%	31%	9%	23%	16%	6%	50%	38%	23%
Basic political neutrality	38	31	36	31	35	19	25	33	42
Some political advocacy	25	38	55	46	49	75	25	28	35
	101%	100%	100%	100%	100%	100%	100%	99%	100%

parsimonious illustration comes from a series of closed questionnaire items. One of these items, to which respondents were asked to express agreement or disagreement, asserted that "in contemporary social and economic affairs it is essential that technical considerations be given more weight than political factors." Natural scientists and technologists disproportionately endorse this epitome of the technocratic mentality, while British and German social scientists resoundingly reject it.

This item is one of six on the written questionnaire that tapped hostility or tolerance toward various aspects of the political environment, including parties, interest groups, parliament, and politicians. Responses to these six statements are intercorrelated; that is, those who feel that political considerations should be less important than technical factors tend as well to decry the divisiveness of parties, the particularism of interest groups, the selfishness and interference of politicians, and so on. Thus, we have combined responses to these six items into a single Index of Tolerance of Politics. (See Putnam, 1973: 269-270 for further discussion of this index and its correlation with other aspects of these officials' belief systems.)

The components of the Index of Tolerance for Politics are given in Table 7 along with the rankings of each of our groups of officials. The results are unequivocal. In each country officials trained in natural science and technology are disproportionately skeptical about politicians and political institutions, just as hypothesized by the theory of technocracy. On the other hand, in Britain and Germany (though not in Italy), social scientists are anything but "technocratic" in their appraisal of the protagonists of pluralist politics.

One bit of more behavioral evidence will complete our assessment of our respondents' orientations toward the world of politics. Among our three nations, only in Germany is partisan political activity legiti-

TABLE 6
Technics Versus Politics by Type of Training

	Britain			Germany			Italy		
	Nat	Law	Soc	Nat	Law	Soc	Nat	Law	Soc
	Sci	Hum	Sci	Sci	Hum	Sci	Sci	Hum	Sci
In contemporary social and economic affairs it is essential that technical considerations be given more weight than political factors.									
Agree	46%	22%	18%	62%	47%	29%	100%	67%	93%
Disagree	54	78	82	38	53	71	0	33	7
	100%	100%	100%	100%	100%	100%	100%	100%	100%

mate for civil servants. There, however, such involvement is quite common. Overall, one-third of our German respondents are formally members of some political party, and slightly more than half report active participation in politics, usually at the local level. Yet among natural scientists and technologists, only one in eleven reports party membership, and literally none reports any active political involvement. (Party membership, though not other sorts of political involvement, is even more common among the social scientists than among conventionally trained officials.) In this sense, at least, the natural scientists and technologists practice what they preach—avoidance of the “dirty business” of politics.

**TECHNICAL TRAINING
AND POLITICAL ELITISM**

Theorists of the technocratic mentality have maintained that the technocrat typically lacks sympathy for popular participation in government and shows contempt for the average citizen. Six items in our closed questionnaire were aimed at measuring elitist political values, and, again, responses to these statements were sufficiently consistent to be combined into a single Elitism Index. Respondents scoring high on this index believe that some people are better qualified than others to take charge of public affairs, are skeptical about calls for increased citizen control over government, and indeed are slightly dubious about political equality in the polling booth. (For further details on the Elitism Index, see Putnam, 1973: 276-277.)

The components of the Elitism Index are shown in Table 8, along with the scores of each of our groups of civil servants. The pattern of results is familiar. In each country, natural scientists and technologists are dubious about political equality, again confirming their

TABLE 7
Tolerance for Politics by Type of Training

	Britain			Germany			Italy		
	Nat	Law	Soc	Nat	Law	Soc	Nat	Law	Soc
	Sci	Hum	Sci	Sci	Hum	Sci	Sci	Hum	Sci
Index of Tolerance for Politics									
High	42%	71%	91%	46%	60%	93%	0%	11%	0%
Medium	58%	29%	9%	46%	35%	7%	29%	55%	56%
Low	0%	0%	0%	8%	5%	0%	71%	34%	44%
	100%	100%	100%	100%	100%	100%	100%	100%	100%

a. Components of the Index of Tolerance for Politics:

1. Basically it is not the parties and parliament, but rather the civil service which guarantees reasonably satisfactory public policy in this country.
2. Often those who enter politics think more about their own welfare or that of their party than about the welfare of the citizens.
3. The interference of politicians in affairs which are properly the business of civil servants is a disturbing feature of contemporary public life.
4. In contemporary social and economic affairs it is essential that technical considerations be given more weight than political factors.
5. The general welfare of the country is seriously endangered by the continual clash of particularistic interest groups.
6. Although parties play an important role in a democracy, often they uselessly exacerbate political conflicts.

technocratic mentality. By contrast, however, British and German social scientists are less elitist than any other groups in the study.

**TECHNICAL TRAINING
AND PERSPECTIVES ON SOCIAL CONFLICT**

Assessments of the fourth hypothetical feature of the technocrat's outlook—his belief that social conflict is either illusory or contrived—may be derived from the following question:

Some people say that in politics and society there is always bound to be conflict among various groups, while others say that most groups have a great deal in common and share fundamentally the same interests. How do you feel about this?

One physician-administrator spoke for many natural scientists in denying the reality of social conflict:

Political conflicts are artificial. I believe that the majority of the population has a common interest. The mass of the population

is composed of bourgeoisie—the working bourgeoisie, from the most humble manual worker to the state official. Social conflict is pathological. It was justified a hundred years ago, when there were two classes of citizens—the rich and the poor. But today we are all workers, and prosperity is widely diffused. With just a bit of good will social conflict could be overcome.

An economist, by contrast, expressed a quite different view:

The theory of a conflict-free society is a conservative ideology. In developed industrial societies there are definitely social distinctions, even though the boundaries and the divisions are no longer so sharp. Nevertheless, I would not indulge in visions of harmony, that basically all interests run parallel. They don't. Every society is founded on conflict, and only an ideology can gloss over that. Or else the conflicts are simply repressed by force. But in the end conflicts in human society are unavoidable. And even useful!

Statistical evidence confirms that these men accurately represent the contrasting perspectives of natural and social scientists on the issue of social conflict. In each country natural scientists were more likely than the other two groups to emphasize shared social interests, while in each country (this time including Italy) social scientists were most likely to stress divergences of interest. Moreover, natural scientists were most likely to opine that social conflict is on the decline, while social scientists were least likely to hold this view. Once again, the technocratic mentality does characterize natural scientists, but definitely not social scientists.

TECHNICAL TRAINING AND STYLES OF POLICY ANALYSIS

Each respondent was asked to discuss two specific policy problems. The first came in response to a question about the most important problems facing the country in his area of responsibility. The second, national economic planning, was identical in all interviews. These discussions provide evidence relevant to the fifth hypothetical characteristic of the technocratic mentality—an emphasis on technical or practical considerations rather than on ideological, moralistic, or political criteria in dealing with public issues.

Each respondent's discussion of each policy problem was rated along a series of stylistic dimensions. Did he moralize the issue, for example, by blaming someone for the problem? Did he discuss conflicting interests among different social groups, or did he instead imply that

TABLE 8
Elitism by Type of Training

	Britain			Germany			Italy		
	Nat Sci	Law Hum	Soc Sci	Nat Sci	Law Hum	Soc Sci	Nat Sci	Law Hum	Soc Sci
Elitism Index									
High	54%	37%	9%	62%	35%	21%	71%	59%	81%
Medium	25	32	36	23	24	29	14	13	4
Low	21	32	55	15	40	50	14	28	15
	100%	101%	100%	100%	99%	100%	99%	100%	100%

a. Components of the Elitism Index:

1. In a world as complicated as the modern one it doesn't make sense to speak of increased control by ordinary citizens over governmental affairs.
2. It will always be necessary to have a few strong, able individuals who know how to take charge.
3. People should be allowed to vote even if they cannot do so intelligently. [Scoring for this item is reversed in calculating the Index.]
4. Few people know what is in their real interest in the long run.
5. All citizens should have the same chance of influencing policy. [Scoring for this item is reversed in calculating the Index.]
6. Certain people are better qualified to lead this country because of their traditions and family background.

the issue was a technical one that could be resolved in everyone's interest? Did he use political feasibility as a criterion for assessing policy alternatives? Did he use technical or administrative practicality as such a criterion?

These stylistic characteristics are typically patterned so that those who moralize issues tend also to discuss conflicting interests, to refer to political feasibility and *not* to technical or administrative practicality. Therefore, from the ratings of these policy discussions we have constructed a single index, measuring a respondent's tendency toward either an "administrative or a "political" style of policy analysis. (See Putnam, 1975: 189-191 for further details on this index.) Table 9 shows how each of our groups rank on this measure. The pattern is by now monotonously familiar. In each country natural scientists are least likely to "politicize" the discussions of issues, whereas social scientists, at least in Britain and Germany, are most likely to do so.

TECHNICAL TRAINING AND SOCIAL VALUES

The solutions offered by our respondents for specific social problems tend to confirm yet another hypothesis of the theory of technocracy, for

there were *no* systematic differences across our groups in the extensiveness of the reforms they proposed. Radical reformers and modest tinkerers were found in virtually the same proportions among natural scientists, humanists, and social scientists. Educational background does not affect one's propensity for seeking innovative solutions to specific problems.

Yet a different impression of the social values of these officials emerges from the final question posed in each interview:

We want to ask about the kind of society you would like to see for your children and grandchildren. How would that society differ from British [or German or Italian] society today?

Not surprisingly, this question evoked a profusion of disparate and often idiosyncratic hopes for the future. Yet common themes emerged. Some respondents offered passionate pleas for greater social justice.

It should be more democratic than it is today. It should show small differences in wealth and income. It should give everyone the same chance for education. These are things that concern me because I come from the real working class, and indeed from a time—even before the great world economic crisis—when there was still a proletariat in the genuine sense, with nothing more than its labor to sell and living constantly under the scourge of unemployment.

Others expressed a more intellectualized desire for social equality:

Any movement towards the decline of class distinction would be highly desirable. The more one can get towards a meritocracy and away from inherited wealth . . . more a Balliol [an Oxford college] type of society than what we've got, that's what I'd want.

On the other hand, some respondents emphasized economic stability and growth, without particular reference to distributive issues:

The two outstanding problems we have today are both financial. One is the balance of payments in our changing position in the world, the other is the growing fear of run-away inflation in this country. Get those two put right, and there is nothing fundamentally so wrong today that it must be put right for the benefit of the next generation.

As a society, in terms of composition, I don't think there can be great innovations. There should be further improvements in the

TABLE 9
Style of Policy Analysis by Type of Training

Style of Policy Analysis ^a	Britain			Germany			Italy		
	Nat	Law	Soc	Nat	Law	Soc	Nat	Law	Soc
	Sci	Hum	Sci	Sci	Hum	Sci	Sci	Hum	Sci
Political	25%	46%	55%	17%	35%	44%	12%	30%	21%
Mixed	42	28	27	50	16	19	25	15	38
Administrative	33	26	18	33	49	38	62	55	41
	100%	100%	100%	100%	100%	101%	99%	100%	100%

a. See text for definition.

standard of living, which I hope we can achieve with a further thrust toward industrialization.

Finally, some people seemed unwilling or unable to formulate distant dreams:

There are always changes, but on the whole I find the world in which we live at the moment really quite good. In ten years it won't be the same as it is today, for there will always be improvements. But already one can be quite satisfied.

The future society can be essentially that of today. Obviously, if we were to eliminate individual initiative, we would eliminate the element that brought us to our current position. If we regimented everything, leveled everything downward, we would badly serve society.

Data presented in Table 10 show that these themes appeared in different proportions in the reflections of our several groups of respondents. Both social and natural scientists stressed economic progress, but distributive justice had little salience for natural scientists, while appearing prominently in the replies of social scientists. Instead, natural scientists often expressed general contentment with the main features of contemporary society. "More of the same" seems a common desire among this group of officials. Once again, within the limits of the data at our disposal, natural scientists fit the ideal-typical protrait of the technocratic mentality fairly well, while social scientists, particularly in Britain and Germany, deviate markedly from that portrait.

PROSPECTS FOR TECHNOCRACY: AN APPRAISAL

Our main empirical findings can be summarized concisely:

- (1) Scattered but consistent evidence suggests that the importance of technical training as a credential for elite recruitment is rising throughout the industrialized world.
- (2) Decision makers trained in natural science and technology are peculiarly committed to the technocratic ethos. They define their role as the application of apolitical expertise. They find the political aspects of their work repugnant. They are antagonistic toward politicians, political institutions, and citizen involvement in government. They are relatively insensitive to conflicting social interests and to issues of distributive justice.¹⁰
- (3) In at least two of our three countries, decision makers trained as social scientists, by contrast, display a distinctively *untechnocratic* mentality. They adopt an avowedly political role as policy advocates, and they are concerned with the social consequences of government activity, rather than merely its technical elegance. They are comfortable with both the institutions and the normative premises of democratic politics. They affirm the reality of social conflict and the importance of social justice.

To be sure, those Italians we have classified as social scientists do not correspond to this description. This anomaly may be due to the fact that many of them were actually students of commerce rather than social science proper; certainly, as a group, they are less professionally committed to social science than are their counterparts in Britain and Germany. Whether or not this explanation is correct, however, it is important to note that even in Italy "social scientists" do not endorse the full-fledged technocratic philosophy espoused by their compatriots trained in natural science.

In sum, theories of technocracy must distinguish—as they have not typically done—between decision makers technically trained in the natural sciences and those technically trained in the social sciences. Economists ought not to be linked casually with scientists, mathematicians, and engineers, as practitioners of "the new intellectual technology" (Bell, 1973: 344).

Two questions need to be addressed in reflecting on these findings: why? and so what? What are the probable explanations for these patterns of association between technical training and administrative philosophy? What are the implications of these patterns for the possible emergence of technocratic government in the decades ahead?

TABLE 10
Priorities for the Future by Type of Training

	Britain			Germany			Italy		
	Nat	Law	Soc	Nat	Law	Soc	Nat	Law	Soc
	Sci	Hum	Sci	Sci	Hum	Sci	Sci	Hum	Sci
Selected priorities for the future ^a									
Social justice	17%	22%	67%	17%	31%	40%	0%	26%	23%
Material progress	57	64	89	42	13	33	43	29	27
Status quo	26	11	11	33	28	13	29	14	12

a. Not all responses are shown here. Multiple responses were allowed.

SOME POSSIBLE EXPLANATIONS

Personnel systems in modern government probably assure some rough correlation between skills and jobs. If so, possibly the associations we have observed between outlook and educational background are essentially spurious, induced by postrecruitment socialization. Perhaps credentials in natural science lead one to a career that breeds a technocratic outlook, whereas a social scientific degree leads toward a career that inculcates contrasting attitudes. Without evidence on the evolution of our respondents' outlooks since their entry into public service, this explanation cannot be excluded. However, several bits of evidence render it less plausible.

First, we can find no consistent differences in the length or intensity of exposure that our three educational groups have had to politics and policy-making. Respondents in the three categories are not distributed differently across grades. Both natural and social scientists are more likely than conventionally trained officials to have had nongovernmental posts before joining the civil service, but (with one exception, to be discussed momentarily) all three groups have served in government on average more than a quarter-century by now. Natural scientists report neither more nor fewer contacts with politicians and politics than do social scientists, although, as we have seen, the former are much less happy about those contacts.

There are only marginal discrepancies in the distribution of the three groups across departments, and those discrepancies offer no obvious explanatory leverage.¹¹ For example, social scientists are not concentrated in departments concerned with "people" (e.g., health and services), and natural scientists in departments concerned with "things" (e.g., transportation). Nor are social scientists consistently found in client-related departments (e.g., agriculture or labor), and natural

scientists in more "independent" departments (e.g., ministries of the interior).

Perhaps finer-grained information about job histories would reveal correlations with both training and outlook, though, of course, we still could not exclude the possibility that the differences in outlook predate and helped determine the differences in assignment, rather than the reverse. Postrecruitment socialization remains a possible explanation for the differences we have observed, but, for now, we must enter the Scots verdict: not proved.

One important exception must be noted to the homogeneity of career patterns across our educational categories, for the German social scientists constituted a rather distinctive group. They were heavily supporters of, and frequently activists within, the SPD. They were on average nine years younger than their colleagues and had entered government ten years more recently; indeed, half of them had entered after 1967. Compared to their jurist and natural scientist colleagues, they reported more frequent contacts with the Chancellor's Office and with ministers other than their own. In sum, our German social science cadre is disproportionately composed of Social Democratic partisans, imported by the Brandt government to help reform German government and society. Thus, their strongly antitechnocratic outlook is probably bound up with a broader ideological stance. It seems highly likely that this stance was cause, not consequence, of their recruitment into the national administration. The British case illustrates, by contrast, that the link between social scientific training and an antitechnocratic outlook need not be mediated by, nor even associated with, partisanship.

Yet another line of evidence argues that the association between professional training and administrative philosophy may antedate the administrative careers of these officials. Numerous studies of educational sociology have reported sharp disciplinary differences in political outlook. For example, Emmerson (1968: 403) reports that "evidence from nineteen countries shows that, on the whole, students in the social sciences and the humanities are more likely to be politicized and leftist than their colleagues in the natural and applied sciences," and Ladd and Lipset (1972) describe in detail the spectrum of views across American faculties, from social scientists on the left to engineers and agronomists on the right. In the context of this research our findings are somewhat less surprising than when laid against theories of technocracy. Nevertheless, it remains remarkable that the disciplinary differences extend beyond contemporary issues and partisan ideology to encompass

administrative philosophy, and that the differences have survived decades of common experience in government and other aspects of adult socialization.

Assuming that we have correctly traced the differences in outlook between social scientists, natural scientists, and conventionally trained officials to their college years, another important question remains: does the link between discipline and outlook depend on socialization or on self-selection? Are social scientists taught that conflict is real, justice important, and politics good, or do young people already inclined to these beliefs therefore choose social science as a major field? Are hard scientists taught to believe in absolute objectivity, natural harmony, and materialism, or do hard-headed students choose hard science? No doubt the right answer is "a bit of both," although evidence at the mass level tends to emphasize the importance of self-selection.¹² Our research cannot contribute to that debate, though our findings do underline its importance. In particular, the outcome of that debate would affect one's judgment about the probably efficacy of curricular innovations designed to moderate the antipolitical orientations of natural scientists and technologists headed toward administrative careers.

Without additional information on the substance of our respondents' training, we cannot determine just what it is about the several curricula that might have produced contrasting outlooks. Differences in disciplinary content are probably less important than differences in styles of analysis. For example, students in natural science are probably taught to make a more rigid distinction between fact and value than are their colleagues in other disciplines. Doubtless, too, there are important curricular differences from country to country and from decade to decade, particularly in the humanities and the social sciences. One might speculate, for example, that the rigor of contemporary economics is creating—and attracting—more hard-headed students, who may subsequently display political attitudes more like those of our natural scientists. (However, we have been unable to discover any age-related differences in the disciplinary profiles displayed by our samples.)

SOME POSSIBLE CONSEQUENCES

Trained engineers probably build safer bridges than nonengineers, and trained economists probably commit fewer technical errors in macroeconomic policy-making than noneconomists. In short, technically trained officials are probably more expert at designing technical policy instruments than are conventionally trained officials. This

difference probably explains why the former are becoming more common and the latter less common. Thus, one consequence of the increasing importance of technical credentials for elite recruitment probably will be greater technical efficiency and possibly greater innovativeness with respect to the tools of policy, though probably not with respect to policy objectives. These are at least plausible hypotheses.

I shall not discuss this range of consequences of our findings, however, in part because my evidence does not speak to such questions, and in part because debates about technocracy have centered on other issues. The central question is this: will government in advanced industrial societies, government by technicians, become increasingly technocratic in the pejorative sense—less responsive, more remote, less sensitive to the needs of disadvantaged groups, perhaps even more authoritarian?

The answer depends, first, on what *kinds* of technicians with what *kinds* of skills and sympathies gain power. If nothing else, I hope to have shown that the link between “technician” (a decision maker trained in applied science) and “technocrat” (a socially and politically insensitive decision maker) is an empirical and not a definitional one. Our evidence suggests that government by technicians trained in natural science might well be more technocratic in the pejorative sense, although government by technicians trained in social science probably would not. (It is interesting to note that while Soviet elites are increasingly drawn from hard-science backgrounds, elite recruitment in the West seems increasingly to emphasize soft-science training, as well.)

Some important qualifications must be added to this formula. The comparison of Germany and Italy, for example, reminds us that the social scientists recruited by governments may vary a good deal in their political sensibilities. The same point obviously applies to the recruitment of natural scientists and technologists, but in that case a more subtle qualification needs notice. Ironically, the antipolitical sentiments of most natural scientists may make them less threatening politically. As several of our natural scientists noted, they are not really very good at politics. Political ineptitude or political abstinence may prove a serious constraint on their political power, at least where policy must be made, and defended, and implemented in public.

The point can be generalized. The prospects for technocratic government depend not merely on the skills and propensities of bureaucratic elites, but also on the skills and propensities of politicians. Elsewhere (Putnam, 1975) I have drawn on our elite surveys to show how dissimilar politicians and bureaucrats are as policy makers. Not sur-

prisingly—but not tautologically—elected politicians are more “political” in the way they treat issues, more sensitive to pressures from the grassroots, more willing to question current politics and patterns of power. Moreover, the technical skills of politicians are rising at least as rapidly as those of bureaucrats. Indeed, there is some evidence that in both capitalist and communist industrial nations the emergence of the hybrid figure of the politician-technician may be the single most significant contemporary trend in elite composition (see Putnam, 1976: 205-214). The power of technocrats clearly depends on the power of their potential competitors. Fears (or hopes) that politicians of passion and principle will soon be outnumbered and outclassed by antiseptic social engineers are at least premature.

The prospects for technocracy also depend in part on the cohesiveness of technocrats. Nothing in our evidence supports the notion that technically trained experts typically concur on the substance of policy. Technocrats agree that “politics” should be replaced by “rationality,” but on practical issues they may rarely agree which policy is uniquely “rational.” Political coalitions are as likely to cross as to follow any formalistic line between technocrats and nontechnocrats (see Suleiman, 1974: 374-383). In particular, the emergence of technically skilled counterelites—nuclear scientists concerned with nuclear safety, physicians worried about the delivery of medical care, and so on—may temper the threat of a technocratic conspiracy. The venerable notion that democracy depends on conflict has much contemporary relevance.

Finally, our evidence on the differing outlooks of technically and conventionally trained officials and on the increasing prominence of the former must be interpreted in the light of other, more or less independent trends in elite character. As I have reported elsewhere, evidence from our surveys of European administrative elites is suggestive of a secular tendency toward more responsive governance. “In each of our three countries (and in Sweden as well) our younger respondents are much more open to the idea of political equality and mass participation, much less hostile and suspicious toward the political environment in which they increasingly move, much more inclined to a programmatic style of politics” (Putnam, 1973: 285-286). In this context it may be significant that the social scientists in our samples, special bearers of the new political sensibility, also express special satisfaction with recent changes in the role and qualities of civil servants. Perhaps they sense that, as our evidence suggests, although the future belongs to the technically trained, it need not belong to the technocrat.

NOTES

1. See Putnam (1976: 202-205) for additional discussion and citations to relevant literature.

2. See Putnam (1976: 205-211) for additional evidence and citations to relevant literature.

3. It is sometimes suggested that technocrats tend to be "specialists" rather than "generalists," but several close examinations of French technocracy have discounted this claim (Ridley, 1966; Suleiman, 1974, 1978). I have chosen, therefore, not to include specialism in this ideal-typical portrait of the technocrat.

4. Ridley (1966: 42-43) enters a minority dissent from this interpretation of the technocrat's value structure: "Of only the crudest technocrat could it be said that he believes technical achievements to be an end in themselves. . . . The technocrat is likely to believe . . . that it is technological achievements which will make the 'good society' possible. . . . He is concerned with the transformation of society, so that the new wealth may serve the 'full man'."

5. This research has been supported in part from grants from the National Science Foundation, the Ford Foundation, and the University of Michigan. The other countries included in the project are the United States, France, Sweden, and The Netherlands. For preliminary reports on other parts of the project, see Eldersveld et al. (1975), Aberbach and Rockman (1976 and 1977), and Anton et al. (1973).

6. In each country we also interviewed smaller samples of younger, especially promising civil servants. Evidence from interviews with these "high-fliers" will not be presented here, although the results of initial analyses of those data are consistent with the findings reported here.

7. The availability of three independent national samples compensates for the small samples inevitable in elite studies. A consistent pattern of responses across all three samples is much more significant, both theoretically and statistically, than the identical pattern observed in a single sample (see Blalock, 1972: 166-168).

8. The relatively high number of natural scientists and technologists in the British sample is misleading as a measure of scientific training in the traditional administrative class. At the time of the survey, scientific professionals were segregated in specialist classes, although in many cases they exercised functions that in other countries would have been exercised by ordinary administrators. To obtain a usable number of interviews with such officials, a separate sample was drawn of high-ranking members of the specialist classes.

9. Interview responses and background data were coded entirely separately in this study, so that the coding represented in Table 3 (and all subsequent tables) was "blind" with respect to the respondents' education. Hence, none of the findings reported here are tainted by "halo effect" from the respondents' university majors. To ensure consistency and reliability, each interview was coded independently twice, and the two coders then reconciled any divergent judgments; analyses throughout this paper are based on these final, agreed codings.

10. I know of no other evidence on the outlooks of technically trained elites in Western democracies with which our findings might be compared, but for roughly comparable findings in Eastern Europe, see Barton (1973: 254-257) and Bauman (1964).

11. The only consistent significant pattern of departmental concentration is a moderate and unsurprising tendency for social scientists (mostly economists, it will be recalled) to be overrepresented in the departments responsible for macroeconomic policy.

12. A slender bit of evidence that disciplinary differences may in part predate college training is that, in all three countries, officials trained in social science come from significantly more modest social backgrounds than their colleagues. (On the other hand, their fathers were not significantly more likely to have supported left-wing parties.)

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