STUDIES IN COMPARATIVE POLITICS

POLITICS
AND
TECHNOLOGY

ROGER WILLIAMS

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Politics and Technology

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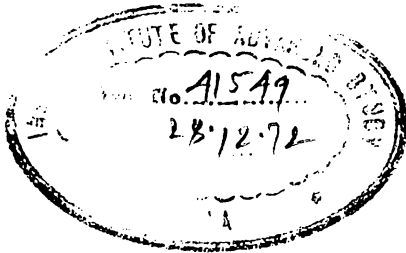*Printed in Great Britain by*
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1 Introduction

It has come to be realised in recent years that it is characteristic of science and technology continually to be creating new problems and new types of problem for political systems. Politics is thought of as being concerned with the conduct of public affairs and the governing of men, and science and technology are increasingly seen as defining or complicating the substance of public matters, and furthermore, as together constituting a growing influence on the structures and methods through which the business of the state is decided and controlled. It is with the overall political effect of science and technology on society, state and government that this essay deals, but it is as well at the outset to bring to mind more specific aspects of the technology–politics relationship.

In the field of national politics, a host of essentially new difficulties have been recognised as associated with technological advance. Thus society has become conscious of the dangers of over-population and the tensions of urban living, of worsening environmental pollution and despoliation, of the threat to privacy and freedom implicit in surveillance and data-processing techniques, of the challenges which derive from progress in medicine and genetics, and of the stresses which accompany automation. Nor is this by any means the whole of the inventory. People in general have been encouraged by education, by mass advertising, and by their own recent experiences, to make unprecedented socio-economic demands, and ultimately these are translated as demands on the political system. The capacity of this system to respond appropriately is then called into question as never before. In some cases the response needed may amount to no more than a redistribution of inputs and outputs, in others it may involve enhanced political participation and decentralisation, in others still a

reaffirmation of ideology and national goals. Where the response is inadequate, then, depending upon the political maturity of the country concerned, one may have anything from unhealthy politics to a revolutionary condition, or even incipient anarchy. For a highly industrialised country even the least of these ills is a grievous peril. Britain's then Minister of Technology confessed his fear in 1968 that, unless adjustments were made to the parliamentary system, discontent, 'expressing itself in despairing apathy or violent protest, could engulf us all in bloodshed'.[1] Without going as far as this, it is obvious that advanced modern societies could be in great difficulties if they failed to give the closest attention to adjustments which techno-economic progress may call for in their political and legal systems. There does indeed appear to be a 'dawning realisation that . . . it is rapid technological change rather than ideological strife or even economics that is building up a fundamental political crisis'.[2] And there is probably a growing appreciation of a need for political inventiveness, for governments to respond to future as well as to present electorates.[3]

From the point of view of public administration, it becomes extremely important for each country to discover, evolve and execute sound strategies for science and technology. This objective is naturally closely related to industrial and educational policies. Since in addition the direct outcome of research and development is by no means always certain, and the indirect results are often entirely unpredictable, arriving at an ideal science and technology policy is rather like finding a unicorn. It is not therefore surprising that the institutions and methods shaping these policies should have received the great volume of cross-national analysis which they have done in recent years.

Turning finally to the sphere of international relations, mankind has for more than a decade lived with the most critical danger it has ever faced. Perhaps for the continued existence of the human race, and certainly for the perpetuity of most of civilisation, the precarious balance must be preserved between two (and presumably soon three)[4] countries more or less antagonistic to each other. It must be hoped of the leaders of each of these countries that, in every possible circumstance, they eschew the initiation of nuclear war, and also that they unequivocally avoid being drawn into situations where either of the other two could misconstrue their actions or intentions.

These are stringent requirements, and in spite of international agreements it would be optimistic to assume that the second at least will always be fulfilled. In this context it has been learned that technology is equally the symbol of might and of uncertainty. To quote an ex-Director of Defence Research and Engineering in the Pentagon: 'there is no technical solution to the dilemma of the steady decrease in our national security that has for more than twenty years accompanied the steady increase in our military power'. Since technology cannot guarantee their survival, the super-powers have no alternative but to investigate thoroughly the potential of political devices, formulae and understanding[5], however little they may seem to promise. So critical is this issue that every other fades by comparison, including the subject treated in this essay. As Toynbee put it: 'so long as the human race allows itself simply to stay alive it can be confident that it will outlive any of the habits and institutions that it has introduced into its social and cultural heritage'.[6]

As regards each of the three political areas which have been distinguished here – national politics, public administration and international politics – one can reasonably argue that the impact of technology has for some time been very substantial. That is not to say, of course, that the only major political problems are now occasioned by technology, but it should suggest that the interaction between politics and technology be considered as a key determinant of contemporary political life.

Some five years ago an American political scientist, discussing the increasing flow of books and articles dealing with this confrontation, referred to it as 'a literature in search of a field'.[7] His reasons for so regarding it were partly that he did not feel, at that time, that the total volume of material had reached the 'critical mass' typical of a scholarly discipline, partly that the literature was 'long on ominous and articulate warnings of the importance of the problems and short on systematic research and methodology'. The literature has continued to grow and if, on the first count, it has still not become a 'field', then it is scarcely likely to achieve this distinction in the future. On the other hand, while much of the material is now descriptive and interpretative, much also remains predictive and prescriptive. The literature extends over the whole domain of political science, covering each of the three areas

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mentioned above, and it is in order to avoid a too unacceptable superficiality that the present essay is concerned with what has been variously called the 'technological society', the 'post-industrial society', the 'technocratic state', the 'new industrial state', and so on. It will emerge that there is as yet no general agreement as to which of contemporary industrial states already are, or are about to become, 'post-industrial'.[8] Nor is it a unanimously held view that such states must be qualitatively different in certain vital respects from their predecessors. Still less is there a consensus on their probable modes of operation and evolutionary paths. In fact, to confess the worst at the outset, the post-industrial state still lacks an authoritative political philosopher, so that one can neither be sure about its relationship to more traditional concepts of the state, nor can one know with confidence how to regard its significance for the political future of man. Indeed, it may still make more sense to talk about post-industrial *societies* than about post-industrial *states*, at least until we are absolutely sure that a fundamental change in the very nature (and not just in the functions) of the state has taken place.

The approach adopted here is to begin with a brief examination of the idea of 'industrial society', and to move on from there to discuss the nature and apparent political imperatives of technology. This is followed by an analysis of the twin concepts of technocomplex and technocracy, meaning respectively the special political and organisational arrangements technology is typically said to encourage, and the special class whose political and social roles it appears to promote. This analysis provides the basis for a wide-spectrum review of published opinion on the 'technological society' and the 'technological state'. The essay concludes with some remarks on the fashionable occupation of predicting the future of such societies and states. Throughout, the widest possible construction is placed on the term 'science and technology'. In particular, 'science' is taken to include the social as well as the natural sciences, and technology to refer to such social technologies[9] as systems analysis as well as to the more usual engineering categories.

2 Industrial Society

It is because 'technological society' is represented as the future of 'industrial society' that it seems right as a preliminary to summarise some of the thought behind 'industrial society', itself a hypothetical construct. Saint-Simon was the first to focus on it for this purpose, though he himself was following the intellectual lead of Condorcet, whose achievement it was, according to Lakoff, 'to synthesise the Baconian conception of the utility of science with the Rousseauistic and Lockean vision of a society of freedom and equality'.[10] Saint-Simon was followed by the Saint-Simonian school, by Comte and by Spencer. The influence of Saint-Simonism has been much greater than is generally realised, partly because Comte has received much of the honour properly due to Saint-Simon himself,[11] and Marx, Engels, Carlyle and Mill were all among those exposed to Saint-Simonian thinking. What Saint-Simon wanted was the placing of all social responsibilities with those individuals best fitted to discharge them in the general interest.[12] He envisaged an industrial order which would have overcome the arbitrariness, incapacity and intrigue of existing political systems, and which, though having 'brain', 'motor' and 'sensory' classes, would yet have had no class domination or conflict. This would have been an integrated, planned, productive and internally secure society, fair too, one might say, but still hierarchical.

Industrial society as a contemporary analytical idea owes much to Aron, for whom it is the 'major concept of our time'.[13] Gellner is another who places the transition ('the hump') from pre-industrial to industrial society at the centre of thought about political experience.[14] What is more, so discontinuous does the transition seem to Gellner that he is even prepared to deny the feasibility of a valid political theory embracing it:

'given the concepts, beliefs, values, of pre-industrial society, it is impossible to construct in *their* terms a so-to-speak anticipatory theory of the transition. . . .'[15] 'Industrial society' is really a pretty general concept, and it is not surprising that there have been objections, practical as well as philosophical, to its use.[16] What then are its key features in the judgement of those writers who have defended its operational validity?

It is a society based on large-scale industry, predominantly concerned with the performance of that industry, and therefore with the corresponding organisational requirements. It is an urbanised society of nuclear families and mass culture. Its division of labour is increasingly determined by its technology, as also is its accumulation of capital and its search for a calculus of rational choice. The ownership of its means of production is less politically critical than the actual control of those means. Although politically pluralised because of its need for specialisation, aggregate associations such as unions or corporations may have great leverage, and in any case find their true counterpart in a large, centralised, meritocratic bureaucracy. The rich interconnectivity, and hence interdependence, of the society, and its substantial international coupling to similar societies, together present problems of control and stability, and the rapid methods of communication and transportation now available, while facilitating control, may also magnify any instabilities.

Aron, who intends the concept to be no more than a type, albeit an unprecedented one, points out that it could equally well be designated 'scientific', since science (in the sense of a will to power rather than a quest for truth) provides its essential drive: 'The *qualitative* difference between present-day and earlier science and technology is *obviously* the indispensable precondition of all the other features usually attributed to modern societies. . . .'[17]

Faunce settles for 'rationalism' as being responsible for the qualitative difference between non-industrial and industrial societies, and the quantitative difference between early and late industrial societies.[18] It strikes him as paradoxical that, while 'the more dramatic threats to individual freedom occur during the early stages of industrialisation', there yet appears to be 'inherent in the structure' of mature industrial societies 'constant, less obvious, and therefore more insidious

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pressures to change the balance of freedom and control'.[19]

That his concept gives rise to paradoxes Aron himself fully acknowledges. As one example, he notes the need for an ideology capable of bridging the gap between the egalitarian pretensions of industrial societies and their hierarchical realities. He is also quite conscious of the irony that these societies have so far proved 'peacable in theory, but bellicose in fact'.[20] In his book *Democracy and Totalitarianism*[21] he demonstrates the strangest paradox of all:

> . . . the characteristic of each type of industrial society is dependent on politics. (p. 11)
> . . . industrial societies can choose between a liberal or a tyrannical democracy . . . [and] between two types of economic organisation. . . . But these two summary alternatives do not cover the variety of present phenomena. . . . (p. 253)

Echoing Faunce and Aron, Birnbaum too maintains that industrial societies still display 'profound contradictions'.[22] In any case, he fears that 'The history of industrial society is not the history of the extension of liberty.'[23] Participation within these societies is, he continues, 'infrequent and often immensely superficial'.[24] They are societies in which 'routine and compliance are the usual sources of consensus', and they are 'perfectly able to function with enormous amounts of what I would term "dissensus" '.[25] Nevertheless, he will concede that they perhaps contain 'important possibilities for political change'.[26] That is probably as well, for Aron is surely correct in asserting that, although industrial societies are a long way yet from being universal, they are potentially so, because of the world-wide valuation of them as the '*sine qua non* of power and prosperity'.[27]

3 Technological Imperatives

Industrialisation, followed by the establishment and exploitation of successive generations of indigenous advanced technologies, is certainly now seen as the uniquely progressive path for all countries. However, there are, or are believed to be, certain imperatives associated with technological growth, and it may be that not all polities realise exactly what it is they are getting into, what they are committing themselves to do, and to give up, in technology's name.

The 'imperatives' spring from the enormous time and money costs of advanced technology, and from the fact that major technological projects, and volume production of smaller technological products, call forth large and complex administrative organisations.[28] These, the corporations in a capitalist state, the enterprises in a communist one, depend for their survival on at least a 'satisficing'[29] economic performance, and they therefore press for a predictable economic environment, which means in practice some form of state planning, even in capitalist states. There is naturally a great deal of difference between normative planning of the Soviet type and the persuasive-indicative-remedial planning typical in the West; and, for different reasons, there has been disillusionment in both the communist bloc and in the capitalist countries with their very different styles. In spite of this, the demand for a dynamically stable economy still seems to make automatic a substantial governmental involvement with industrial planning.

A second requirement introduced by technology is that the state should share, or bear fully, the risks of research and development, and often of production too. The need, on national security grounds, to protect key technological industries, the responsibility to do as much as lies within the power of government to strengthen industries which have to compete inter-

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nationally, and the exigencies of regional and employment policies, all conspire to compel the state, however reluctantly, to accede to this requirement also. Benevolent abdication is less and less an alternative to discriminatory interventionism. (In the Soviet camp, of course, by definition, it never was.)

Then there are the other, less direct, ways in which technological imperatives take on the character of social goals via, in Galbraith's words, the 'triumph of unexamined but constantly reiterated assumption over exact thought'.[30] Thus it seems logical that the state should arrange its educational system so that its output matches the industrial system's input needs both qualitatively and quantitatively. Or, as a second example, there is the fact that industrial companies themselves work to combat technological risk and uncertainty by the scale of their operations, and this leads to their asking for political acceptance, approval or assistance as they grow to become first national giants and then later, perhaps, huge multinational corporations. The objective of ever larger and more homogeneous markets, which they pursue simultaneously, can lead to another pressure on government, this time to participate in appropriate trade agreements or, where necessary and possible, in an economic community. Finally, these corporations want their markets to be not just politically stable and economically sound, but also preconditioned to absorb an endless stream of such technological products as they can make available. In this, too, governments are urged to help, through their own purchases and those of the public sector generally, by adopting a tolerant attitude to manipulative marketing, and by framing policies and legislation in such a way as to stimulate the demand for ever more advanced consumer and capital goods. It is because of the socio-economic and political consequences of 'speeded-up' technological innovation that Shonfield chooses to refer to a capitalism that is 'modern'.[31] It deserves this epithet, he argues, because economic growth in the advanced Western countries has, over the last twenty years, been both steadier and faster than ever before, and further, its benefits have been more evenly distributed. The 'distinctive features' of this modern capitalism are for him the conscious pursuit of full employment and an 'accelerated pace of technological progress'. The key elements of its pattern include a great expansion in public management of the economy; the pursuit of 'intellectual

coherence' in this and in private economic management; private competition that has lost its savagery through public regulation; a widespread and explicit assumption of a continuing rise in real personal income; and finally, a public 'preoccupation with social welfare', 'in human terms . . . [the] most striking characteristic' of 'the new capitalism'.

Each country's success in operating this new capitalism is measured to a large extent in terms of the annual growth rate which it achieves in its economy. It is no longer enough for this to be determined simply by the summed outcome of individual decisions as between present and future consumption. Modern economies have already been too much altered by public intervention for that. The central economic problem which the new capitalist state has to solve could therefore be seen as the securing of an appropriate balance between collective action and market principles. Even then, reconciling long-term planning with Western-style democratic politics presents serious difficulties of its own.[32]

It is important to realise that, while the various technological imperatives as outlined here have a putative relationship with the corporate profit motive, they really derive their effective dynamic from the personal and professional motives of the managerial-technical class itself. Consequently, one must not be misled by the fact that in communist states most of them are less visible. Like other basic forces not allowed formal expression by the political rules of those countries, the imperatives express themselves rather differently, but the source is the same and, economically if not politically, so also may the end be. The point is that the imperatives are sustained by an almost universal conviction that economic growth is an absolute good. Indeed, political régimes are nowadays not infrequently evaluated in terms of their capacity to provide it. It follows that an attack on it threatens the rationale of the imperatives, and challenges the political logic of those societies – which is to say, increasingly, all societies – which take them seriously. When economists, who otherwise agree on so little, present a virtually united front in defence of growth, how is one to react, save intuitively, to one of their number who concludes, offering proof where it seems to him possible to do so, that 'the continued pursuit of economic growth by Western societies is more likely on balance to reduce rather than increase social wel-

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fare'?[33] Mishan proceeds to argue for stronger legislation safe-guarding the individual right to amenity, and for increased investment in the environment at the expense of industry, but his case does not rest on recognition of the external diseconomies of innovation. He deplores the competition between politicians which, he says, exaggerates the significance of modernisation, and he distrusts the scientist whose solution to any short-comings or misuse of science is to press for still more science.[34] Those who feel, as he does, first that technological progress is an unending process of substituting dependence upon machines for dependence upon people, and second that the world's cult of efficiency leads to a blunting of moral sensibilities, will agree with him that 'it is well worth discussing whether humanity will find [the sort of world towards which technological growth is bearing it] more congenial or not'.[35] They may well also choose to remember in this context the appalling vision Michael Young offers of a meritocratic Britain in 2033: 'Since the country is dedicated to the one overriding purpose of economic expansion, people are judged according to the single test of how much they increase production, or the knowledge that will, directly or indirectly, lead to that consummation.'[36]

4 The Technocomplex

To pursue economic growth is to serve the technocomplex; that is the next proposition which must be examined. Here, 'techno-complex' is to be understood as simply a generalised version, in the sense that industries concerned with non-military technology are also now included,[37] of the older 'military-industrial complex'. This itself began as a convenient, and dramatic, label for a large set of tendencies in the American governmental and industrial sectors concerned with defence, space and atomic energy. The term has a particularly sinister ring. Behind it lurk the 'power élite' theories of Mills[38] and others. Furthermore, the potential dangers inherent in the existence of the complex were given official recognition by President Eisenhower in his much-quoted farewell address. Noting that, for the first time, America's military establishment and arms industry had both become immense, Eisenhower concluded that it was necessary in government to 'guard against the acquisition of unwarranted influence . . . by the military-industrial complex'.[39]

The complex came about in the United States because the technological revolution was interpreted there as a challenge to national security, and because this threat was then met by the device of the contract. The latter provided for public prog-rammes to be undertaken by private organisations, on either a normal commercial or a not-for-profit basis, in many cases the private organisation actually being brought into being in order to take up the contract. The result of the national reaction to the technological revolution was a major commitment to foster science and technology, and the contract turned this into a clutch of symbioses between government agencies and non-government institutions, the agencies failing to develop in-house capabilities, the institutions doing so instead only to find government more or less the only customer for them, so that

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they became government-oriented, or even government-dependent, bodies. The philosophy behind this development is neatly summarised in the following official declaration:

> . . . public sector problems can be regarded as the source of new commercial opportunities rather than as unending burdens and threats to society at large. We question whether the levels of service demanded in our society immediately and over the years ahead can in fact be met at tolerable cost unless we succeed in bringing both advanced technology and commercial competitive incentive to bear.[40]

The phenomenon which has resulted is almost entirely a post-war one, and political scientists have seen in it a new style of government, a sort of federalism by contract,[41] or a contract state, with the contract between a government department and a private organisation one of two major mechanisms used to decentralise federal concerns. The other, of course, remains the more traditional grant to a state or local authority. But the two methods have been used in quite different ways, virtually only the contract being used for national security and technology programmes. There has also been a striking difference in the quality of resources provided for the two approaches.[42] The contract system has made available to government almost all of the nation's scientific and technological capacity, it has made possible achievements which only a short while ago would have seemed staggering, and it is consequently not likely easily to be abandoned. The system has also led to important new political problems. It has, for instance, proved very awkward to ensure a proper degree of accountability (and not just fiscal accountability) when contractor independence is also being promoted.[43] In other cases the receipt of certain contracts by university establishments has been bitterly questioned. Overall, sharp regional and institutional imbalances in research and development expenditure have led to chronic political controversy. It is easy to see what Miller means when he states that 'The most profound constitutional change in the history of the [American] nation is the advent of the techno-corporate state'.[44] A professor of law, he adds two original observations. First, the future-oriented government of the United States has, he believes, assumed an identity transcending the individual national interest it represents: 'the state as group-person'. Second, the era of

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the super-corporations has simultaneously 'undermined the historical individualistic basis of law', so that law becomes politicised and freedom means only the freedom to choose which group to join. Convinced of these developments, Miller concludes that, for the United States, managing the inevitable change to come will be 'about as large an order as any nation has ever faced'.

But do the aggregated dangers threaten some insidious political takeover by the minions of the complex? Views diverge at a much lower level of question, as the following quotations illustrate:

> . . . political influences seldom lead to decisions which are seriously uneconomic from both short-run and long-run points of view. . . .[45]

> If politics does not in fact play a role in defence contracting, every member of Congress has been operating under a severe and costly delusion for many years . . . the complex does not want war. . . . What the complex wants is defence – and more and more of it.[46]

Very many books have now been written about the 'military-industrial complex' but there is perhaps no more succinct an exposition than that achieved by Adams in a quite short article.[47] He begins by referring to the complex as a particularly clear instance of the 'morganatic alliance between government and business' and continues:

> Here government not only permits and facilitates the entrenchment of private power but serves as its fountainhead. It creates and institutionalises power concentrations which tend to breed on themselves and to defy public control. . . . This unique buyer–seller relationship, which defies analysis by conventional economic tools, lies at the root of the military-industrial complex and the new power configurations generated by it. The complex is not a conspiracy between the 'merchants of death' and a band of lusty generals, but a natural coalition of interest groups with an economic, political, or professional stake in defence and space. It includes the armed services, the industrial contractors who produce for them, the labour unions that represent their workers, the lobbyists who tout their wares in

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the name of 'free enterprise' and 'national security', and the legislators who, for reasons of pork or patriotism, vote the sizeable funds to underwrite the show. Every time the Congress authorises a military appropriation, it creates a new constituency. . . .

But there is, Adams believes, nothing inexorable about this 'blending of private economic power and public political power', this 'form of private socialism' which he likens to the Elizabethan monopoly system: on the contrary, it is a creature of political power, and there is nothing inevitable about public policies.

The reality of socio-political dominance by an essentially unified military-economic élite has certainly been questioned by many social scientists. Rose,[48] for example, admits that sections of the economic élite are given to undermining the American political process, but at the same time he rejects both the suggestion that they have controlled that process, and the notion that the economic élite is monolithic. He argues that the only tenable type of hypothesis with respect to heterogeneous industrialised societies is one which takes due account of the multilateral nature of conflict, with shifting sides, intermittent involvement, and a consensus that is rarely more than partial and temporary. What is not clear is how far this latter kind of hypothesis continues to hold when 'corporate giantism' replaces 'economic pluralism'.[49] In that context it would be very reassuring if one could be certain that obtaining democratic control over the contract state was really 'but a new phase of a continuing challenge in Western industrial societies'.[50] After his very thorough study of the contract-web Danhof, in an over-view entitled 'The Integrity of the System', comments that:

> The advantages of the contractual system to the nation are attainable in full measure only as the government is effective in identifying the public interest in the selection of its objectives. . . . When uncertainty exists in the work assigned to a contractor further delegation of the function of defining the public interest occurs.[51]

He acknowledges that the 'intimacy' of the public/private connection, which 'historically would have been considered intolerable', may reasonably arouse suspicion.[52] His counter-

attack is that many of the actual criticisms are of policy rather than of process.[53] In these terms 'the warfare state'[54] is only incidentally also a 'contract state', and sharpening review procedures at every level would overcome any threat to the public interest hidden in the contract process – except that 'A large element of faith is unquestionably required here as in any situation where the public must deal with experts',[55] a familiar admission, but none the happier for that. Not that Danhof is complacent. He too refers to 'wide-ranging and disquieting impacts upon the nation's political and economic structures' and he recognises that the long-term implications of these may not yet have fully revealed themselves.[56] Will the techno-complex, in the sense of a permanent mutual dependence between the state and technology, or more strictly between the servants of both, prove in the long run to be of major political importance? Everywhere it is still a relatively new pheno-menon. The foregoing remarks have been couched mainly in terms of the American contract experience because it is about that that most has been written, but the concept can be con-strued more widely without too great a dilution of meaning. Thus, the Soviet Union, planned from the first as a state which would fuse technology with national destiny, now has its own military-industrial complex,[57] and its own government-determined 'priority' areas, aviation, rocketry, space explora-tion and atomic energy all being outstanding examples.[58] Other countries may also be expected to encourage techno-complexes as extensions of their traditional political and econo-mic practices. Sometimes, as seems partly to have happened in France, they may for good measure even imitate the United States.[59]

In all cases the typical manifestation of the technocomplex is the large technologically-based, partly government-supported corporation or enterprise. These, it has been said, 'hold the future of the world's high-technology industries in their hands', and that indeed must have 'tremendous implications' for politi-cal scientists.[60] Looking for a moment beyond the boundaries of the nation-state, it is important to realise that, while the international company is not a new phenomenon, the modern multinational corporation is, in the sense that its products and its operations are both very largely predicated upon recent technological advances. Since several of them have sales turn-

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overs larger than the gross national products of medium-size countries like Portugal, since many of them are heavily science-based, and since this type of organisation 'stands out as the one institution powerful enough to make speedy and effective, worldwide decisions', they are evidently of enormous potential political significance.[61] They are by no means all American, and they can make some very desirable contributions to domestic economies, but inevitably it is the American examples of the genre and the political-economic dangers of the multinationals which have attracted most criticism. Direct political activity by them is apparently rare. More to be feared it seems are their subtler political pressures, which can diminish the autonomy of government. As Turner points out, there are other sources of international pressure, but the experiences of France, and more recently of Sweden, at the hands of the United States demonstrate the sort of political difficulties which can arise.[62] Governments must also beware of damage to their economies caused by political, or company, decisions taken in the multinational's home country, decisions connected for instance with balance of payments problems or with the concentration of research and development. Then, though really neither least nor last, there is the threat to culture. The nationality of origin of a product is culturally immaterial according to Turner, and governments can impose quality control on imports, but 'What they cannot do is to keep out the basically materialistic or secular values. Such values become a neo-colonial force.'[63] This particular battle is, he fears, already lost.

The multinational corporation symbolises the international dimension of the technocomplex. It has many other international aspects. Thus it seems that a 'businessman's United Nations' already exists in embryo, and a start has apparently also been made towards international unions.[64] Finally, it must be noted that many international and supranational political organisations and authorities were called into being by circumstances which were at root technological, and also that many of them, such as Intelstat, I.A.E.A., I.C.A.O. or ESRO,[65] are primarily concerned with the administration and control of technology or its results.

5 Technocracy, Technostructure and Participation

President Eisenhower, in the speech quoted above, recognising that there was a grave danger of the nation's science being dominated by the state, went on to warn of an 'equal and opposite danger that public policy could itself become the captive of a *scientific-technological élite*'.[66] With its shades of Burnham,[67] this particular élite can perhaps be subsumed under a more general term, technocracy. 'Technocracy' was a seven-day wonder in the United States of the Depression[68] but is nowadays more Continental than Anglo-Saxon, and usually refers to the actual and potential political power of technical administrators, economists, engineers and related groups.[69] In short, it is to be thought of as a rather special mutation of bureaucracy. Granting that France, at least under the Fourth Republic, constituted a somewhat unusual case, Blondel has shown that technocracies can be defeated or prevented by social and political controls, and also that they are basically unstable.[70] However, the writers concerned with the new industrial state appear to have in mind a more formidable technocracy than this, a sort of 'technostructure' as it were.[71] This is Galbraith's word and he means by it all who contribute a specialised knowledge or experience to decision-making, a process which in government and in industry becomes correspondingly more and more a group exercise. Whether formal or informal this is a co-ordinated process, in that the requisite informational input is ensured by drawing on the appropriate individuals at all organisational levels. It follows that the individual participates to the extent that he has special know-

ledge, but it is also true that responsibility for decisions is more diffused over the whole technostructure than it is concentrated in the hands of the nominal leaders. In the limit, the techno-structure may even be thought of as a continuous network running right through the public and private sectors. It is to this technostructure, says Galbraith, that power in the new industrial state has passed.[72]

There is a link here with Apter, for whom science as an ideology is at once the 'ultimate talisman against cynicism' and also a vital bridge between the modernising and the industrial nations.[73] It is, he believes, a politically pregnant ideology: 'The application of knowledge by political means – and not the responsiveness of government to private wants – becomes the test of good government.'[74] However, unlike other ideologies, this one cannot be shared by all, and this exclusiveness, expressing itself as meritocracy, divides the community. The scientific élites then become a class, and the ethic of science becomes the ethic of man.[75] Apter regards these élites as 'fundamentally revolutionary', but because of their economic importance and not for any long-run, specifically political, contribution they may make.[76] Since he is also uncomfortably aware that they need not 'necessarily be a force for democratic government as we know it', he regards as urgent the task of defeating scientific philistinism by inculcating in 'the new technocrats' a 'sensitivity to human rights and values'.[77]

As evidence of the political significance of scientific élites, the three very different national *causes célèbres*, the Lindemann–Tizard affair, the Oppenheimer affair and the Lysenko affair, are certainly only the tip of the iceberg.[78] Beyond these cases there is a multitude of instances in which scientists have acted out a political role of some kind, occasionally *qua* scientists, but more often as advisers, administrators, analysts, innovators, diplomats or 'witch doctors'.[79] Price, though intending no close analogy with the medieval original, has even described the (American) scientific community as a loosely-defined estate of the realm.[80] Others, less sympathetic, have called it 'the new priesthood'[81] and the 'scientific Mafia'.[82] Having been allowed to enter the political arena, especially the permeable American one, because they were useful, the members of this community have made themselves indispensable, though not infallible.[83] The politicians, Price argues, must defend their power by

ensuring that it is they who define the issues and the assumptions, they who determine which expertise to seek and when, and lastly, they too who learn to discover and exploit conflicting specialist opinion.[84] The politician must also remember that the scientist is as prone to irrationality as the next man.[85]

As to whether the natural or the social scientist is in general most given to pseudo-rationality, it is hard to say. It has been suggested that the latter tends to be more guilty because he is accustomed professionally to applying reasoned analysis to problems not unlike those on which politicians take decisions.[86] However, in American experience, it is the physicists who have shown themselves most ready to offer advice, and some of it has seemed to be in the style of their professional pronouncements, a form very unsuitable for the quixotic world of politics. Scientists in politics, or perhaps more correctly intellectuals generally, might also profit from Beloff's advice. They should not, he suggests, too much concern themselves with the next step – that is properly the work of civil servants – nor with the far horizon – that is politically unhelpful; instead 'It is the middle distance that is all-important'.[87]

It is perhaps in the mantle of policy analyst that the scientist excites most suspicion. Historically, it is not much of an inaccuracy to say that systems analysis resulted from a breakthrough in the mid-fifties by the United States RAND corporation in methods of doing operational research. The claims made on its behalf are sometimes excessive. Here, for instance, are three of them:

It is inevitable that as communication, data-processing, and educational sophistication in management grow, we shall cease to settle our national problems on the basis of who has the strongest lobby.[88]

. . . our technology, our knowledge, our sophistication generally has reached the point where, without question, we are ready and ripe for an explosive take-off into the social sciences. . . .[89]

There is little question that we are at last in a position to invent better social systems.[90]

This, very likely, was the sort of thing which caused Hoggart to regard the 'extreme technological rationalists' as 'extra-

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ordinarily innocent people . . . the real descendants of the medieval scholastics, almost entirely without a sense of the political nature, the irremediably political nature, of social life'.[91]

Most practitioners are usually far more cautious. Enthoven, then Assistant Secretary of Defence, told Congress in 1967 that systems analysis was much misunderstood, and that it aimed only to make open and explicit the assumptions and tacit calculations that went into decision-making anyway.[92] He protested that where it was not neutral it was on the side of the politician rather than on that of the expert. As against this, Schlesinger has admitted that, while the theory underlying systems analysis is unexceptionable, the practice suffers in the real political world, as a result, for instance, of a methodological bias in favour of whatever is quantifiable, through an unconscious initial commitment by the analyst, or because of the intentional deceits of bureaucratic politics. As a realist, he knows that, whereas politics is concerned with appearance and the short-run, systems analysis is detached and long-term:

> Political decisions in a democratic society can hardly be more 'rational' than the public, the ultimate sovereign, is willing to tolerate. All of the old elements remain: the myths and ideologies, the pressure groups, the need for accommodation and compromise, the decision made under duress. Systems analysis may modify, but it cannot extirpate these elements.[93]

It is probably true that in the immediate future the most democracy has to fear from systems analysis is that it becomes a formidable instrument of persuasion. Beyond that, has Wildavsky really cause to worry that political rationality may be so far swallowed up that even the legitimacy of the political system is threatened?[94] Or, at worst, will the future be a 'period of technocracy tempered by democracy'?[95] In any case, the weakest part of Galbraith's analysis seems to lie in his suggestion that the educational and scientific community which the industrial system brings into being will be the instrument, the only instrument, through which that system's monopoly of social purpose will be broken.[96] Being generous, the historical record is thus far very ambiguous.[97]

Those who distrust systems analysis reserve a particular dislike for its still less scientific offshoot, defence and strategic analysis. In this context Green has provided a detailed indict-

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ment of systems analysis and games theory, concluding that they reveal both 'political obtuseness' and 'moral obscurantism'.[98] The methods employed by most of their practitioners are, he believes, 'exactly the opposite of what genuine scientists in any field actually do'.[99] Although his is the most savage, though reasoned, attack yet, he has not been alone in criticising 'the pseudo-science of strategic analysis' and the 'intellectual imperialism of deterrence theory'.[100]

Systems analysis is only one part of the mechanism of technocracy. With the advent of technocracy de Jouvenel despairs for participation:

> . . . the discussion of public affairs is no longer a matter of ratiocination and rhetoric from *ex ante* premises, but is an estimation of the most fruitful actions, a speculation on *ex post* states of affairs. . . . Participation in discussions of that character requires an initial investment so considerable as to restrict entry to a few.[101]

In much the same spirit Meynaud describes technocracy as a form of 'enforced abdication' or 'political dispossession' incompatible with democracy, but none the less a 'natural consequence of our kind of civilisation'.[102] His position is that 'until now complete domination of politics by technics . . . is still fiction. . . . Technocracy has not managed to gain a completely preponderant control of government action in any contemporary regime. . . .'[103] Nevertheless the process, he is sure, has begun and will continue, so that one should not underestimate 'the technocratic peril'.[104] As to overcoming the problem, 'the chances of averting a swing towards technicians' dominance are dependent on the amount of help that the public wishes to and is capable of bringing to elected leaders through the parties . . . the outlook is not very encouraging'.[105]

Participation in the context of technocracy was, it will be remembered, an especially fashionable topic in 1968–9. *The Times* was moved to editorialise:

> Many advanced states are experiencing, within themselves, the same kind of gap between public opinion and the machinery of government. A paradox of the modern technological society is revealed: the society creates problems so complex that they can be handled only by those with

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specialist skill and intricate knowledge, and at the same time it produces people who are in general more highly educated and inquiring than previous generations. It centralises decision-making but spreads the desire to make decisions. How can democracy, in this predicament, satisfy both the need for reater efficiency and the need for wider participation?[106]

This editorial was prompted by a speech of the then Minister of Technology, Mr Wedgwood Benn, part of which was quoted above. It was perhaps rather disingenuous for a government minister to outline what he thought might be the prerequisites of a 'new popular democracy', even though his ideas were not themselves entirely new. They were in any case easily dismissed by most commentators. Some thought that there was nothing especially wrong, at least in Britain, which could not be put right by a simple change of government. One of the minister's political colleagues, while admitting that participation was a matter of great importance, nevertheless felt that much of the discussion implied courses of action which were 'either impossible, or irrelevant, or positively undesirable'.[107] Professor Crick thought participation was something of a red herring, an unrealistic demand in the context of large societies. The need instead was for 'open government and truthful public explanation . . . to reduce the incomprehensible and inhuman scale of things', in short a 'theory of free communications' to supplement the inadequate 'theory of representative participation'.[108]

But Mr Benn has since expanded on his ideas, and they now amount to a very new style of politics. This, he believes, is needed to cope with the 'changing relationship between democratic politics, the huge new organisations on the one hand, and the new citizen, both created by technology, on the other'.[109] Mr Benn begins with a call for the political protection of human dignity and diversity, which would also involve the definition of new priorities in education. He rejects authoritarianism in industry no less than in politics, and this would lead to workers' control, with production as well as government 'by consent'. He wants government that is less secret, that restricts itself to 'the big decisions within the state', and that is directed by leaders who derive their power 'less from the executive authority they have acquired by election and more from influence'. These ideas perhaps deserve more attention than

they have received, and certainly more than they can be given here. Mr Benn also defends direct action, with qualifications. It must be 'precisely defined in a democratic society where the theoretical possibility of change by traditional means is held to exist . . . where the machinery of peaceful change does not exist, the use of real force from below is right'. This sort of proposition has, of course, received plenty of attention from political theory. If at the end of the day precise definition turns only on opinion, and therefore on politics, one would have to be ready for the troublesome probability that, in a technological, and therefore complex, society, definition in any scientific sense might have a vanishing significance.

Two other of Mr Benn's proposals may be taken together. These were, first, some direct sharing of decision-making with the electorate as a whole through referenda, a possibility Mr Benn thought would be facilitated by developments in electronics which could be expected within a generation; and second, a radical re-examination of mass communications leading to greatly expanded access by minority groups to broadcasting time. Now Zworykin explained in 1964 that technology had already made it possible 'to give the people the ability to communicate their wishes and opinions to the government with a directness and immediacy comparable with that realised at present only in the opposite direction'.[110] This would have entailed using the virtually complete coverage of the population provided by the parallel communication networks of the broadcasting and telephone systems. Each telephone would have had simple auxiliary equipment to connect it into a voting station: voting could thus be carried out at home on issues declared at, when necessary, only a few hours' notice, with the count made electronically and the result therefore available very quickly. Zworykin felt on the one hand that only broad policy decisions could profitably be made in this way, with details left to the 'judgement of a hierarchy of technical advisers', and on the other that direct democracy of this kind would encourage the development of the preconditions for its success – an increased sense of responsibility and involvement on the part of the public. At the least he considered that politicians would find valuable an accurate index of the public view on key questions.

There are several obvious comments on all this. First, to

make explicit a point implied above, in liberal democracies it may be not the opportunity to participate but an understanding of the complex issues involved that is lacking so far as people in general are concerned. This is the conclusion reached by Kornhauser,[111] and his solution to the danger of social alienation, 'the central problem posed by the theory of mass society', follows from it, namely the creation of new forms of socio-political association. Second, participation, taken initially as means, may change nothing,[112] so that ultimately even as an end it may be scorned. Third, what if across the board those most willing to participate are also those most psychically malleable?[113] Finally, how could government be conducted sensibly, and with continuity, if it had always to observe the dictates, or even the preferences, of a volatile public opinion? Old politics, like old lamps, should perhaps not too unthinkingly be exchanged for new.

For a last word on the technocracy–participation dilemma one might do worse than turn to Fromm. It has been asserted that he 'lacks a clear and accurate conception of the political',[114] but his psychoanalytical insights into the political stresses of modern societies are sympathetic, and for many will also be persuasive. Point one: 'certain factors in the modern industrial system in general and in its monopolistic phase in particular make for the development of a personality which feels powerless and alone, anxious and insecure . . . '.[115]

Point two, the political reflection of this, is that 'the expression of the will of the voter in modern democracy is an alienated expression'.[116]

Point three, this could hardly be other when 'the functioning of the political machinery in a democratic country is not essentially different from the procedure on the commodity market'.[117]

Finally, point four, non-democratic forms are naturally worse, indeed it is the affluence capitalism has made possible which offers escape:

The victory of freedom is possible only if democracy develops into a society in which the individual, his growth and happiness, is the aim and purpose of culture . . . in which the individual is not subordinated to or manipulated by any power outside himself, be it the state or the economic machine. . . .[118]

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6 Technological Society: The Mainly Negative View

In their analyses of technological society and the technological state, contemporary Western writers reveal a wide spectrum of opinions, and this essay must evidently consider some at least of these, though unfortunately none at great length. First, the anguish of Arendt:

> The question therefore is not so much whether we are the masters or the slaves of our machines, but whether machines still serve the world and its things, or if, on the contrary, they and the automatic motion of their processes have begun to rule and even destroy world and things.[119]

The definition and description of man in terms of what he makes have, she claims, precipitated the violence of modern times, and in the shift from the old to the new world there has also been an extraordinary loss of 'human experience'.[120] Now these may indeed have been consequent ills, but if the coming technological utopia does turn out to be 'the deadliest, most sterile passivity history has ever known',[121] then the first will, *ipso facto*, have to be seen as a transient phenomenon. Then again, what exactly does Arendt want one to make of scientists in politics? She observes initially that it may be sensible to distrust them in this capacity, not because of their ethical short-comings or naïveté, but because their language is a symbolic one beyond speech and therefore beyond politics.[122] Yet she also remarks that their doings have greater political significance than those of most statesmen; and that they are the 'only ones left who know how to act and how to act in concert'.[123] These uncertainties – they are not contradictions – are fairly charac-teristic of the pessimistic authors, and Arendt is certainly of

their number.[124] There is, she avers, 'little cheerfulness left' in either modern science or modern philosophy.[125]

For his part, Marcuse reckons as perhaps the most remarkable accomplishment of advanced industrial society the capacity he believes it to have of containing major social change.[126] The fact that almost everyone accepts this kind of society, because bribed by its economic performance, does not make it for him either less irrational or less reprehensible. The technological order is a 'comfortable, smooth, reasonable, democratic unfreedom', a totalitarian system in which technology replaces terror.[127] The net result is that action and thought become 'one-dimensional', that is, are conducted in the language of the *status quo*, and the society cuts itself off from all possibility of liberating change. It is easier to accept this diagnosis than the cure Marcuse proposes,[128] which would withdraw toleration of free speech and the right of assembly from those holding certain views, and which would look to those excluded from the affluent democracy to act as the carriers of the revolutionary new democracy. To the liberal this is nothing but a 'vulgar form' of 'existential politics'.[129]

Ellul's vision of the technological society is almost as extreme and more fatalistic.[130] In his assessment, technical progress is always ambiguous and an insistence on rationalising all human activity is the most worrying form of determinism in the modern world.[131] The nation is becoming simply an 'affair to be managed', the state ultimately will become 'nothing but a huge machine' and democracy itself 'mere appearance'.[132] The forces which found expression in the classical state will vanish, to be replaced now by the worship of efficiency, order and speed. In due course this will lead to a new totalitarianism, neither brutal nor arbitrary, but founded upon technical necessity. In the consequent 'mass society', 'mass participation' will largely be concerned with distracting 'mass man' from psychic difficulties, themselves mainly the product of this society. Worse still, state propaganda, based now on the science of psychology and amplified by modern methods of communication, will increasingly facilitate mass manipulation, the inculcation of successive political predispositions as these become necessary.

Ellul uses 'technique' as a blanket word for all the things he fears. It is not just that politics is modified by technique, but that 'the political world is today *defined* through its relation to

the technological society'.[133] Substitute 'machine' for 'technique' and this kind of fear goes back to Erewhon and beyond. There is also a clear echo here of Wiener's fear, not of machines, that is of the computer empire and hierarchy, but of 'political techniques as narrow and indifferent to human possibility as if they had, in fact, been conceived mechanically'.[134] Wiener, the father of cybernetics, thought that the modern industrial revolution was bound to devalue the human brain as the first industrial revolution had devalued the human arm, unless, that is, society became based 'on human values other than buying or selling'.[135] Similarly the 'most notorious victory' of which Seligman writes is that of the machine over man, a victory of automation and cybernation. The end he foresees is 'an ice age of perfect social functioning . . . a utopia of changlessness'.[136] It was the same sort of technique, too, which Mannheim saw as freeing humanity from the tyranny of nature on the one hand, and subjecting it in like measure to social coercion on the other.[137] 'The extension of the doctrine of technical supremacy' Mannheim considered inevitable, and he blamed Marx for not realising that its significance would reach well beyond the economic sphere: 'Compared with the Liberal State the modern state . . . has an almost complete power of control . . . the power of the State is bound to increase until the State becomes nearly identical with society.'[138] No withering-away of the state there, but Mannheim manages to provide an escape clause: 'freedom', he adds, 'can only exist when it is secured by planning',[139] that is, in Ellul's language, by more technique. . . .

Ellul's is an extreme formulation, and his case is not much helped by his distortions, not to say inconsistencies.[140] As social science the images of Huxley or Orwell are almost as credible. On the other hand, Ellul is not alone either in judging efficiency to be the motive power of the new utopianism, as humanitarianism was of the old,[141] or in fearing its potential for extending the control of man over man. Nor is he the only author to see totalitarianism at the end of the technological road. Friedrich and Brzezinski, for instance, state that of the six traits they discern as being common to totalitarian dictatorships, four are technologically conditioned, namely monopolistic control of communications, weapons, terror and the economy.[142] Morgenthau too thinks it no accident that the rise of totalitarianism has coincided with the development of modern tech-

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nologies, and it disturbs him that governments should be no longer limited by their imperfect capacities, but instead by whatever political restraints they are forced to observe.[143] For these authors, therefore, technological society is only a logical exaggeration of the technological state of modern society, and without technology, totalitarianism would dissolve into old-style autocracy or despotism.

Westin underlines this point. His basic premise is unequivocal: 'The modern totalitarian state relies on secrecy for the régime, but high surveillance and disclosure for all other groups.' Limits on these are, he says, 'a prerequisite for liberal democratic societies' because 'privacy is an irreducibly critical element in the operations of individuals, groups, and government in a democratic system with a liberal culture'.[144]

Yet, he continues, since the Second World War a stream of technical advances, typically socially useful in origin, have threatened this privacy, through physical devices, psychological methods, and the creation of computer files on a growing number of individuals. The problem is old, only the techniques are new, and it is for that reason that Westin ends by describing science and privacy as the 'twin conditions of freedom in the twentieth century'.[145] Theodore Roszak's critique of the technological society does not differ greatly from that of Ellul or Marcuse, but his account of the new counter-culture is in contrast by far the most articulate and persuasive one which has yet appeared. Sure that a culture which can live in the shadow of thermonuclear annihilation is fatally diseased, Roszak himself is on the side of the counter-culture, though he fully recognises that it has its own drawbacks, not least a tendency towards righteous violence. His 'good society beyond technocracy' is more a psychic than a social vision, but he is terribly clear that it is in its attitude to science and technology that the new radicalism differs from the old. He wants the pursuit of technical progress relegated so that it forms only part of man's cultural base, the grander part being directed to the task of expanding the human personality as a whole. This is actually far more political than it looks:

In a sense, the true political radicalism of our day begins with a vivid realisation of how much in the way of high principle, free expression, justice, reason, and humane

intention the technocratic order can adapt to the purpose of entrenching itself ever more deeply in the uncoerced allegiance of men.[146]

Roszak sees very clearly that if this is to be changed it cannot be by heroic confrontation or self-congratulatory militancy; not the barricades but

> Beyond the tactics of resistance, but shaping them at all times, there must be a stance of life which seeks not simply to muster power against the misdeeds of society, but to transform the very sense men have of reality. . . . A political end sought by no political means. . . .[147]

Roszak must be compared with Reich,[148] who finds the United States to be in the grip of 'the immense apparatus of technology and organisation' which it has built, the Corporate State, 'a mindless juggernaut, destroying the environment, obliterating human values, and assuming domination over the lives and minds of its subjects'. This is more than the creation of a power-élite, more than a technological society. It is technology 'out of control', manipulated still by power and profit interests, yet making these interests also in the end its captives, so that nobody can really be said to control its momentum. 'The essence of the Corporate State is that it is relentlessly single-minded; it has only one value, the value of technology-organisation-efficiency-growth-progress.'[149]

How does Reich see this 'immensely powerful machine' being defeated? 'The Corporate State cannot be fought by the legal, political, or power methods that are the only means ever used up to now by revolutionists or proponents of social change.'[150] On the contrary, the coming revolution 'will originate with the individual and with culture, and it will change the political structure only as its final act'. More specifically, Reich adds that 'The individual who is free of the conventional goals can make an amazing amount of independence for himself within any organisation', so that 'for the present, *all that is necessary to describe the new society is to describe a new way of life*': we must all, that is, choose a new life-style.[151] Will enough people ever do this? Has the Vietnam War ('the Corporate State's one unsaleable product') really accelerated the process in the United States? Will the youth and the returning soldiers vote

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as Reich believes they now think? And will it make any difference if they do?

One thing is distressingly clear: where official opposition is concerned, the moderate new Left, like its extreme counterpart, lacks faith. Are not party differences more about means these days than about ends? Can you realistically expect, as Calder has constructively suggested,[152] new groups to stand for 'scientific conservationism' as against 'technological opportunism'? Thus rejected from without, official opposition is also increasingly ignored from within by those substantial sections of the technocracy which equate usefulness only with leverage, and in this betrayal the people, disillusioned with what they receive as politics, concur. This is Harrington's 'accidental century', in which revolutionary technology has far outstripped political and social imagination, so that an unparalleled transformation is being allowed to happen casually.[153] It is also Michael's 'unprepared society', ill prepared, 'institutionally, methodologically, and personally', to extend its use of long-term planning, as this is forced on it by the convergence of social and technological trends.[154] And it is also Drucker's 'age of discontinuity', in which a sceptical attitude towards government has become the most fundamental discontinuity of all. Government may have become big, but it has also, contends Drucker, become sick.[155]

To infer that this is a sickness contracted in the defence of advanced capitalism, if it is not special pleading, is certainly less than a comprehensive account. It is the core of Miliband's explanation: 'it is certainly in the interests of dominant classes in advanced capitalist societies that very large masses of the population *should* be politically apathetic and inert. . . .'[156]

In Miliband's opinion, the legitimation process of advanced capitalism is, first of all, a 'permanent and persuasive *effort*' on the part of a variety of agents, the conservative parties and business naturally, but also the media – 'the expression of a system of domination, and a means of reinforcing it' – and educational institutions generally.[157] Even social democratic parties reveal themselves at every opportunity to be 'the protagonists of the reinforced state'.[158] The current promise of advanced capitalist economies conflicts, in Miliband's estimation, with their operation in the interests of private individuals. This in turn puts capitalist societies under acute new strains,

and since the record shows that political reform never goes far enough, it follows that these states will exercise their 'second option', repression. Their degeneration into 'more or less pronounced forms of [conservative] authoritarianism' is then 'more rather than less likely'.[159]

Much more cautiously, because he does not pretend to know what the ultimate effect of science and technology on civilisation will be, Heilbroner expects that 'things will go on much as they are'.[160] As Heilbroner reads the situation, this means that the ambivalent 'progress' which technology makes possible will drive the individual to 'an ever wider, more demanding engagement with his society'.[161] He regrets that the only important control modern societies choose to exercise over the incursions of technology is still the criterion of economic desirability. Even accepting that a growing hegemony of technology is inevitable, that is no reason, he argues, to forgo an attempt to control its social consequences.[162] But he too, with the United States in mind, wonders how, without recourse to an authoritarian state, it is going to be possible to control an economy already enormous and still growing.[163] In the outside world he rightly points out that, although there are still in evidence the forces of technology, economics and politics which led, through the industrial revolution, to a 'polar change' in Western attitudes to human existence, nowadays these forces portend a quite different socio-political outcome.[164] This leads him to fear the ideological isolation of the West. There is something rather chilling about his suggestion that pressures which are at root technological are causing history to 'close in' on the United States, bringing no sudden crisis but instead a steady worsening of present inadequacies and impoverished philosophies.[165] That such a calm analysis should lead to such a conclusion is really far more impressive than the many appreciations in more paranoid style.

7 Technological Society: The Mainly Positive View

Rotenstreich[166] offers a neutral interpretation of the technology–politics interaction. Technology, he declares, has 'generated an illusion of achievement', but without it there would have been no welfare state. By increasing the number of participants it has broadened the scope of politics, but by inducing a concentration only on those improvements which technology can effect, it has made politics more shallow. Although he feels that man's authoritarian drive has now become his technological drive, Rotenstreich is still left hoping that man will learn to make his technology reflect his creativity rather than simply his urge to dominate.

This is very much in line with Brzezinski's expectation.[167] Brzezinski, whose word for the coming age is 'technetronic', fully recognises the risks of a dictatorship built upon the multiplicity of technical means for controlling citizens which are, or will shortly be, available to government. Yet he is hopeful of the cataclysmic metamorphosis through which modern societies must pass, the United States leading the way. He is reconciled to a 'meritocratic democracy' dependent upon the 'effective mobilisation of the ablest', a democracy provided with the means both to delegate and to co-ordinate better than any contemporary society can, and sensitised by the intellectual community to respond to social needs. Boulding is another prepared to offer a 'cautious and critical acceptance' to what in his case he calls 'post-civilisation' and 'the emerging super-culture'.[168] If there is one ideology more beneficial to the transition than any other, then Boulding holds that it is neither socialism nor capitalism but a pragmatic social strategy that is based on the ideology of science and that has regard for the

pre-existing institutions of a society. He blames the clash between traditional culture and the superculture for most of the world's current problems, and is deeply disturbed about the destructive power with which the latter has furnished the former.

Less cosmopolitan, Schick,[169] like Brzezinski, and indeed like most of the American school, concentrates on what he perceives to be happening in the United States. Modestly, he borrows his reference term: the American 'cybernetic' state would be a linear development from the original political state via two intermediate forms, the administrative and the bureaucratic states. The bureaucratic state is not yet dead, and the cybernetic state may never fully establish itself, but there are already plenty of cybernetic tendencies, and Schick essays to identify many of the loci points of the transformation: 'In the post-industrial cybernetic state, government functions as a servo-mechanism, concerting the polity and the economy to achieve public objectives.'[170] That is, government becomes more 'distributor' than 'doer', its responses become automatically triggered, its regulatory functions turn into self-regulation, so that 'In a full-blown cybernetic state, politics and bureaucracy would wither away, though their forms might remain'.[171]

In this situation Schick notes that political science would start to call itself policy science, but he then itemises four issues which he thinks might become of prime constitutional importance. All four, and especially the mode of participation appropriate to a cybernetic state and the structure of government to provide for it, could not but be highly political. However, even if this criticism is allowed, Schick must still be seen as very open-minded about the future. Very realistically he speculates that, retrospectively, the cybernetic state, whether of the 'unparalleled freedom' or 'unprecedented enslavement' varieties, 'might turn out to have been fantasy, compounded of fears and hopes. . . . Citizens might resist the cybernetic penetration of their lives.'[172] How this might be done he does not indicate.

Bell, the originator of, and main force behind, the post-industrial concept, having dealt at length with the ('intellectually devitalised') end of ideology,[173] has, more perhaps than any other, sought precision in delineating the heart of the new society:

. . . in the post-industrial society, what is crucial is not just a

shift from property or political criteria to knowledge as the base of new power, but a change in the character of knowledge itself. What has now become decisive for society is the new centrality of *theoretical* knowledge. . . .[174]

He justifies his reference to a 'post'-industrial society on the grounds that the 'direct and deliberate contrivance of change itself', innovation based on codified theoretical knowledge, is 'perhaps the most important social change of our time'.[175] The fact that a switch has occurred (in the United States at least), from a primarily manufacturing economy to a mixed service/ manufacturing economy, and the possibility of large-scale controlled social experiments leading to the outlining of alternative futures, are said to be other factors which serve to distinguish post-industrial from industrial societies. Tomorrow's men, then, will be the scientific professionals, its dominant institutions the universities and research centres.[176] But since 'the crucial turning points in a society occur in a political form',[177] Bell expects that the coming decades will see the political arena grow in importance. He regards the United States as being now for the first time a *national* and a *communal* society, so that social problems have become national ones, inadequacies in the administrative structure are more evident, and the rise of plebiscitarian pressures threatens increased violence.[178] Bell regrets the loss of 'insulating space' which modern communications have occasioned, and he fears a communications overload of the political decision-making system. Since the United States has also become a future-oriented society, he looks on the relationship between the technocrat and the politician as likely to remain a key issue, but he refuses to fall into the same trap as Veblen: 'It is not the technocrat, but the politician who ultimately holds power.'[179] What he does not anticipate is the synthesis of a perfect calculus of costs and benefits: 'The Great Society aims to rise above "mere" politics toward some kind of rational political behaviour – but rigorous theoretical analysis leads us back to "mere" politics.'[180] Put another way, even if the technological means are at hand, the act of setting goals remains stubbornly political.[181]

Ferkiss accepts the parallel between the rise of the nation-state and that of science and technology, but is not too happy with post-industrialism. 'Industrial society', he comments, 'is not so

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much being transformed into post-industrial technological society as it is breaking down – economically, politically and culturally.'[182] Not that he shares the despair of, say, Ellul, or that he agrees with the rigidity of the various mass society/mass control theories. On the contrary, he stresses that technology has created not only the scientific and technocratic classes but also a myriad others, based now on achievement and function as well as on ascription, and he is convinced that not even totalitarian societies can halt this tendency.[183] About the centralising effect of technology he is less confident, recognising its shortcomings and quoting Neumann's remark: 'The higher the state of technological development the greater the concentration of political power.'[184] Really his own appraisal of the effect of technology on politics leads in another direction: 'Technology has laid the basis for a radical alteration of the political order by underwriting the movement toward noneconomic issues. It has not, as some would hold, led to alienation and withdrawal from politics. Instead it has changed the content of politics.'[185]

The mildness of this is deceptive, for Ferkiss goes on to contemplate the 'breakdown of parties' and the 'breakdown of nations'.[186] He returns to more familiar ground when he examines the failure of political systems to structure and relate technological issues to mainstream politics. Not 'politics as usual' but a true 'rediscovery' of politics is what he feels is needed, but he himself appears to desert political science in his description of 'technological man'. This would be man 'in control of his own development within the context of a meaningful philosophy of the role of technology in human evolution', and Ferkiss thinks that he discerns the outline at least of such a philosophy, and the new norms of decision-making its enhanced rationalism would entail. His philosophy rests on the three principles of a new naturalism, a new holism and a new immanism, and fascinating though these concepts are, they are hardly political science. And that is perhaps a just adequate excuse for taking them no further here.

With Mesthene, Director of the Harvard Programme on Technology and Society, one is back to politics, and the reconnaissance offered is an imaginative one. Mesthene holds that direct participation is decreasingly relevant in societies where cause–effect relationships are very complex. Consultation and accountability are one thing, and Mesthene has called for 'a

more differentiated system of electoral consultation', but 'no amount of "participation" . . . can substitute for the expertise and decision-making technologies that modern government must use'.[187] The 'greatest challenge yet to political inquiry and political action', as he sees it, is that of finding and making operational 'a positive correlation between knowledge and political consensus'.[188] This sounds like a quest for some new philosopher's stone, but what exactly does it imply? Mesthene continues: 'The most fundamental *political* task of a technological world is that of systematising and institutionalising the social expectations of the changes that technology will continue to bring about.'[189]

The pursuit of this end would not, however, necessarily be helped by the continued decline of politics and ideology as 'necessary' ingredients in change, something else Mesthene, citing Lane, looks forward to.[190] Wheeler provides another decisive statement of the need for change in political institutions:

> Science has become society's legislature. This is the most general political implication of the scientific revolution. . . . The scientific revolution . . . faces us with the necessity of inventing new deliberative and legislative processes that will be as adequate to the issues of today as our traditional governmental institutions were to the kinds of issues characteristic of the times of their founding in the 18th and 19th centuries.[191]

It is, of course, one thing to posit that institutions must change, and another thing altogether to prescribe in detail what those changes should be. As a politician himself – he was a junior minister in Britain's 1964–70 Labour government – Bray distrusts outdated concepts of government as much as he distrusts technocratic remedies. Political thought 'can only come to grips with changes wrought by technology and society if it masters the language and methods of technology',[192] and Bray's method is to propose three concepts which, he says, are intermediate between the Western abstract model of the state and the real ground-level problems caused by technology. The three concepts are the open state, necessary to safeguard individual rights and to make policy coherent; the regenerative society, to translate ideas such as welfare and equality into terms appropriate to a condition of rapid change; and the

adaptive economy. This latter would be based on centrally conceived diffused planning, with disaggregate management of the pressure of demand, and it would be designed to cope with contemporary problems of economic management which Bray feels are beyond the capacity of existing economic approaches.

Toffler[193] has also indicated the sort of institutions he thinks are now needed, institutions which would overcome the 'time-bias' of politics, with the political horizon extending only to the next election. Toffler wants post-technocratic, or humanised, planning. This would have both future and distant-future components, and would be linked to 'anticipatory democracy'. The latter Toffler would achieve by convening *ad hoc* 'social future assemblies' to represent the various geographical levels, and also to represent social units. Toffler denies that his proposal is either naïve or impractical: 'nothing is more naïve than the notion that we can continue politically to run the society the way we do at present . . . nothing is more impractical than the attempt to impose a humane future from above'.[194]

In the Reith Lectures of 1970, having previously urged the need for an appropriate 'ethic of change', Schon sets out briefly his own ideas for establishing one.[195] He begins with a conventional enough explanation for the loss of what he chooses to call 'the stable state', by which he means the cosy normalcy of the slow social change which was all the world knew until the watershed of the Second World War. Traditional generation-to-generation adaptation cannot deal, he asserts, with the impact of modern technology, and social systems must therefore be discovered and adopted which will facilitate learning and social transformation. Unfortunately, Schon is least persuasive in his treatment of the state. He seems almost to forget that he is dealing with political societies, and he is another who draws much too exclusively on American experience. He has none the less some useful recommendations. For instance, flexible government he would seek by operating where possible on a project, rather than a departmental, basis. His project groups or organisations would have intelligence and control functions and would be served by competence pools. This would certainly get away from the cliché of government as a collection of memorials to old problems, and might, by encouraging loyalty to government at a higher level of generality, also reduce the 'dynamic conservatism' of the departmental style, both objectives Schon

has in mind. As an example of Schon's insight, one might consider his belief that the 'centre-periphery model' of social organisation has collapsed. According to this model the centre of the social system is distinct, and diffuses unequivocal messages to the periphery. Governments insist all too frequently on preserving this model, and this, says Schon, 'is a kind of euphemism for authoritarianism'.[196]

It is in his proposals for a new model in keeping with the times that Schon must dismay the political scientist. His model is a network one in which either all the elements are controlled or, much more commonly, the elements retain autonomy but the network as a whole is controlled. His typical examples of the two strategies are the 'business-systems firm' and the 'youth movement', both lacking clear centres, structures and boundaries, but both succeeding in being very powerful as informally integrated wholes. The 'process of network-building and network management', says Schon, is 'the central social function in our time with respect to problems of the reform and redesign of institutions'.[197] As political science, this conclusion is frighteningly sweeping, and the reason for that surely lies in the fact that one of Schon's premises is only a very partial truth; management of modern society depends on much more than an 'ability to spread things [novelty] in it'.[198]

It is something of a relief to find democracy described by Bennis and Slater as inevitable. Their justification for this view of it is that under certain conditions it becomes the most efficient order of social organisation: 'It is only when the society reaches a level of technological development in which survival is dependent on the institutionalisation of perpetual change that democracy becomes necessary.'[199]

In a similar vein, Latey has pointed out that, while free societies may fear new restrictions on liberty because of technology, those living under dictatorships may look for some expansion of their freedom for the same reason, because, that is, 'Modern technology develops more naturally and efficiently in a plural than in a totalitarian society'. Realistically, he adds that there is 'nothing inevitable about the process'.[200]

By far the most exciting response to the technological society among the communist states was the study by an interdisciplinary group under the auspices of the Czech Academy of Science. This group began work in the mid-sixties and the

results of its efforts would probably have been an important influence on the further changes that would no doubt have occurred in Czechoslovakia but for the Russian invasion of 1968. The group defended its call for thoroughgoing economic reform not simply as a contribution to industrial efficiency, but on the grounds that only thus could the country fully embrace the scientific-technological revolution and so accomplish basic socialist objectives. Socialism, they claimed, stands or falls with science no less than with a communist government; the communist party must open itself to change; and there must be a new style of political dialogue:

> If the avant-garde organisation is to operate as the leading centre in society and the organiser of the scientific and technological revolution, with all its social implications – and herein lies the supreme and, by all appearances, the ultimate historical mission of the Communist Party – it will be equal to the task only if it oversteps the narrow bounds of rule by power and the corresponding means of administration, to evolve superior, more effective forms of *society-wide* ('socio-political') guidance.[201]

Although much in this Czech report is familiar from Western sources, it has an especially refreshing promise which makes more poignant still the events of August 1968.

It is interesting to compare it with the updated Marxism of Mandel. Mandel has unsurprising views on most aspects of the technology–politics relationship. The armaments economy, for instance, is said to represent the 'essential' replacement market for declining capitalism, and state intervention, or indicative planning, is adjudged as merely consolidating the capitalist profits of the decisive monopolies.[202] But Mandel *does* believe that 'Present-day technique has . . . found a "final" answer to the oldest of objections to a socialist economy'.[203] The machines will perform the unpleasant tasks. The *technical* means for the progressive withering-away of the state is the extension of leisure in socialist society.[204] 'Is this', he asks, 'a Utopia?'[205]

Not unless its communism was post-Marxian. That is how Mumford would reply. Mumford[206] explains the connection between technology and civilisation in terms of four stages, the eotechnic, the palaeotechnic, the neotechnic and the biotechnic. (He is careful to refer to these as phases rather than

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periods.) During the first, lasting roughly from 1000 to 1750, those discoveries and inventions were made, or foreshadowed, which afterwards made possible 'the new barbarism' of the palaeotechnic era. This lasted some 150 years and is, of course, normally referred to as the 'industrial revolution'. While civilising eotechnic practices remain, with traces of the biologically-based technology of the biotechnic mode beginning to appear alongside the neotechnic complex, Mumford still emphasises that in general 'Palaeotechnic ideals still largely dominate the industry and the politics of the Western world', and in particular, that Marx's programme was designed for a palaeotechnic world.[207]

Mumford himself advocates a scheme of socialised political control which he calls basic communism, and this, he says, is an unavoidable social implication if mankind wishes to retain the benefits of the machine.[208] It resembles neither Soviet communism nor Western capitalism, nor some mixed intermediate form. It would cover all the 'calculable economic needs' of every member of the community; then, but only then, 'differentiation and preference and special incentive' would be taken into account. Mumford is prepared for a reduction in industrial enterprise caused by his system, but he counts this a virtue, not a defect. There is room in his technological order, in short, for the traditional, the inspirational *and* the irrational.

For the writers discussed in this section the 'thrust of history' is pretty clearly optimistic,[209] but there are still more exotic versions of the technological society-to-come. Fuller, for example, expects the industrial network to integrate society into a 'one-town world'.[210] He concedes that, for all its 'debilitating and often lethal biases', it is the clear function of politics to 'consolidate the scientific and industrial gains'.[211] How fortunate for man that the 'moment of realisation that it soon must be Utopia or Oblivion coincides exactly with the discovery by man that for the first time in history Utopia is at least physically possible of human attainment'.[212] Here is reason to pause. Fuller's equation rests on the assumption that man has unlimited capability, 'the age-old heresy of man's worship of himself'.[213] It also represents an embarrassment to the utopians. The one type of utopia which might in the end actually exist would be predicated upon technology. And technology involves change. And that means politics. And

then: 'Hard as one tries to fit politics (for the sake of change) into utopia, the feeling could nevertheless persist that once politics has been admitted into utopia (for whatever reason), the serpent has been admitted into the garden.'[214] Even in utopia, it seems, one cannot have everything.

A 'one-town world' for Fuller, a 'global village' for McLuhan. Politics is peripheral for McLuhan, and it is also not easy to take seriously someone who suggests that 'War, in fact, can be seen as a process of achieving equilibrium among unequal technologies . . .'.[215] At first sight, though, the following assertion is equally ridiculous: 'Man must serve his electric technology with the same servo-mechanistic fidelity with which he served his coracle. . . .'[216] Yet this would be a reasonable course to adopt given McLuhan's central thesis, that it is the tyranny of print which first conditions man to accept passively the routine of industrial life. McLuhan is simply greeting 'electric technology' as the key to the prison door. It is hard to improve on Miller's judgement of McLuhan:

> . . . one is left with the disturbing suspicion that McLuhan is 'on to something' . . . he has successfully convened a debate on a subject which has been neglected too long. . . . Perhaps McLuhan has accomplished the greatest paradox of all, creating the possibility of truth by shocking us all with a gigantic system of lies.[217]

As a summary, it is convenient to leave the American political scientist David Easton with the last word on the great contemporary void in which political science and political scientists are floundering:

> Both our philosophers and our scientists have failed to reconstruct our value frameworks in any relevant sense and to test them by creatively contemplating new kinds of political systems that might meet the needs of a post-industrial, cybernetic society.[218]

8 The Future: A Method?

Most of the writers considered above are concerned in their analyses as much with the future as with the present. It may therefore seem rather arbitrary to single out one particular future projection. The justification for looking separately, though still briefly, at Kahn and Wiener's book *The Year 2000* is that it attempts to construct a consistent framework for thinking about the future.[219] This is not science, but it is the best-known attempt at system.

It is very apparent that the current rate of change of industrial societies should make one more cautious than ever in attempting to extrapolate from current political trends. Man has always been obsessed with the future, and much of political science reflects this,[220] but there has been an especially remarkable expansion in recent years of 'future studies'. These have led to the publication of literally dozens of books, the foundation of new journals and, notably in the United States, the setting-up of new research institutes and the redirection of old ones.[221] Despite the attempts to make these studies systematic rather than speculative it is well to remember that political forecasts are what they have always been, fascinating but unreliable. As de Jouvenel says, one cannot have political certainty because political change just is not epiphenomenal:[222] as political history shows, key variables have a disconcerting record of erratic movement. Probably too, one should take Kariel's point that exercises in futuristics, although possessing an authentic radical gloss, in fact lack an idealistic orientation, and so fail truly to expand the political present.[223] In fact, the spate of future studies, a flow which still seems to be gathering momentum, contains remarkably little on the future of domestic politics. Given the critical importance of politics in setting the limits at any time on all societal possibilities, it is, as Dror has observed,

an astonishing omission.[224] Dror blames it on the taboo nature of the subject which, he suggests, derives from its sensitivity to individual opinion, from the contempt many leading futurists have for a phenomenon they expect will shrivel in the techno-logical society, and from the difficulty of using any scientific techniques of prediction in the political field.

The first step in Kahn and Wiener's prediction technique consists in identifying a long-term 'multifold trend'. This turns out to have thirteen elements. They include, for instance, a continuing accumulation of scientific knowledge; increasingly sensate cultures; the waxing of bourgeois, bureaucratic, merito-cratic, democratic and possibly nationalistic élites; and a growing universality of the multifold trend itself. The second step in the method is then to relate the problem of projecting ahead a third of a century, as this problem presents itself now, to estimates of how the same problem would have appeared one-third and two-thirds of a century ago. Next, Kahn and Wiener try to establish baselines, statistical where they can, for major social variables. By extrapolating from these baselines, in accordance with the multifold trend, and with current expecta-tions drawn from the historical perspective, they then make a 'surprise-free' projection leading to a 'Standard World'. Finally, they introduce eight 'canonical variations', alternatives to the Standard World which they feel are still close to surprise-free projection. These eight variations divide into three cate-gories: (a) a relatively peaceful and prosperous world with a high degree of political consultation, co-ordination and even integration among most of the major nations; (b) almost as peaceful and prosperous a world with little arms control or co-ordination; (c) a world in greater disarray even than now, but without major wars.

It is not entirely clear how 'surprise-free' Kahn and Wiener consider the emergence of post-industrial society would be,[225] but they do tabulate fifteen characteristics which they would expect it to have. Most of these have already been touched on in one way or another above.

What have Kahn and Wiener accomplished? Shonfield regards their effort as valuable but incomplete. As he sees it, 'the new literature of systematic projection of long-range futures is an especially effective form of Utopia-building', and 'it is out of the knowledge of society, rather than of technology,

that the major insights about the world a quarter of a century away are likely to come'.[226] The point was made above that the future of technological society still has no recognised political interpreter, and Shonfield reiterates this: 'it would be splendid if someone could, like de Tocqueville a hundred and thirty years ago, find a living model in the present which would make it possible to discern the essential elements of the society of the future.'[227]

The Post-Industrial (or Post-Mass Consumption) Society[228]
1. Per capita income about fifty times the pre-industrial.
2. Most 'economic' activities are tertiary and quaternary (service-oriented), rather than primary or secondary (production-oriented).
3. Business firms no longer the major source of innovation.
4. There may be more 'consentives' (*v.* 'marketives').
5. Effective floor on income and welfare.
6. Efficiency no longer primary.
7. Market plays diminished role compared to public sector and 'social accounts'.
8. Widespread 'cybernation'.
9. 'Small world'.
10. Typical 'doubling time' between three and thirty years.
11. Learning society.
12. Rapid improvement in educational institutions and techniques.
13. Erosion (in middle class) of work-oriented, achievement-oriented, advancement-oriented values.
14. Erosion of 'national interest' values.
15. Sensate, secular, humanist, perhaps self-indulgent criteria become central.

9 Interlude: Britain

Bearing in mind only the authors referred to above, it is clear that the possible political consequences of modern technology have received substantial theoretical analysis, much of it more conjectural perhaps than rigorous, and most of it undeniably centred chiefly on the United States. Surely, one is inclined to say, it is all very remote from the *real* nature and stuff of politics in contemporary Britain? Surely, even when there is occasion to bring in some British example, the participation issue mentioned above for instance, it is as an exotic diversion rather than as an instance of mainstream politics? Certainly most of what has been written does seem too esoteric for there to be any useful correlation between theory and current British practice. In spite of this, it may still be worth while reflecting on recent British experience in the light of the kind of thought with which this essay has dealt.

To begin with Gunn:

> In the early and middle 1960s there were a number of developments in British government which seemed to form a pattern and to point to a new style of managing the economy, even to a new style of politics in this country. . . . There was obviously a predisposition to action and intervention on the part of the government, often involving a readiness to assume entrepreneurial as well as regulatory functions. . . .[229]

The Labour party began the 1960s with the aim, as Harold Wilson put it in his Scarborough conference speech of 1960, of harnessing socialism to science and science to socialism. By 1963 Mr Wilson, then Leader of the Opposition, was telling another Scarborough conference of a new Britain 'to be forged in the white heat' of a government-inspired technological and

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organisational revolution. Several new notes were indeed struck by the Labour government of 1964, in particular the Ministry of Technology plus the Industrial Reorganisation Corporation experiment. The former became in stages 'the biggest state-directed complex of scientific and industrial power in Europe'.[230] It was consciously intended as 'a new kind of government department, set up to achieve aims which had not previously been the direct objects of official action'.[231] But it could also be seen as a department in which ministerial responsibility and parliamentary control were 'stretched thinner ... than perhaps anywhere else, with a single Minister nominally answerable for decisions taken in dozens of different institutions at varying levels of technicality'.[232] It is interesting retrospectively to note that by 1966–7 *The Times Business News* thought that 'it is difficult not to recognise in contemporary political leadership in Britain classic epiphenomena of the Galbraith industrial state'; and the *Guardian* that 'there are parts of the picture he paints which are increasingly true of Britain too'.[233]

By the late 1960s the difficulties experienced by the Labour government had left their mark, the technological revolution had not quite worked out,[234] and Gunn concludes of this period that ' "the planning imperative" is a good deal more resistable than is often thought'.[235] The formal switch by the Conservative government elected in 1970, from 'intervention' to 'disengagement', would seem to confirm his judgement, though the reconstituted Department of Trade and Industry remained something of a Whitehall 'super-ministry'.

But the 'planning dimension' should probably be seen as only one aspect of the relationship between the state and technology. Of the origin of this relationship in Britain it has been said that 'As the Empire disappeared, technology ... became the substitute proof of national strength'.[236] How understandable then that when Britain began to doubt her ability to go it alone technologically she should emphasise this aspect of European co-operation. Hence Servan-Schreiber's sensational warning:

Fifteen years from now it is quite possible that the world's third greatest industrial power, just after the United States and Russia, will not be Europe, but *American industry in*

Europe . . . [and since] *. . . the power to create wealth is the power to make decisions . . .* we will be overtaken and dominated, for the first time in our history, by a more advanced civilisation.[237]

And the British Prime Minister's response:

. . . there is no future for Europe, or for Britain, if we allow American business, and American industry so to dominate the strategic growth-industries of our individual countries, that they, and not we, are able to determine the pace and direction of Europe's industrial advance . . . this is the road . . . to an industrial helotry, which . . . will mean a declining influence in world affairs, for all of us in Europe. . . . Creating the basis for a European technology . . . is a categorical imperative for all of us.[238]

The 'technological imperatives' have perhaps not led to a very impressive 'technocomplex' in Britain. On the other hand, the major public commitment to a nuclear energy programme in 1955 led one industrial journalist a decade later to describe the public agency entrusted with the costly research and development work as an 'atomic incubus' and 'a monument to our mistakes'.[239] And a far-seeing science correspondent noted even before this that 'One of the important lessons of the short history of nuclear power in Britain is the need to find ways of making more flexible government policy towards major technical innovations. Atomic power is after all only a herald of things to come.'[240]

Whether or not the Atomic Energy Authority had by 1965 become an incubus, most British government ministers since 1964 would concede privately that, whatever the final outcome, Concorde had turned out to be a political albatross. This project was by 1971 costing the country almost £1 million per week, the treasure still being spent more in desperate hope than in confidence. Nor was this the government's only major entanglement with the aircraft industry. Having in late 1969 steeled itself to resist the 'imperatives' in the case of the two airbus projects urged upon it, the government, a Conservative one anxious to minimise its involvement with industry, found itself with little option but to nationalise the Rolls-Royce company when that company was forced into the hands of the

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receiver as a result of underestimating the costs of technological development of an aircraft engine. Since this engine was being developed for the American Lockheed company, also in unhappy financial plight, and since the projected Lockheed aeroplane was more or less vital to at least one major United States airline, the American as well as the British government became caught up in the resulting negotiations.

In a third advanced technology field, successive British governments had lent support to the domestic computer industry, and when in early 1971 a study cast doubt on the prospects of the only important British company in this field, *The Economist* was prompted to remark that, if the report were to prove correct, 'it will just about remove Britain as a signifi-cant commercial force from every high technology industry – and there was a time not too long ago when politicians claimed the nation's future depended on such industries'.[241] In the words of one of these politicians, in fact a member of the previous Labour government: 'Between 1959–69 . . . brilliant technological breakthroughs were proclaimed. . . . But they came unstuck. . . . Where breakthroughs were proclaimed at the boundaries of technology, disappointment all too often seemed to follow.'[242]

Overall, though Britain might have no great technocomplex, and certainly no military-industrial complex, there have been, and at the time of writing still are, important industrial and technological pressures, to some of which even the most reluc-tant government would be forced to respond. In the industrial relations sector especially, Edward Heath as Prime Minister indicated in 1970 that the government had 'both a right and a duty to concern itself'.[243] Even while his government was producing its controversial industrial relations legislation, Britain suffered an industrial disruption, the electricity power workers' work-to-rule, which once again underlined how depen-dent the modern society is on certain essential services. (How-ever, this incident also hinted that interruptions in such services without broad public support may sometimes provoke a poten-tially stabilising public irritation.) Then, while the Industrial Relations Bill was passing through Parliament, there occurred another instance of indirect political pressure exerted by an international company, when Henry Ford, president of the Ford Motor Company of America, stated that his company

could not contemplate substantial new investment in Britain until industrial relations had improved.[244]

As to technocracy, British government has usually been criticised as having been too amateur, and the Fulton Committee sought to improve the civil service in this respect: 'Technical progress', the committee said, 'has a major impact on both the making and the implementation of policy' so that it had become necessary for civil servants 'to keep up with the rapid growth of new knowledge and acquire new techniques to apply it'.[245] In a similar vein the Redcliffe-Maud Royal Commission on Local Government in England argued that 'The new and more sophisticated techniques of management also give an impetus to the development of central management. Fresh prospects are opened up by the computer. . . .'[246]

There has in recent years been one paramount government scientific advisor in Britain, Sir Solly Zuckerman, though many have wondered whether his influence was really as great as it sometimes appeared to be.[247] The answer? 'Nobody, except perhaps the Prime Minister, really knows.'[248]

Of course, British government has traditionally been extremely secret, and on science and technology matters especially the competence and achievements of Parliament have been very meagre. According to Vig, 'In the contemporary world there is no field in which Parliament could more appropriately reassert itself.'[249] And according to Crick, 'There is much historical evidence to suggest that in a complex modern industrial society decisions which cannot be questioned publicly are likely, in the long run, either to prove obviously inept or to need a degree of violent enforcement that civilised societies should not stomach. . . . The primary function of Parliament is to inform the electorate.'[250] It would be very encouraging to think that Mr Benn was right in his belief that the country could not again embark on a Concorde-style adventure without a full public debate.[251]

So what conclusions may one reasonably draw about Britain as a technological society? First, presumably, that she subscribes, though not unquestioningly, to the 'imperatives' (economic growth, bigger industrial units, the industrial need for E.E.C. membership). Second, that the country having given up a world role, and the military might required to sustain it, scarcely has a 'technocomplex'. Third, equally, that there is

hardly a technocracy, and while there are technostructures within many organisations, private and public technostructures are still far from forming a single network. Fourth, that issues such as pollution, the role of the computer and the right to privacy have all begun to attract public discussion; some scientists at least have begun to take a greater interest in the socio-political consequences of science and technology; and books have started to appear with such titles as *The Data Bank Society* and *Big Brother in Britain Today*.[252] Finally, that all in all, in spite of its many shortcomings, and its obsessive secrecy in government, Britain remains among the more 'civilised' of modern industrial societies.

10 Interim Conclusions

1. Technology expands the politically possible.[253] The means are to hand to provide 'full' direct democracy, or to safeguard 'modified' liberal democracy, or to facilitate the operation of any 'mixed' form. Equally, other means are available to provide central governments with controls over their citizens which would tighten by several notches the most restrictive totalitarian belt any nation has yet worn. 'That science is demonstrably the best way – almost by definition – to achieve our goals can almost be taken for granted. That the ends for which it will be used will be good, can be challenged.'[254]

Written over twenty years ago, that ought now to be banal. But it is not, and the argument continues about the degree of freedom, equality and humanity to be expected in tomorrow's civilisation. It is an argument inflamed, but not caused, by differing perceptions and opinions about the current states of modern industrial societies. Its fulcrum is the relationship between scientific freedom and a wider socio-political freedom. That a substantial amount of the former is essential to techno-logical society is nowadays taken for granted, but that it then inevitably leads to the latter is perhaps best regarded as 'not proven'.[255] It might therefore be possible to gear a wide range of technological societies, including capitalist and communist ones, to provide a high and steadily growing level of material affluence. As a political hypothesis a convergence theory would then be a luxury of wishful thinking.[256] One would expect both bureaucrats and politicians in all types of system gradually to become more technically minded, if not technically trained, but the precise political nature of any régime, in the future as in the past, is likely to be the outcome of many factors, only some of which will be attributable to the influence of technological society.

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2. There is a world-wide expectation of continually improving material standards, the outcome of economic growth predicated upon technological innovation. However, military procurement has become easily the most important pressure for technological development. Current technology faithfully reflects these two facts, and the criterion of social effectiveness is a very bad third. It follows that modern technologies are by no means necessarily neutral politically. This would seem to be true of both communist and capitalist systems. One should perhaps recall Neumann's warning that there is no threat to a politically responsible democracy if it directs the fruits of advanced technology to military ends for a short period, but that a long postponement is possible 'only in a wholly repressive system'.[257] Even so, being realistic, one ought presumably to reconcile oneself to the military 'push' on technology, at least until there is a marked improvement in the international climate. And as regards that, the world is not necessarily 'too dangerous for anything less than Utopia'.[258] On the contrary, it is all too easy to imagine an indefinite continuation of the contemporary frustrations and dangers of international politics, politicians refraining only from the ultimate absurdity. And even then, as McNamara has pointed out, 'every future age of man will be an atomic age . . . '.[259]

One might as well face the truth too about the second pressure on modern technology. A switch from economic efficiency 'push' to social effectiveness 'pull' would at the very least require the fulfilment of two ambitious criteria, namely (1) that a high level of affluence be generally attained and held; and (2) that people in influential numbers be educated to understand the real cost of any increment of economic growth, so that they might choose non-material and social goals where this seemed to them indicated by a full calculation of costs and benefits. Even then, there will presumably always be the relatively poor and the culturally indifferent.

3. If technocracy is the newest mode of government, the older characteristics of muddle, incompetence, insincerity, injustice and barbarity remain. To the extent that it drives these elements out, technocracy is to be welcomed. However, the spirit in which public decisions need to be taken is not 'omniscience or omnicompetent knowledge', but instead 'something closer to wisdom, and common sense'.[260] To make matters worse, all too

often technocratic rationale is will masquerading as wisdom.

Technological society is likely to encourage alliances, only at first glance curious, between the true radical and the true conservative, both being in distressed opposition to the paradox of atomised attention and mass manipulation they claim to discover in the coming styles of government. They may find themselves in an uncomfortable minority and may be forced to rely to a large extent upon the leavening effect of liberal education to sway the indifferent and check the convinced. State subsidy of politically and socially oriented groups, however desirable, will no doubt invariably lag the need.

4. The political stability of technological societies may be threatened from many directions. First, by the hopelessness and alienation of the technologically excluded sub-poor. Second, by the intellectuals who reject the 'smothering compulsion' of technological society. Third, by the chaos of competitive and incessant economic group demands. Fourth, by failure, for whatever reason, to maintain the option of economic growth. Fifth, by inability to ensure that the myth of purposefulness is reborn in every generation, or replaced by an acceptable alternative. None of these should prove insurmountable problems to either the democratic or the totalitarian form of technological society, given the unprecedented means likely to be at their disposal. This does not mean that government must get better in any philosophical sense, only that it must become more competent in a managerial sense.

5. In spite of all that has been said here, technological society is likely to seem increasingly pleasant to most of its members. Indeed, by comparison with former times many would argue that the peoples of the West at least already live in utopia. The saddest feature of the coming age is perhaps that, like every previous age of man, it seems fated to fall far short of what it might be. It is some time now since Keynes wrote that 'For at least another hundred years we must pretend to ourselves and to every one that fair is foul and foul is fair; for foul is useful and fair is not'.[261] He was speaking of the harsh facts of economic life which could be cast aside when mankind at last emerged from the 'tunnel of economic necessity'. But man's economy, like his society and politics, mirrors not only his technology but his nature. And if one sets aside the double-edged sword of genetic interference, man's nature will not so

quickly change. It is highly likely that, within the period postulated by Keynes, man's technology could bridge the gulfs in this world between East and West, and North and South. But there is scarcely as yet a sign that his politics will allow this.[262] Of the many possible futures, the one which actually becomes the present will be that one which political vision, or the lack of it, has helped to shape. There is poverty in futurism,[263] but unfortunately there is poverty also in politics.

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Notes

1. Anthony Wedgwood Benn, quoted in *Observer*, 26 May 1968.
2. Edward T. Chase, 'Politics and Technology', *Yale Review*, LII 3 (Mar 1963) 321.
3. Ibid., p. 324.
4. See the reference to China in the posture statement of the U.S. Secretary of Defence, spring 1971.
5. Herbert F. York, 'Military Technology and National Security', *Scientific American*, CCXXI 2 (Aug 1969) 29.
6. Arnold Toynbee, *Change and Habit* (London: Oxford U.P., 1966) p. 52.
7. Brewster C. Denny, 'Science and Public Policy: A Literature in Search of a Field', *Public Administration Review*, XXV 3 (Sep 1965) 239–48. Lynton K. Caldwell (ed.), *Science, Technology and Public Policy: A Selected and Annotated Bibliography*, vols I and II (Bloomington, Ind.: Institute of Public Administration, Indiana University, 1969), is a very useful guide to much of the literature. For an updating of Denny's assessment see Richard A. Rettig, 'Science, Technology, and Public Policy', review article, *World Politics*, XXIII 2 (Jan 1971) 273–93.
8. It is as well to bear in mind Raymond Aron's observation: 'none of the banal expectations, such as automated factories and bureaucracies regulated by computers, portend a change in direction for society. At most, what is in question is the point at which the change in quantity might begin to entail qualitative modification.' *Progress and Disillusion* (London: Pall Mall Press, 1968) p. 110.
9. *Social Technology* is the title of a book by Olaf Helmer *et al.* (New York: Basic Books, 1966).
10. Sanford A. Lakoff, 'The Third Culture: Science in Social Thought', in Sanford A. Lakoff (ed.), *Knowledge and Power* (New York: The Free Press, 1966) p. 16.
11. See Émile Durkheim, *Socialism and Saint-Simon* (London:

Routledge & Kegan Paul, 1959) and *The Division of Labour in Society* (Glencoe, Ill.: Free Press, 1947).

12. For Saint-Simon's work see *Œuvres de Claude-Henri de Saint-Simon* (Paris: Éditions Anthropos, 1966) 6 vols; *Selected Writings*, ed. trans. and with an introduction by F. M. H. Markham (Oxford: Blackwell, 1952); Frank E. Manuel, *The New World of Henri Saint-Simon* (Cambridge, Mass.: Harvard U.P., 1956).

13. Raymond Aron, *18 Lectures on Industrial Society* (London: Weidenfeld & Nicolson, 1967) p. 42: 'Europe, as seen from Asia, does not consist of two fundamentally different worlds, the Soviet world and the Western world. It is one single reality: industrial civilisation.' It is interesting to compare this with Michael Kidron, *Western Capitalism Since the War* (London: Weidenfeld & Nicolson, 1968) pp. vii–viii: 'western capitalism . . . cannot be understood except in terms of the world system'. The West, as Kidron sees it, has made a definite 'contribution to sustaining the conservative, class-ridden state-capitalisms of "the east" '.

14. Ernest Gellner, *Thought and Change* (London: Weidenfeld & Nicolson, 1964) pp. 71, 220. Also, at p. 179: 'Roughly, science is the mode of cognition of industrial society, and industry is the ecology of science.'

15. Ibid., p. 120.

16. See, for example, Edgar Salin, in Raymond Aron (ed.), *World Technology and Human Destiny* (Ann Arbor: University of Michigan Press, 1967) p. 67: 'everyone agrees that modern technology brings about social changes. But the critical question is whether or not the technical organisation results in the technical-philosophical rearrangement of society which alone will give rise to the industrial society'.

17. Raymond Aron, *The Industrial Society* (London: Weidenfeld & Nicolson, 1967) pp. 99–100.

18. William A. Faunce, *Problems of an Industrial Society* (New York: McGraw-Hill, 1968) p. 34.

19. Ibid., pp. 155, 159–60.

20. *18 Lectures on Industrial Society*, p. 234.

21. Raymond Aron (London: Weidenfeld & Nicolson, 1965).

22. Norman Birnbaum, *The Crisis of Industrial Society* (New York: Oxford U.P., 1969) p. 98.

23. Ibid., p. 55.

24. Ibid., p. 91.

25. Ibid., pp. 66, 71.

26. Ibid., p. 98.

27. *The Industrial Society*, p. 67.
28. See especially John Kenneth Galbraith, *The New Industrial State* (Harmondsworth: Penguin Books, 1969) chap. 2, 'The Imperatives of Technology'.
29. See, for instance, James G. March and Herbert A. Simon, *Organisations* (New York: Wiley, 1963) pp. 140-1.
30. *The New Industrial State*, p. 169.
31. Andrew Shonfield, *Modern Capitalism: The Changing Balance of Public and Private Power* (London: Oxford U.P., 1965). The quotations which follow are taken from chap. iv, pp. 61-7, and chap. 1, p. 7.
32. This is the conclusion reached by Geoffrey Denton, Murray Forsyth and Malcolm Maclennan in their study *Economic Planning and Policies in Britain, France and Germany* (London: Allen & Unwin, for P.E.P., 1968) pp. 416-18. Their last sentence is worth quoting: 'Competition is itself a form of democracy; where and in so far as it is replaced or controlled by intervention, new forms of democratic supervision must be evolved' (p. 419).
33. E. J. Mishan, *The Costs of Economic Growth* (Harmondsworth: Penguin Books, 1969) p. 219.
34. Ibid., pp. 32, 184.
35. Ibid., pp. 213, 225.
36. Michael Young, *The Rise of the Meritocracy* (Harmondsworth: Penguin Books, 1963) p. 167.
37. On this point see for instance *The New Industrial State*, in chap. 29, 'The Industrial System and the Cold War'. The Cold War is said there to provide the image which rationalises technological competition (p. 331): 'By its nature a technological competition is never resolved . . . obsolescence in a technological competition is a nearly perfect substitute for battlefield attrition' (p. 333). 'Anything that is roughly equivalent in scale and technical complexity will serve . . the space competition is nearly ideal' (pp. 342-3).
38. C. Wright Mills, *The Power Elite* (New York: Oxford U.P., 1959).
39. *Public Papers of the Presidents, Dwight D. Eisenhower 1960-61* (Washington: U.S. Government Printing Office, 1961) item 421, p. 1038.
40. *U.S. Industrial Policies* (Paris: O.E.C.D., 1970) p. 25.
41. See Don K. Price, *Government and Science* (New York: Oxford U.P., 1962) chap. iii.
42. Murray Lew Weidenbaum, *The Modern Public Sector: New Ways of Doing the Government's Business* (New York: Basic Books, 1969) pp. 26-7.

43. See Bruce L. R. Smith and D. C. Hague (eds), *The Dilemma of Accountability in Modern Government* (London: Macmillan, 1971).

44. Arthur Selwyn Miller, 'The Rise of the Techno-Corporate State in America', *Bulletin of the Atomic Scientists*, xxv 1 (Jan. 1969) 14–19. 'Techno-corporate' is Miller's word for the 'new politico-economic order' imposed by the 'interlocking partner-ship' between 'big business and big government'.

45. Merton J. Peck and Frederic M. Scherer, *The Weapons Acquisition Process* (Harvard Graduate School of Business Administration, Division of Research, 1962) p. 381.

46. Julius Duscha, *Arms, Money and Politics* (New York: Ives, Washburn, 1965) pp. 60–1.

47. Walter Adams, 'The Military Industrial Complex and the New Industrial State', *American Economic Review*, LVIII 2 (May 1968), Papers and Proceedings of the 80th Annual Meeting of the American Economic Association. The quo-tations are taken from pp. 654–6. Adams describes his hypo-thesis as 'the obverse of Galbraith's' (p. 653).

48. Arnold M. Rose, *The Power Structure* (New York: Oxford U.P., 1967).

49. Andrew Hacker feels that 'government is weaker than the corporate institutions purportedly subordinate to it' and that consequently the growth of the corporation as 'the character-istic institution of our time' is weakening the foundations of democratic politics. See Andrew Hacker (ed.), *The Corpora-tion Take-over* (London: Harper & Row, 1964) pp. 11, 268.

50. H. L. Nieburg, *In the Name of Science* (Chicago: Quadrangle Books, 1966) chap. x, p. 199.

51. Clarence H. Danhof, *Government Contracting and Technological Change* (Washington, D.C.: The Brookings Institution, 1968) p. 431.

52. Ibid., p. 183.

53. Ibid., p. 435.

54. *The Warfare State* is the title of a book by Fred J. Cook (London: Collier-Macmillan, 1964).

55. *Government Contracting and Technological Change*, p. 437.

56. Ibid., p. 13. Similarly he concludes that, while the problems still to be overcome 'relate primarily to the assignment of social priorities and the more efficient operation of a well articulated structure', still 'Possibilities of abuse remain . . .' (pp. 452–3).

57. Richard Armstrong, 'Military Industrial Complex – Russian Style', *Fortune* (1 Aug. 1969) pp. 85 f.

58. R. Amann, M. J. Berry and R. W. Davies, 'Science and

Industry in the U.S.S.R.', in *Science Policy in the U.S.S.R.* (Paris: O.E.C.D., 1969) p. 435.

59. See Robert Gilpin, *France in the Age of the Scientific State* (Princeton: Princeton U.P., 1968) p. 258.

60. Anthony Wedgwood Benn, Minister of Technology, 'The Government's Policy for Technology', *New Technology*, no. 13 (Jan. 1968).

61. Louis Turner, *Invisible Empires: Multinational Companies and the Modern World* (London: Hamish Hamilton, 1970) p. 14.

62. Ibid., pp. 45–9.

63. Ibid., p. 66.

64. Ibid., pp. 96–103, 199–206. See also Malcolm Warner, 'Towards Trans-National Trade Unions', *New Society*, 15 Oct. 1970, pp. 670–1. no. 420

65. International Telecommunications Satellite Organisation, International Atomic Energy Agency, International Civil Aviation Organisation, European Space Research Organisation

66. Op. cit., p. 1039.

67. James Burnham, *The Managerial Revolution* (London: Putnam, 1943).

68. See Henry Elsner Jr, *The Technocrats, Prophets of Automation* (Syracuse, N.Y.: Syracuse U.P., 1967).

69. See F. F. Ridley, 'French Technocracy and Comparative Government', *Political Studies*, xiv (1966) 34–52.

70. Jean Blondel, *An Introduction to Comparative Government* (London: Weidenfeld & Nicolson, 1969) pp. 405–12.

71. *The New Industrial State*, chap. 6.

72. Ibid., p. 67.

73. David E. Apter, *The Politics of Modernisation* (Chicago: University of Chicago Press, 1965) pp. 316, 317.

74. Ibid., p. 433.

75. Ibid., esp. pp. 433, 461.

76. Ibid., pp. 443–4, 459–60.

77. Ibid., pp. 176, 461.

78. Starting-points for study of these three cases could be: (*a*) C. P. Snow, *Science and Government* (London: Oxford U.P., 1961), provided the biographies are also consulted; (*b*) Philip Stern, *The Oppenheimer Case: Security on Trial* (New York: Harper & Row, 1969); (*c*) Zhores A. Medvedev, *The Rise and Fall of T. D. Zysenko* (New York: Columbia U.P., 1969).

79. Robert Gilpin and Christopher Wright, *Scientists and National Policy-Making* (New York: Columbia U.P., 1964) pp. 7–12.

80. Don K. Price, *The Scientific Estate* (Cambridge, Mass.: Harvard U.P., 1965) esp. pp. 20, 132–6.

81. Ralph E. Lapp, *The New Priesthood: The Scientific Elite and the Uses of Power* (New York: Harper & Row, 1965).

82. 'The Scientific Mafia', *The Economist*, 13 Jan. 1968, p. 55.

83. The phenomenon is a very old one. Thomas W. Africa, *Science and the State in Greece and Rome* (New York: Wiley, 1968), notes that 'The relationship of scientists to Greek city states was complicated by the fact that some scientists thought that an intellectual élite ought to exercise political authority' (p. 28), and also that 'As scientists and advisers, the Roman court astrologers are comparable to the scientific consultants who help shape national policy in the twentieth century' (p. 74).

84. Price, *The Scientific Estate*, pp. 199–200.

85. Writing of the U.S.S.R., David Holloway concludes: 'A new theory of the relationship between the authority of the scientist and the authority of the politician is needed.' 'Scientific Truth and Political Authority in the Soviet Union', *Government and Opposition*, v 3 (summer 1970) 367.

86. F. R. Jevons, 'Politicians and Scientists', *Physics Bulletin*, XIX (Feb. 1968) 45.

87. Max Beloff, *The Intellectual in Politics* (London: Weidenfeld & Nicolson, 1970) p. 15.

88. George W. Morgenthaler, book review, *Operations Research*, XIV (1966) 181.

89. Joseph H. Engel, 'Systems Analysis on the Horizon', in Grace J. Kelleher (ed.), *The Challenge to Systems Analysis: Public Policy and Social Change* (New York: Wiley, 1970) p. 148.

90. Stanley Young, 'Organisation as a Total System', in David I. Cleland and William R. King (eds), *Systems, Organisations, Analysis, Management* (New York: McGraw-Hill, 1969) p. 62.

91. Richard Hoggart, 'Values and Virtues', in *Technology and Society*, the 1st Bath Conference, 1965 (Bath: The University Press, 1966) p. 16.

92. Alain Enthoven, 'Systems analysis and P.P.B. in the Pentagon', Statement before Congressional Sub-committee on National Security and International Operations, Committee on Government Operations, U.S. Senate, *Hearings: Planning-Programming-Budgeting*, 90th Congress. 1st sess., part 2, 27 Sep., 1967. It may be worth pointing out that 'systems analysis' has a different meaning in the United States as compared with Britain. In the United States it is to strategy what operations research is to tactics. See James R. Schlesinger, 'Quantitative Analysis and National Security', *World Politics*, XV 2 (Jan. 1963) 295–315.

93. James R. Schlesinger, 'Systems Analysis and the Political Process', RAND Corporation Paper (June 1967) p. 29.

94. Aaron Wildavsky, 'The Political Economy of Efficiency: Cost Benefit Analysis, Systems Analysis and Program Budgeting', *Public Administration Review*, 26 Dec., 1966, pp. 292–310.

95. François Bloch-Lainé, The Utility of Utopias for Reformers, in Frank E. Manuel (ed.), *Utopias and Utopian Thought* (Boston: Houghton Mifflin, 1966) reprinted from *Daedalus* (Spring 1965) p. 217. This axiom, the author says, is 'both a hypothesis and a conviction'.

96. *The New Industrial State*, pp. 380, 385, 400.

97. This itself may be thought an ungenerous remark in view of the establishment in recent years of such bodies as the British Society for Social Responsibility in Science, and the various groups of American scientists formed to prevent A.B.M. deployment, or to combat pollution. However, industrial scientists and engineers are under-represented in such bodies, by no means all academic scientists and engineers are members, and finally, the effect of such bodies on political outcomes has not as yet been very significant.

98. Philip Green, *Deadly Logic* (Columbus: Ohio State U.P., 1966) p. 267.

99. Ibid., p. 263.

100. Ibid., pp. 273, 275. Green is uncompromising: 'The false attribution of expertness to an intellectual élite, which has in effect passed a test of political acceptability, narrows rather than enlarges the channels of influence' (p. 276).

101. Bertrand de Jouvenel, 'The Political Consequences of the Rise of Science', in Alexander Vavoulis and A. Wayne Colver (eds), *Science and Society, Selected Essays* (San Francisco: Holden-Day, 1966) pp. 83–4. (The essay was reprinted from the December 1963 *Bulletin of the Atomic Scientists*.)

102. Jean Meynaud, *Technocracy* (London: Faber & Faber, 1968) pp. 58, 68, 110.

103. Ibid., p. 296.

104. Ibid., p. 303.

105. Ibid., p. 291.

106. *The Times*, 27 May 1968.

107. Anthony Crosland, President of the Board of Trade, 'The Future of Socialism 1968', *Observer*, 6 Oct. 1968.

108. Bernard Crick, 'Free Societies in Ferment', *Observer*, 2 June 1968.

109. Anthony Wedgwood Benn, *The New Politics: A Socialist*

Reconnaissance (London: Fabian Tract 402, Sep. 1970). The quotations which follow are at pp. 11, 26, 27 and 19.

110. V. K. Zworykin, 'Communications and Government', in Nigel Calder (ed.), *The World in 1984* (Harmondsworth: Penguin Books, 1965) p. 52.

111. William Kornhauser, *The Politics of Mass Society* (London: Routledge & Kegan Paul, 1960) p. 237.

112. Bear in mind, for example, Thomas R. Dye, *Politics, Economics and the Public; Policy Outcomes in the American States* (Chicago: Rand McNally, 1966) pp. 266–7, 270. 'Our evidence seems to support the conclusion that levels of political participation in state politics have little independent effect on policy outcomes . . . these findings in no way reflect upon the moral imperatives in democratic theory about popular participation' [!].

113. In this context see Brent M. Rutherford, 'Psychopathology, Decision Making and Political Involvement', *Journal of Conflict Resolution*, x (1966) 387–407: 'the existence of psychopathology in participants at different levels of activity in democratic situations remains an open question' (p. 392).

114. John H. Schaar, *Escape from Authority: The perspectives of Erich Fromm* (New York: Harper & Row, 1961) p. 296. According to Schaar, Fromm 'deals with political subjects only in order to end politics . . .' (p. 297).

115. Erich Fromm, *The Fear of Freedom* (London: Kegan Paul, Trench, Trubner & Co., 1942) p. 207.

116. Erich Fromm, *The Sane Society* (London: Routledge & Kegan Paul, 1956) p. 184.

117. Ibid., p. 186.

118. *The Fear of Freedom*, p. 233.

119. Hannah Arendt, *The Human Condition* (Chicago: University of Chicago Press, 1958) p. 151.

120. Ibid., pp. 228, 321.

121. Ibid., p. 322.

122. Ibid., p. 4.

123. Ibid., p. 324.

124. See Manfred Stanley, Dept. of Sociology, Syracuse University, N.Y., 'Technicism: The Modern Demonology', Paper presented to the 7th World Congress of the International Sociological Association.

125. Arendt, *The Human Condition*, p. 273.

126. Herbert Marcuse, *One-Dimensional Man: The Ideology of Industrial Society* (London: Sphere Books, 1968) p. 11.

127. Ibid., pp. 19, 13.

128. Herbert Marcuse, 'Repressive Tolerance', in Robert Paul Woltt, Barrington Moore Jr, and Herbert Marcuse, *A Critique of Pure Tolerance* (London: Jonathan Cape, 1969).
129. Arthur M. Schlesinger, Jr, *The Crisis of Confidence* (London: André Deutsch, 1969) p. 39.
130. This seems fair even bearing in mind his more recent work, but see Jacques Ellul, 'Technique, Institutions and Awareness', *American Behavioural Scientist*, xi 6 (July–Aug. 1968) 38–42.
131. Jacques Ellul, *The Technological Society* (London: Jonathan Cape, 1965) p. xxxi.
132. Ibid., pp. 263, 279, 275.
133. Jacques Ellul, 'The Technological Order', in Carl F. Stover (ed.), *The Technological Order* (Detroit: Wayne State U.P., 1963) p. 11.
134. Norbert Wiener, *The Human Use of Human Beings* (London: Sphere Books, 1968) p. 157.
135. Norbert Wiener, *Cybernetics* (New York: Wiley, 1948) pp. 37–8.
136. Ben B. Seligman, *Most Notorious Victory: Man in an Age of Automation* (New York: The Free Press, 1966) p. 400.
137. Karl Mannheim, *Man and Society in an Age of Reconstruction* (London: Kegan Paul, Trench, Trubner & Co., 1940) pp. 373–4.
138. Ibid., pp. 243, 247–8, 337.
139. Ibid., p. 378.
140. See, for example, Charles E. Silberman, *The Myths of Automation* (New York: Harper & Row, 1966) chap. 6, 'Is Technology Taking Over?'
141. Robert Boguslaw, *The New Utopians* (Englewood Cliffs, N.J.: Prentice-Hall, 1965) p. 202.
142. Carl J. Friedrich and Zbigniew K. Brzezinski. *Totalitarian Dictatorship and Autocracy* (New York: Praeger, 1966) p. 22.
143. Hans J. Morgenthau, 'Modern Science and Political Power', *Columbia Law Review*, LXIV (1964) 1386–1409.
144. Alan F. Westin, *Privacy and Freedom* (New York: Atheneum, 1968) pp. 23, 24, 368.
145. Ibid., p. 399.
146. Theodore Roszak, *The Making of a Counter Culture: Reflections on the Technocratic Society and its Youthful Opposition* (London: Faber & Faber, 1970) pp. 266–7.
147. Ibid., p. 267.
148. Charles A. Reich, *The Greening of America* (New York: Random House, 1970).
149. Ibid., p. 90.
150. Ibid., p. 300.

151. Ibid., pp. 350, 357, 369.
152. Nigel Calder, *Technopolis* (London: MacGibbon & Kee, 1969) p. 287.
153. Michael Harrington, *The Accidental Century* (London: Weidenfeld & Nicolson, 1965).
154. Donald N. Michael, *The Unprepared Society* (New York: Basic Books, 1968) p. 3.
155. Peter F. Drucker, *The Age of Discontinuity* (London: Heinemann, 1969) chap. 10.
156. Ralph Miliband, *The State in Capitalist Society* (London: Weidenfeld & Nicolson, 1969) p. 237.
157. Ibid., p. 181.
158. Ibid., p. 273.
159. Ibid., pp. 272, 276.
160. Robert L. Heilbroner, *The Future as History* (New York: Harper Torchbooks, 1968) p. 167.
161. Ibid., p. 158.
162. Ibid., p. 187.
163. Ibid., p. 168.
164. Ibid., p. 56.
165. Ibid., chap. ii and pp. 170, 189; cf. Ronald Segal, *America's Receding Future* (London: Weidenfeld & Nicolson, 1968).
166. Nathan Rotenstreich, 'Technology and Politics', *International Philosophical Quarterly*, VII (1967) 197–212.
167. Zbigniew Brzezinski, 'America in the Technetronic Age', *Encounter*, XXX 1 (Jan. 1968) 16–26.
168. Kenneth Boulding, *The Meaning of the Twentieth Century: The Great Transition* (London: Allen & Unwin, 1964).
169. Allen Schick, 'The Cybernetic State', *Transaction* (Fulton, Mo.), VII 4 (Feb. 1970) 14–26.
170. Ibid., p. 18.
171. Ibid., p. 22.
172. Ibid., p. 26.
173. Daniel Bell, *The End of Ideology: On the Exhausting of Political Ideas in the Fifties* (New York: Collier Books, 1961).
174. Daniel Bell, 'The Post-Industrial Society: A Speculative View', in E. and E. Hutchings (eds), *Scientific Progress and Human Values* (New York: Elsevier, 1967) p. 157.
175. Daniel Bell, 'Notes on the Post-Industrial Society (1)', *The Public Interest*, no. 6 (winter 1967) p. 25. (This is another version of the above.)
176. Kumar has made a shrewd comment on this. The ideology of futurology, he points out, 'is being created by the very groups who are said by the ideology to be on the way to

becoming the most powerful and influential in the post-industrial society'. 'My feeling', he adds, 'is that the futurologists underestimate the irrationality of political motivations, and may find themselves displaced with scant respect for their supposed indispensability.' Krishan Kumar, 'Futurology', *The Listener*, 18 Feb. 1971, p. 207.

In *The Reforming of General Education* (New York: Columbia U.P., 1966) Bell itemises four problems which he says the university must overcome before it can successfully fulfil its central role in the post-industrial society. The third and fourth of these problems are coming to terms with its function as a political institution, and removing the disjunction between culture and social structure, 'a disjunction expressed most directly in the two major orientations towards the future that divide the intelligentsia today – the technocratic and the apocalyptic' (pp. 303–12).

177. *Scientific Progress and Human Values*, p. 168.
178. Daniel Bell, 'The Commission on the Year 2000', *Futures* II, 3 (Sep. 1970) 263–9 (foreword to first of a series of volumes, this one being *U.S. Government in Year 2000*, ed. Harvey Perloff).
179. *Scientific Progress and Human Values*, p. 168.
180. Daniel Bell, 'Notes, etc. (2)', *The Public Interest*, no. 7 (spring 1967) p. 105.
181. Cf. John Diebold, 'Goals to Match our Means', in Charles R. Dechert (ed.), *The Social Impact of Cybernetics* (Notre Dame, Ind.: University of Notre Dame Press, 1966) p. 9.
182. Victor C. Ferkiss, *Technological Man: The Myth and the Reality* (London: Heinemann, 1969) p. 271.
183. Ibid., chap. 7, 'Technology and the Rediscovery of Politics'.
184. Franz L. Neumann, 'Approaches to the Study of Political Power', *Political Science Quarterly*, LXV (1950) 170, quoted at p. 157.
185. Ferkiss, *Technological Man*, pp. 181–2.
186. Ibid., p. 184.
187. Emmanuel G. Mesthene, *Technological Change: Its Impact on Man and Society* (London: New English Library, 1970) pp. 80–1.
188. Emmanuel G. Mesthene, 'How Technology will Shape the Future', *Science*, CLXI (12 July 1968) 142.
189. Ibid.
190. Robert E. Lane, 'The Decline of Politics and Ideology in a Knowledgeable Society', *American Sociological Review*, XXXI (1966) 662.
191. Henry Wheeler, *Democracy in a Revolutionary Era: The Political*

Order Today (Santa Barbara, Calif.: Centre for the Study of Democratic Institutions, 1970) p. 119.

192. Jeremy Bray, 'Technology and Society: The Future of Systems and Ideologies', *Anticipation* (Geneva: World Council of Churches), no. 4 (Oct. 1970) p. 10.

193. Alvin Toffler, *Future Shock* (London: Bodley Head, 1970) pp. 400–30.

194. Ibid., p. 424.

195. For his earlier ideas see Donald A. Schon, *Technology and Change: The New Heraclitus* (New York: Delacorte Press, 1967). The Reith Lectures, 'Change and Industrial Society', were printed in *The Listener*, LXXXIV 2173–8 (19 Nov.–24 Dec. 1970).

196. Ibid., p. 875 (6th Lecture).

197. Ibid: 'In eras of stability, the roles that come into prominence ... are the stable roles at the century [*sic*] organisations. In our time ... the roles that become critical are the network roles.'

198. Ibid., p. 810 (4th lecture). See also *The Times*, editorial, 21 Dec. 1970.

199. Warren G. Bennis and Philip E. Slater, *The Temporary Society* (New York: Harper & Row, 1968) chap. 1, p. 13.

200. Maurice Latey, *Tyranny* (London: Macmillan, 1969) p. 305.

201. Radovan Richta, *Civilisation at the Crossroads* (New York: International Arts and Sciences Press Inc., 1968) p. 253.

202. Ernest Mandel, *Marxist Economic Theory* (London: Merlin Press, 1968) pp. 522, 541–2.

203. Ibid., p. 606.

204. Ibid., p. 673.

205. Ibid., p. 677.

206. Lewis Mumford, *Technics and Civilisation* (London: Routledge & Kegan Paul, 1967) p. 109. Mumford's is an 'evolutionary' theory, like those of Marx and Rostow, rather than a 'cyclical' theory, such as those put forward by Spengler or Toynbee.

207. Ibid., pp. 213, 216.

208. Ibid., pp. 403–6.

209. Cf. Richard Kostelanetz, *Beyond Left and Right: Radical Thought for our Times* (New York: William Morrow, 1968) p. xi.

210. R. Buckminster Fuller, *Utopia or Oblivion* (London: Allen Lane, The Penguin Press, 1970) p. 324.

211. Ibid., pp. 235, 391.

212. Ibid., p. 335.

213. David S. Landes, *The Unbound Prometheus: Technological*

Change and Industrial Development in Western Europe from 1750 to the Present (Cambridge: Cambridge U.P., 1969) p. 555.

214. George Kateb, *Utopia and its Enemies* (New York: The Free Press of Glencoe, 1963) p. 106.

215. Marshall McLuhan, *Understanding Media* (London: Routledge & Kegan Paul, 1964) p. 344.

216. Ibid., p. 57.

217. Jonathan Miller, *McLuhan* (London: Fontana/Collins, 1971) pp. 131–2. Cf. Sidney Finkelstein, *Sense and Nonsense of McLuhan* (New York: International Publishers, 1968) p. 117: McLuhan's 'vision of an electronic, automated, computerised dictatorship controlling the population by beaming radio and TV waves at them is presented tongue in cheek, as a sick joke'. Elsewhere he comments that what McLuhan calls 'involvement' is in fact 'brainless' (p. 100).

218. David Easton, 'The New Revolution in Political Science', *American Political Science Review*, LXIII 4 (Dec. 1969) 1058.

219. Herman Kahn and Anthony J. Wiener, *The Year 2000: A Framework for Speculation on the Next Thirty-three Years* (New York: Macmillan, 1967).

220. See Benjamin Akzin, 'On Conjecture in Political Science', *Political Studies*, XIV (1966) 1–14.

221. Some of the better-known works are Kurt Baier and Nicholas Rescher (eds), *Values and the Future* (New York; The Free Press, 1969); Robert Jungk and Johan Galtung (eds), *Mankind 2000* (London: Allen & Unwin, 1969); 'Toward the Year 2000: Work in Progress', *Daedalus* (summer 1967). There are several other books with 'the year 2000' in their title. Erich Jantsch, *Technological Forecasting in Perspective* (Paris: O.E.C.D., 1967) provides a good annotated bibliography of the forecasting field as it stood at that time. One particularly worthwhile book (still) seems to be Dennis Gabor, *Inventing the Future* (Harmondsworth: Penguin Books, 1964). Also from Britain has now come Michael Young (ed.), *Forecasting and the Social Sciences* (London: Heinemann, 1968), a collection of papers for the S.S.R.C.'s Committee on the Next Thirty Years. The latter is a partial equivalent of de Jouvenel's Futuribles project or the American Commission on the year 2000. To confirm that we-have-been-there-before, there is W. H. G. Armytage, *Yesterday's Tomorrows: A Historical Survey of Future Societies* (London: Routledge & Kegan Paul, 1968).

222. Bertrand de Jouvenel, *The Art of Conjecture* (London: Weidenfeld & Nicolson, 1967) p. 238: 'a political forecast is not

given to us as a bonus once we have completed an economic and social forecast. . .'.

223. Henry S. Kariel, 'Expanding the Political Present', *American Political Science Review*, LXIII 3 (Sep. 1969) 768–76.
224. Yehezkel Dror, 'Alternative Domestic Political Futures: Research Needs and Research Design', *Futures*, II 4 (Dec. 1970) 302–11.
225. Kahn & Wiener, *The Year 2000*, p. 23, and cf. p. 24.
226. Andrew Shonfield, 'Thinking about the Future', *Encounter* (Feb. 1969) pp. 16, 19.
227. Ibid., p. 25.
228. From Kahn & Wiener, *The Year 2000*, p. 25.
229. Lewis A. Gunn, 'Government, Technology and Planning', to be published in 1971 as a chapter in J. N. Wolfe (ed.), *The Impact of Technology*.
230. Editorial, *Observer*, 27 Nov. 1966.
231. Anthony Wedgwood Benn, Minister of Technology (Mintech) at the beginning of 1967, *New Technology*, no. 1 (Jan. 1967).
232. William Plowden, 'Mintech Moves On', *New Society*, 12 Jan. 1967.
233. *Times Business News* editorial, 'Galbraith Builds His House', 4 Sep. 1967; *Guardian* editorial, 'Bureaucrats and Businessmen', 19 Dec. 1966.
234. See for instance 'White-Hot Revolution?', five articles in *New Scientist*, 26 Sep. 1968, pp. 644–53.
235. Gunn, in *The Impact of Technology* (forthcoming).
236. Anthony Wedgwood Benn, 'Science, Europe and a New World', *New Scientist and Science Journal*, 18 Feb 1971, pp. 348–50.
237. J.-J. Servan-Schreiber, *The American Challenge* (London: Hamish Hamilton, 1968) pp. 3, 32.
238. Harold Wilson, Guildhall speech, as reported in *The Times*, 14 Nov. 1967. On the 'European technological imperatives' see the review article by Linda B. Miller, 'Europe's Futures: Change and Continuity?', *Journal of Common Market Studies*, IX 1 (Sept. 1970) esp. part ii, 'Science and the State', pp. 103–8.
239. Mary Goldring, 'The Atomic Incubus', *New Society*, 28 Oct. 1965, pp. 7–9.
240. John Maddox, 'The Atomic Future', *Guardian*, 16 Apr. 1964.
241. 'Is I.C.L. in Trouble?', *The Economist*, Business Brief, 27 Feb. 1971, pp. 56–7.
242. Shirley Williams, M.P., 'The Responsibility of Science', *The Times*, Saturday Review, 27 Feb. 1971. She concludes: 'We

need new machinery quickly if we are to use science more wisely than we have done up to now.'

243. Edward Heath, speech to Institute of Directors' Conference, reported in *Financial Times*, 6. Nov. 1970.

244. As reported in *The Times*, 16 March 1971. Ford of Britain had at the time a major industrial dispute on their hands.

245. *Report of the Committee on the Civil Service* (London: H.M.S.O., 1968) Cmnd 3638, vol. I, paras. 30–1, p. 16. In this context one should also note the establishment by the 1970 Conservative government of a Central Policy Review Staff headed by Lord Rothschild–'the Cabinet office "think-tank" ' in the words of the *Guardian*, 7 Nov. 1970, editorial.

246. *Royal Commission on Local Government in England 1966–69*, vol. I, *Report* (London: H.M.S.O., 1969) Cmnd 4040, para. 488, p. 125.

247. Sir Solly retired from his official responsibilities in March 1971.

248. Harold Jackson, 'A Man for all Sciences', *Guardian*, 7 Apr. 1967.

249. Norman J. Vig, *Science and Technology in British Politics* (Oxford: Pergamon Press, 1968) p. 161.

250. Bernard Crick, *The Reform of Parliament* (London: Weidenfeld & Nicolson, 1968) pp. 2, 245.

251. Anthony Wedgwood Benn, writing in *Sunday Times*, 28 Feb. 1971, p. 12.

252. Malcolm Warner and Michael Stone, *The Data Bank Society* (London: Allen & Unwin, 1970); Anthony A. Thompson, *Big Brother in Britain Today* (London: Michael Joseph, 1970).

253. Cf. Edwin Layton in *Technology and Culture*, II 1 (Jan. 1970) 30, or R. J. Forbes, *The Conquest of Nature* (London: Pall Mall Press, 1968) p. 82: 'Technology has broadened the politician's choice, and all too often also has obscured his view.'

254. Jessie Bernard, 'The Power of Science and the Science of Power', *American Sociological Review*, XIV 5 (October 1949), 584.

255. Note Andrei D. Sakharov, *Progress, Coexistence and Intellectual Freedom* (Harmondsworth: Penguin Books, 1969) p. 25 '. . . intellectual freedom is essential to human society. . . . Freedom of thought is the only guarantee of the feasibility of a scientific democratic approach to politics, economy, and culture.'

256. But see G. Ionescu's essay in this series, *Comparative Communist Politics*.

257. Franz Neumann, *The Democratic and the Authoritarian State*, ed. and with an introduction by Herbert Marcuse (Glencoe, Ill.: The Free Press, 1964) p. 193. Note also p. 251: 'Modern

industrialism is politically ambivalent because it contains and intensifies two diametrically opposed trends in modern society: the trend toward freedom and the trend toward repression.'

258. John R. Platt, *The Step to Man* (New York: Wiley, 1966) p. 200.

259. Robert S. McNamara, *The Essence of Security* (London: Hodder & Stoughton, 1968) p. 51.

260. Charles Frankel in Edward Reed (ed.), *Challenges to Democracy: The Next Ten Years* (New York: Centre for Study of Democratic Institutions, 1963) p. 91. In *The Case for Modern Man* (London: Macmillan, 1957), Frankel says that 'Technological developments have eaten out the social texture of modern society' (p. 176) and therefore that 'The essential point is to introduce a competition of powers into the decision-making process that does not now exist' (p. 180).

261. John Maynard Keynes, *Essays in Persuasion* (London: Hart-Davis, 1952) p. 372.

262. Cf. James Martin and Adrian R. D. Norman, *The Computerised Society* (Englewood Cliffs, N. J.: Prentice-Hall, 1970) p. 542: 'We have now reached the point where we have the *technical* capability to build almost any society we could wish for, but just as certainly still lack the *political* capability.' Since both authors are computer professionals, two other sentences are perhaps worth quoting: (*a*) 'computers can help both in gaining power and in keeping it' (p. 402); (*b*) 'the computerised society will have to become a far more *tolerant* society than most societies of the past if true freedom is to survive' (p. 336).

263. The allusion is of course to Karl R. Popper, *The Poverty of Historicism* (London: Routledge & Kegan Paul, 1960), and he says (p. xi), before him to Marx, and before Marx to Proudhon.
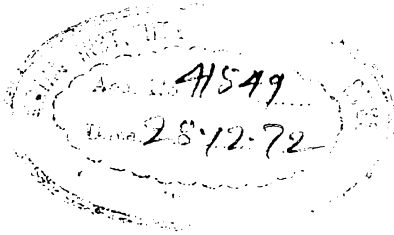
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