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Richard W. Donnelly

University of Wollongong

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THE POLITICS OF TECHNOLOGY: A CRITIQUE OF THE WORK OF LANGDON WINNER

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by

Richard W. Donnelly, B.A. (A.N.U.), Dip.Ed. (Syd.)

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DECLARATION

This work has not been submitted for a degree to any other university or institution.

Richard W. Donnelly
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Numbers of writers have agreed that technology is political, yet in exactly what ways this is to be understood has been the subject of much debate. One author whose work has been influential in this regard is Langdon Winner. In his two books, Autonomous Technology and The Whale and the Reactor, he has argued that profitable insights can be gained by the application of the categories of political philosophy to the study of "technology itself", which, for him, involves understanding technologies as "political phenomena in their own right".

In this thesis, I examine this claim and argue that, while Winner's analysis provides perceptive insights into the challenges posed by technology for contemporary politics, his locating of the political in the technology itself has significant conceptual problems. I will suggest that most of the problems in Winner's analysis arise from his inconsistent understanding and use of the concepts, "technology" and "politics". Furthermore, I argue that his failure to draw out the ideological nature of much of the discourse surrounding technological decision-making is a key weakness in his analysis and I suggest how such a perspective would do much to reconcile many of the ambiguities in his argument.
INTRODUCTION

That technology has significant implications for political life has been long recognised. However, what those implications are and how they should be addressed has been a matter of considerable ongoing debate. While the continuous development of science and technology has, for the past two hundred years, been seen as the indispensable motive power of progress, the post-war period, particularly since the sixties, has witnessed a growing restlessness about the identification of social progress with technological development. Environmental despoliation, worker alienation, urban breakdown, the greenhouse effect, exploitation of the Third World, and the proliferation of nuclear weapons are just some examples of what are widely understood to be manifestations of the failure of the technological promise.

Critical studies from a number of different perspectives have called for and sought to provide a re-evaluation of the role of technology in modern societies. However, very few have sought to address specifically the issue of politics and technology. This may be due to the fact that in social thought, as Badham has shown,\(^1\) there have been two dominant theoretical approaches to the politics of technology - industrial society theory and capitalist society theory. The dominance of these two models has tended to result in the conceptual separation of technology and politics, with the result that analysis focusses either on the development of technology, understanding the political as essentially responses to that development (industrial society theory), or alternatively on the politics of the existing class structure, understanding technology essentially as a reflection of that class structure (capitalist society theory).

However, both theories can be said to share a common characteristic: the denial of the primacy of the political. In industrial society theory this is most obvious; here technology is understood as obeying its own technical requirements in relative autonomy, a situation to which politics must then necessarily adapt. In capitalist society theory, on the other hand, the devaluation of the political is a result of the Marxist understanding of politics as essentially a transitional stage - an aspect of the superstructure of capitalist

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\(^1\) Badham R., *Theories of Industrial Society* (Croom Helm, London 1986).
society, which will ultimately disappear in a communist future. Thus while the capitalist society analysis appears to have a greater commitment to the primacy of politics, it is only to be understood as a reflection of more profound structural contradictions within capitalism and an expression of class struggle.

Nevertheless, at the same time, there has been within each of these perspectives a recurring argument that technology itself is political. But what exactly is meant by this claim? Does it represent a theoretical synthesis which does full justice to both the technological and the political, or does it merely conflate the one into the other? What does such a claim understand "technology" and "politics" to mean?

This thesis aims to explore these questions as they are addressed in the work of Langdon Winner. Winner has consistently sought to explore the phenomenon of technology for contemporary political life. In so doing, he has formulated a "theory of technological politics", a perspective which he claims takes seriously the technical artifacts themselves and which, in fact, "identifies certain technologies as political phenomena in their own right". Winner is significant in that his work can be understood as providing a theoretical bridge between those who are interested in a macro-analysis of technological change, and those who prefer the perspective of micro-analysis. At the same time, his contribution is distinctive for its commitment to the necessity for and centrality of political philosophy as a tool for technological analysis.

Winner's work is characterized by the clarity of its insights into the challenges which technology poses for modern society and its strong commitment to democratic political theory. However, this thesis will argue that these strengths in fact become weaknesses when Winner seeks to analyse the political nature of technology. It will be suggested that his predilection to understand technology as culture and politics as democratic politics significantly restricts his perspective and limits the value of his analysis.

In order to gain a clearer understanding of Winner's argument, Chapter One will attempt to place him in some sort of context by briefly referring to four authors who have 2 Winner, L., The Whale and the Reactor (University of Chicago, Chicago 1986) p.22.
made crucial contributions to the intellectual framework within which he develops his theory, a framework that is generally critical of the implications of technology for political life: Jacques Ellul, Herbert Marcuse, David Dickson and Harry Braverman. Chapters Two and Three will then focus on Winner's argument in *Autonomous Technology* and *The Whale and the Reactor* respectively, before a final assessment of his work is attempted in the concluding chapter.
CHAPTER ONE

While there is no pretension here to exhaustiveness in choice or treatment, Ellul, Marcuse, Dickson and Braverman have provided what have become classical statements of the political nature of technology and at the same time are very much representative of the changing nature of critical technology analysis over the past three decades. They also represent the movement in Winner's own work, from the more macro analysis of the politics of technology, Autonomous Technology in which he draws considerably on Ellul and Marcuse, to the more focussed discussion on the politics of artifacts in The Whale and the Reactor where he explores perspectives previously developed by Dickson and Braverman. It will be instructive to examine the ways in which Winner draws on and yet differs from them.

Jacques Ellul

Of central significance for an understanding of the intellectual influences on Langdon Winner is the work of Jacques Ellul. With the 1964 American publication of The Technological Society, Ellul established himself in the English speaking world as a perceptive critic of the increasingly technical rationality of modern Western societies. For him, technique is totalitarian in its effectiveness. His use of "la technique" does not refer to machines, technology or any particular means of achieving ends but, sees it, in a somewhat tautological definition, as the "totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity". His analysis covers such "private" activities as sport, leisure and sex, as well as the more "public" concerns of work, economics and of course, politics. Ellul understands the political as "relating to the state and not to just any power, or just any

social activity".\(^3\) For Ellul, as a result of the domination of technique, it is no longer possible to speak of the state in traditional classical terms, but only in technical terms; "The technological state corresponds directly to modern society itself since it is technically constructed and exists in the very soul of men who worship efficiency, order and speed. The classical state corresponds to vanished forces of an entirely different nature".\(^4\) This has obvious implications for democratic politics: "(T)he doctrines of traditional democracy - the rights of man, the abstract conception of the citizen, equality in voting, the clash between power and liberty - are not adapted to modern social reality. For this reason, we are witnessing the rapid sclerosis and obsolescence of these doctrines; and it is becoming harder and harder to defend them."\(^5\)

The power of technique is such that politics as traditionally understood no longer exists, disappearing through its failure to adapt. And it is not a question of whether such developments take place within a capitalist or socialist framework; all alike are dominated by technique. Yet, ironically, through the expansion of the State into unprecedented areas of social life, all questions have become political questions, and, in turn, all political questions have been reduced to technical questions: "It is not that political problems are disappearing, but, rather, that the free play of traditional political forms is an illusion".\(^6\)

To those who argue that technological progress has advanced the movement towards democratization and social equality through the elimination of scarcity and the greater availability of goods, Ellul responds that such a process is democratic in name only; the "improvements" have been brought about not by the free intervention of the people themselves, but by the demands and operation of technique. "Technique is the boundary of democracy. What technique wins, democracy loses."\(^7\) It is not so much that the State becomes a technocracy, although that is true, but more significantly that politicians themselves become "mere" technicians. For them, "the nation is essentially

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4 The Technological Society, p.280.
5 Ibid.
6 The Political Illusion, p.65.
7 The Technological Society, p.209.
an affair to be managed ... the state is not the expression of popular will, or a creation of God or the essence of humanity, or a modality of the class war. It is an enterprise with certain services which ought to function properly. It is an enterprise which ought to be profitable, yield a maximum of efficiency, and have the nation for its working capital. Technical decisions become unchallengeable by parliaments on any moral or ideological grounds; order replaces justice, with the latter invoked purely for the sake of justification. For the modern State to function efficiently, then submission to technique is inevitable. Interestingly, Ellul suggests that only political corruption has the potential to thwart the progress of technique in politics. However, as it represents the elevation of essentially private interests, for Ellul, it must be considered non-political.

Ellul's understanding of politics is however somewhat ambiguous. There seems to be on the one hand the "political illusion", where the state comes to have increasing power over every aspect of human existence through the totalitarian nature of technique, especially evident in technology and propaganda, and on the other, what he considers to be a more "genuine" political response based on small and committed issue groupings, in short a genuinely democratic politics. He claims that in calling for a broad depoliticization in the face of the totalitarian tendencies of technique, he is not calling people to abandon politics itself. He is calling for the abandonment of the hope that anything of value can be achieved through "constitutional rules, good institutions, or socio-economic changes". There is no chance that the citizen can control the state. Nevertheless, "Politics is a problem of life, and of life without respite ... Experience has shown that the state will retreat only when it meets an insurmountable obstacle. This obstacle can only be man, i.e. citizens organized independently of the state".

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8 Ibid., pp.263-4.
9 Ibid., p.262. Note particularly his discussion on the nature of general interests as opposed to particular interests in relation to technique.
10 Ibid., p.202. Ellul cites as an essential precondition for such developments the demystification of the political illusion and the dominant political myths. However, he doesn't elaborate upon how such is to be accomplished. His understanding of propaganda carries suggestions of "false consciousness" and yet some discussion of the role of the broader ideological framework may have strengthened his claims that genuine politics may be possible as a result of changed consciousness. Cf.below.
Thus the politics which Ellul sees as rendered obsolete, the "political illusion", is that which places absolute dependence for solutions to political questions upon the state. It is large-scale, impersonal, technocratic and absolute. The alternative, which Ellul appears reluctant to call "political", is small-scale, personal, human and limited. His description of his own "political" involvement is instructive here. He explains that it was never his goal to get rid of technology but to develop new directions by reaching the "average" person, those who are more in touch with the "true" values of life than "intellectuals, technical experts, and executives". However, for Ellul the average person must be shown and taught what is "really" happening and this appears to be his task. "All this led me to concentrate on local initiatives - that is, to rely on direct and close relationships to form groups for investigating the issues that require people to take a stand on technology and the technological system, but which are also very concrete".

This raises a number of significant points. First, Ellul has a view of individuals that appears romantic and indeed somewhat rarefied in the light of his critique of the totalitarian nature of technological society. Any political change appears to be located within a change in consciousness; how such a change in consciousness proceeds to change political and social realities is unclear. The role of the intellectual is obviously important here, and yet also somewhat ambiguous. There is no doubt that Ellul understands the ambivalent nature of the political role of the intellectual, but his account begs some questions. Is it only as the "average person" is "enlightened" (by Ellul, the intellectual?) that he or she can arrive at a better understanding of the situation "than intellectuals, technical experts or executives" who are dominated by technique? What is the source of his immunity from the dominant technological rationality? And what of politics as freedom if such is conditional on enlightenment? There are some

12 Ibid., p.80-1. Ellul also comments on the dangers of 'political' involvement; "Again and again, people tried to draw me into political circles, saying that something was happening politically that might lead to the acceptance of my analyses! This is a trap for the ecological movements. I feel that any action pertaining to the technological milieu is extraordinarily enveloping, and I might say, extraordinarily seductive". (p.82.)
problematical authoritarian and elitist implications in this approach. Of most interest here is his suggestion of the existence of false consciousness, the unmasking of which provides the greatest hope for genuine liberation. However, he doesn't explore the dynamics of this ideological deconstruction.\textsuperscript{13} As a result, the processes by which the social reproduction of the power of technique is effected remain unexamined, as does the associated question as to the means by which politics come to be so distorted.

While many commentators have referred to Ellul's unrelieved pessimism, it is incorrect to conclude from his analysis that one is reduced to passive resignation. Ellul argues that his work is intended as a warning. For him realism about the possibility of action in a technological society is the only basis for action. "If an increasing number of people become fully aware of the threat the technological world poses to man's personal and spiritual life, and if they determine to assert their freedom by upsetting the course of this evolution, my forecast will be invalidated" \textsuperscript{14}

For Ellul, then, action and choice are possible, but only within authentic individual lives, suitably alert to the reality of their condition. Political institutions and processes associated with the state have been irreversibly transformed by technique. It is impossible to deal with technology by political action involving state institutions, since politics itself has become an expression of that very technology. Only through the transformation of consciousness and grassroots action can the real challenge to the power of the technological society be undertaken. Yet Ellul understands this grassroots approach as lying outside "politics", because it rejects the institutions of a state, dominated by technique, and appeals instead to the individual consciousness. "While crowds of people adopt all the technological developments, we can act only on individual levels...this implies a development of the intellect and a development of consciousness which can come about only for individuals, but it is the only development possible".\textsuperscript{15} Individual consciousness expressed through small

\textsuperscript{13} Cf. note 10.\
\textsuperscript{14} The Technological Society, p.xxx.\
\textsuperscript{15} Ibid., p.82.
committed groups is the only hope for social and political change in modern society. Only so, can a genuine democratic politics be realised.

Ellul's analysis places him very much within the perspective of industrial society theory where the development of technology is seen as essentially autonomous and politics as reactive. Indeed, Ellul goes further and claims that the very conjunction of state and technique has transformed politics and rendered political institutions irrelevant. However, his use of the wide-ranging yet vague concept of technique and his ambiguity as to what constitutes genuine politics leaves his analysis weak in terms of its explanatory power. There is no attempt to analyse the dynamics of technological development, to undertake any study of the political circumstances of such developments nor to pursue the question of false consciousness and the nature of ideological constructions as they apply to a political understanding of technology. What he provides is a primarily descriptive study of technique as a social phenomenon. However, he fails to locate the source of that phenomenon, and in particular fails to show how his thesis differs from that of Max Weber who identified a similar process of systematic rationalization, a process however which he attributed to capitalism.

Herbert Marcuse

Adopting a somewhat similar perspective, yet from a different starting point, is Herbert Marcuse. Interestingly, his most popular work, One-Dimensional Man, was also published in 1964. In this work, Marcuse ranges over a wide area in providing

16 In his preface to the revised American edition of The Technological Society, Ellul argues that his analysis is at the level of the sociological only and as such cannot deal with the level of individual action which is indeed possible; "As I see it, individual decisions are always made within the framework of this sociological reality, itself pre-existent and more or less determinative. I have simply endeavoured to describe technique as a sociological reality. We are dealing with collective mechanisms, with relationships among collective movements, and with modifications of political or economic structures". (p.xxviii) Thus it appears to be politics as a collective experience that is transformed by technique and which constitutes the "political illusion".
what is essentially a philosophical treatise on the irrationality of the Rational, understanding science and technology as expressive of and embodying most clearly this new form of domination. Although he writes from a neo-Marxist perspective, Marcuse attempts to provide a revision of Marxist theory which had held that the growth in the forces of production would be liberating, in providing for the satisfaction of material needs and at the same time increasing the contradictions which would lead inevitably to a non-alienated communist society. In fact, Marcuse appears as equally despairing as Ellul of the possibility of any genuine politics within the totalitarian technical rationality of modern industrial society. Rather than possessing emancipatory potential, modern technology actually serves to increase domination. "In the face of the totalitarian features of this society, the traditional notion of the "neutrality' of technology can no longer be maintained. Technology as such cannot be isolated from the use to which it is put; the technological society is a system of domination which operates already in the concept and construction of techniques." 18

As with Ellul, Marcuse argues that while a genuine politics was once possible in choosing between historical alternatives, "once the project has become operative in the basic institutions and relations, it tends to become exclusive and to determine the development of the society as a whole. As a technological universe, advanced industrial society is a political universe, the latest stage in the realization of a specific historical project - namely the experience, transformation, and organization of nature as the mere stuff of domination". 19 Marcuse's summary is as blunt as that of Ellul: "In the medium of technology, culture, politics, and the economy merge into an omnipresent system which swallows up or repulses all alternatives ... Technological rationality has become political rationality". 20

This is a reversal of Ellul's argument that "politics have become technics", and yet it amounts to the same thing. The difference in expression appears to come from Marcuse's determination to try to hold to the primacy of an analysis in which he can

19 Ibid.
20 Ibid.
Marcuse argues that genuine politics is essentially the operation of negation and criticism reflected essentially in the class struggle: politics is the process of social change by which "true" human freedom can be realised. For him, genuine politics has been replaced by one-dimensional politics, where criticism and autonomy have been annulled by materialism and the satisfaction of "needs". Moreover, there is no longer any rationale for transcending the society. Traditional politics fed on tension and contradiction; the efficiency of the one-dimensional society has however managed to contain social change. "Independence of thought, autonomy and the right to political opposition are being deprived of their basic critical function in a society which seems increasingly capable of satisfying the needs of the individuals through the way in which it is organized. Such a society may justly demand acceptance of its principles and institutions, and reduce the opposition to the discussion and promotion of alternative policies within the status quo".21 Autonomy has been sacrificed for the achievement of material gain, resulting in "a comfortable, smooth, democratic unfreedom...in advanced industrial civilization, a token of technical progress".22

For Marcuse, then, the political implications of technology lie not so much in the technology itself as in its unprecedented productive power: "If the individuals are satisfied to the point of happiness with the goods and services handed down to them by the administration, why should they insist on different institutions for a different production of different goods and services?" 23

Despite his Marxist perspective, Marcuse argues that as a result of the capacity of industrial production, domination is no longer effected through the class structure of capitalist society per se but by the very nature of science and technology within advanced industrial societies. It no longer appears that a class analysis is possible, for the traditional antagonism between bourgeoisie and proletariat is no longer the motor of

21 Ibid., p.16.
22 Ibid.
23 Ibid., pp.52-3.
social change. Both classes are subjected to technological domination and committed to the preservation of the status quo.

Marcuse in fact proceeds to argue that if there is to be revolutionary action, it will come not through the working class which has been totally absorbed into and transformed by the technological society, but through the marginalised, who are the only group "outside" the system and therefore to some degree autonomous. Marcuse argues that the welfare state has become "the rational and material ground for the unification of opposites, for one-dimensional political behaviour. On this ground, the transcending political forces within society are arrested and qualitative change appears possibly only as a change from without". This opposition however will not be so much conscious and deliberate as an extension of their attempts to survive: "They exist outside the democratic process; their life is the immediate and most real need for ending intolerable conditions and institutions. Thus their opposition is revolutionary even if their consciousness is not. Their opposition hits the system from without and is therefore not deflected by the system; it is an elementary force which violates the rules of the game, and in doing so, reveals it as a rigged game." Thus genuine politics, a true critical and autonomous response can only be realised outside the political universe, the democratic framework. But if this universe, this framework is "revealed" as "rigged", who rigged it and in favour of whom? The capitalist classes? All those within the system? And why "rigged"? One would think from Marcuse's analysis that these outsiders are to be envied, for they are the only truly free!

Similar questions are raised by the classical statement of Marcuse's position on technology and politics: "Today, domination perpetuates and extends itself not only through technology but as technology and the latter provides the great legitimation of the expanding political power, which absorbs all spheres of culture. In this universe, technology also provides the great generalization of the unfreedom of man and demonstrates the 'technical' impossibility of being autonomous, of determining one's

24 Ibid., p.52.
25 Ibid., p.200.
own life. For this unfreedom appears neither as irrational nor as political, but rather as 
submission to the technical apparatus which enlarges the comforts of life and increases 
the productivity of labor".\textsuperscript{26} Here Marcuse refers to the "expanding political power", 
but does not explain whose political power is increasing. Is it the ruling class(es)? If 
so, do they have an autonomy that is denied to everyone else? If not, and they are as 
subject to technological rationality as all the rest, what is the essentially "political" 
nature of their power? Second, and linked to the first point, what exactly is meant by 
domination "as" technology? Is he claiming that the technology itself is inherently 
dominating? If so, how can he claim that the unfreedom is political rather than 
technical? Why the inverted commas around technical? For if the technology is 
inherently dominating, then that can only be seen to be a technical necessity. The key 
problem raised here can be addressed by attention to the ideological nature of science 
and technology.

It is clear that Marcuse's analysis is ambiguous on the essential issue of whether 
power is exercised by and for particular interests, or whether it is inherent in the system 
of instrumental technical rationality itself. The whole question of the politics of 
technology revolves around this point. While it certainly appears that Marcuse believes 
that the totalitarian nature of technological rationality in advanced industrial societies \textit{in itself} renders genuine politics impossible, he also wants to maintain a more orthodox 
class analysis: "In the construction of the technological reality, there is no such thing as 
a purely rational scientific order; the process of technological rationality is a political 
process".\textsuperscript{27} Technological reality then is politically constructed, and this process is 
controlled by specific interests: "The universal effectiveness and productivity of the 
apparatus under which they are subsumed veil the particular interests that organize the 
apparatus. In other words, technology has become the great vehicle of \textit{reification} - 
reification in its most mature and effective form".\textsuperscript{28}

\textsuperscript{26} Ibid., p.130. 
\textsuperscript{27} Ibid., p.137. 
\textsuperscript{28} Ibid., pp.137-8.
Here at one and the same time is the source of and the answer to Marcuse's ambiguity. His use of such words as "reification", "legitimation", "appears" and "veil", highlights his understanding of the ideological role of science and technology in advanced industrial societies, ideology as false consciousness. The ideological use of science and technology obscures the political nature of social reality in the name of technical imperatives and the provision of material benefits. Yet, Marcuse does not examine the nature of the ideological construction involved and, as a result, his criticism often tends to confuse the "reality" with the ideology. As he argues that there are true and false needs, so Marcuse appears to hold that there is a "true" technology and a "false" technology; and that a true liberating technology will be discovered when all interests are stripped away and technology is allowed to be technology.

In fact, Marcuse sometimes seems to suggest, in a vague concession to Marx, that the development of "true" technology will result in the disappearance of the political. For example, he writes that (in his ideal future) "in constituting themselves methodically as political enterprise, science and technology would pass beyond the stage at which they were, because of their neutrality, subjected to politics and against their intent functioning as political instrumentalities. For the technological redefinition and the technical mastery of final causes is the construction, development, and utilization of resources (material and intellectual) freed from all particular interests which impede the satisfaction of human needs and the evolution of human faculties". Interestingly, this would result in all political rationality becoming technical rationality, where all political questions will able to be legitimately reinterpreted as technical ones. It is not at all clear how this accords with Marcuse's commitment to a genuine politics of human autonomy.

So Marcuse's attitude to the political nature of technology is ambivalent. Jurgen Habermas has commented on the ambiguity of Marcuse's analysis arguing that he oscillates between "the model of the original sin of scientific-technical progress" and

29 Ibid., p.183.
"that of its innocence". Habermas rejects Marcuse's speculations about the possibility of a different form of technology because for him, technology is a "project of the human species as a whole", a logical outcome of the species characteristic of purposive-rational action. As such, "it is impossible to envisage how as long as the organization of human nature does not change and as long therefore as we have to achieve self-preservation through social labour and with the aid of means that substitute for work, we could renounce technology, more particularly our technology, in favour of a qualitatively different one". The problem is not in the technological project, but in the sphere of symbolic interaction where political choices need to be made. For Habermas, the key problem of technology for politics is that "it characterizes the growing potential of self-surpassing productive forces which continually threaten the institutional framework and at the same time, sets the standard of legitimation for the production relations that restrict this potential". It is this ideological character of technology that has enabled the political sphere of human interaction to be depoliticized. The technocratic consciousness permits the social institutions, which are committed to political reflection, to be supplanted by a rationality that rightly belongs to the technical field. The task is to strengthen the institutional framework against the encroachment of such rationality. To stress as Marcuse does, the totalitarian nature of technical rationality is for Habermas to accept all too readily the ideology of technology as the only reality.

The attribution of transformative power to totalitarian technological rationality results in politics being understood either as simply one of the totality of processes so

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31 Ibid., p.87.
32 Ibid., p.89.
33 There are some problems with Habermas's analysis, especially the reducing of the political to the sphere of human interaction, separate from that of purposive-rational action which is the sphere of science and technology. This causes him some difficulty in seeking to arrive at a satisfactory democratic response to technological developments. Cf. particularly Chapter 5 in Ibid., "The Scientization of Politics".
transformed and therefore in no way distinctive, or as the most tragic and symbolic transformation by virtue of the fact that the political is not so much transformed as destroyed in terms of its traditional role as the locus of values, human choice and social control. As a result of their understanding of technology as an abstraction, it is impossible for the analyses of either Ellul or Marcuse to provide a means by which politics and technology might be analysed more concretely. It is essential that more is able to be said about the issue than that technical rationality reduces politics to technical rationality, with the only hope a genuine non-politics of individuals or outsiders.

It is significant that Ellul and Marcuse were writing at a time when the end-of-ideology thesis, associated particularly with Daniel Bell, was current, and in many ways their works suggest the same thesis, that social conflict within advanced capitalist societies has been rendered impossible as a result of the success of industrialism and the perceived domination of technological rationality. So for them politics comes to be understood not as conflict between classes but essentially between the individual and the system; the basis of their critique is a commitment to politics as freedom. In neither analysis is the dominance of technological rationality understood to be particularly unpleasant; in fact it is the very success of technology and industry in satisfying human needs, however they might be conceived, that is the central concern. For such material satisfaction has been achieved at the cost of genuine human autonomy.

With the upheavals of the late sixties and early seventies, however, in particular the Vietnam War and the energy crisis, concerns began to be raised about the emerging social costs of science and technology within advanced industrial societies. Technology and science were no longer experienced as providing unquestioned material benefits; increasing pollution, military technologies, predictions about the extinction of natural resources etc. led to a re-examination of the value of the general commitment to science and technology. Such developments gave a new vigour to political and social thought, which had become to a large degree submerged in the end-of-ideology ideology.

Writings about politics and technology tended to come to focus either on the effects of technology on the environment and the place of politics in controlling technology (not for the sake of political freedom as such but in order to ensure quality of life) or on technology as a key site of class struggle. In general, attention moved from technological rationality, as a philosophical or sociological phenomenon, to the politics of specific technologies, seen as part of a broader political struggle. For some like Daniel Bell, such developments called for a strengthened political sphere, a revitalized public culture and a more sophisticated intellectual technology to enable such inevitable consequences of technological development to be managed effectively within a democratic community. For others, a more radical critique of the whole basis of industrialism within capitalism was necessary if the politics of technology were to be understood and effective democratic action undertaken. I want to look at two classic examples of this latter approach, which is more relevant to our discussion in that it claims to place the technology itself at the centre of its analysis.

David Dickson

In 1974, David Dickson's *Alternative Technology and the Politics of Technical Change* was published. This book raised many of the issues that in the intervening years have come to dominate discussions about technology and politics. In it Dickson attempts to demonstrate that technology is political in that it reflects and embodies the prevailing power structures of capitalist society, and yet serves to conceal that fact through what he calls the "ideology of industrialism", an ideology which promotes the idea "that technology somehow possesses an internal objective logic that determines a unique progression from one stage of development to the next. Technology is therefore held to remain politically neutral in any particular situation, playing an entirely passive role with respect to issues of power and control".36

At the basis of Dickson's analysis is what he sees as a growing disillusionment with technological "progress". The opening sentences capture the tone; "Contemporary society is characterised by a growing distrust of technology. The many social benefits which technology has helped to bring about are increasingly counterbalanced by the social problems associated with its use". He argues that these problems result, not only from the uses to which it is put, but also from the nature of the technology itself which Dickson understands as "largely determined by social and political factors, of which technology can never be considered independent". There could be no stronger statement of the argument that "technology is political"; technology is "determined" by political factors and can "never" be considered independent of them. To assess its validity, however, we must be clear as to Dickson's understanding of technology and politics.

In relation to the first, Dickson moves away from the more macro, philosophical perspective of Ellul and Marcuse, of a totalitarian technological rationality, to narrow the focus to technology defined as "an abstract concept embracing both the tools and machines used by society, and the relations between them implied by their use". He makes no distinction between machines and tools, but wants to distinguish technology from "technique", understood as "the act of applying knowledge, whether directly or with the aid of a tool or machine - that is with the aid of an element of technology - to a particular task". However the phrase "and the relations between them implied by their use" renders the definition far broader than tools and machines. In fact, Dickson wants to interpret technology as a social institution ("in common with the legal or education system"), and further as a "language of social action", where the machine is word and technique, speech. Yet, this is somewhat confusing, for Dickson has already distinguished technique from technology. Here

37 Ibid., p.9.
38 Ibid., pp.9-10.
39 Ibid., p.16.
40 Ibid., p.17.
technology, machines and technique are all conflated. While the understanding of technology as a social language is suggestive, it is unhelpful in providing conceptual clarity to an argument about technology as politics, especially as his distinction between technique and "technology" suggests that the former, implicitly the application of technology, is to be understood as relatively autonomous, an understanding that Dickson elsewhere appears to refute.

What then is Dickson's understanding of "politics"? His argument is specifically addressed to the relationship between technology and politics within a capitalist framework: "(O)ne can only understand the nature of the technology developed in any society by relating it to the patterns of production, consumption and general social activity that maintain the interests of the politically dominant section of that society. Within capitalist societies, such interests are maintained by hierarchical patterns of social organization and accompanying authoritarian forms of social control. The validity of collective experience is denied; political power is consolidated in the hands of the few at the top, and fragmented between many at the bottom. The dominant modes of hierarchical organization and authoritarian control ... become incorporated in, and hence come to coincide with, the technology that is developed by capitalist societies". Politics here appears virtually impossible as a result of the effective domination of the "few at the top" and the denial of the validity of collective experience, the stuff of traditional political philosophy. The politics of technology then appears to refer primarily to the activity of the dominant class in manifesting their power in and through technological development. Politics becomes identified with exploitation. No

42 Dickson also combines them when referring to alternative technology. He writes; "This technology would embrace the tools, machines and techniques necessary to reflect and maintain non-oppressive and non-manipulative modes of social production...". (Italics added) (p.11.)

43 Dickson is in fact vague about the use/abuse model of the analysis of technology and indeed its neutrality. The separation of technology and the autonomy of application would suggest that there is a neutrality in technology. He tends to "hedge his bets". E.g. "I suggest how we must see technology itself as part of the political process - even though isolated machines may play a neutral role in this process - and hence the problems associated with it as resulting as much from the nature of technology as from the way in which it is used". (p.16)

44 Ibid., p.10-11.
reference here to political institutions nor to the activities of particular political or social movements. Where in this analysis is the opportunity for a more 'genuine' politics? Such a crude class analysis in fact renders the political marginal.45

Dickson writes that "perhaps the most direct manifestation of the political nature of technological innovation is military technology. This is specifically designed to provide the maximum control over opposing political forces".46 This would appear to imply a broader understanding of the 'political' than it having to do with power and social control, although Dickson does not elaborate on who are the 'opposing political forces'. While he would want to argue that all modern warfare can be understood as resulting from the imperialism inherent in capitalism, military technology pre-dates capitalism and can be understood as vital for the interests of the whole community and therefore understood as 'political' in a more classical sense. He doesn't then explain in what ways such technology is political. He finds it difficult because his main focus is on productive technologies and military technology does not fit this model. That there might be a 'military-industrial' complex profiting from and exploiting 'defence' concerns, does not of itself justify speaking so simplistically of military technology as 'the most direct manifestation of the political nature of technological innovation' under capitalism.

Dickson notes similar problems with industrialization in socialist societies but argues that these are due not to any movement of convergence or an end of ideology, but to their wholesale adoption of capitalist technology and the failure to recognise that the technology embodies capitalist principles. "A general belief in the functional interdependence model of technological development, and hence in the ideological neutrality of the technology itself, goes far to explaining the duplication in Russia and the socialist countries of Eastern Europe of the patterns of industrial development followed in the Western capitalist countries".47 While there may be some truth in this

46 Dickson, Alternative Technology, p.92.
47 Ibid., p.56.
argument, it does little to support Dickson's contention that technology is largely determined by political and social forces and is never independent of them. It could in fact be taken to suggest that the Eastern bloc countries were powerless to shape the technology in accordance with their political principles, that the technology did function independently of them, the very argument Dickson seeks to counter. The central issue raised here is what it is that is regarded as being 'shaped' or determined. Is there a neutral technique that can be shaped one way or another? Are there technical constraints within a technology that remain, irrespective of its ideological context? In other words, is ideological neutrality a possibility?

Although Dickson's analysis is ambivalent on this point, I believe that his argument suggests that technology can be ideologically neutral. However, he is particularly unclear in his discussion of the ideological nature of technology. He writes; "My general thesis is that technology plays a political role in society, a role intimately related to the distribution of power and the exercise of social control. It does this, I maintain, in both a material and an ideological fashion, implying that in both senses technological development is essentially a political process. At a material level, technology sustains and promotes the interests of the dominant social group of the society within which it is developed. At the same time, it acts in a symbolic manner to support and propagate the legitimating ideology of this society - the interpretation that is placed on the world and on the individual's position in it. Both material and ideological factors, I suggest, play an important part in determining the nature of technology itself".48

However this separation of the material and ideological aspects of technology is problematic. As we have seen, for Marcuse and Habermas, it is in the very material of technology that its ideological power resides. It would be difficult to see in what other way power and social control as embedded in technology could operate, in terms of Dickson's argument, if not through the ideological. His problems become evident when he writes that "Industrialization has undoubtedly succeeded in substantially raising the

48 Ibid., p.10.
health and standard of living of a large number of the world's population. Its major achievements in these directions cannot be denied. But it is important to distinguish the essential character of the process of industrialization from the ideology to which it has given rise. What the ideology disguises is the degree of political exploitation and manipulation that has, in almost all cases, accompanied the industrialization process and hence the development of contemporary technology.". Dickson wishes to distinguish the 'ideology' and the 'essence' of industrialization, but there is confusion here. What is the "essential character" of industrialization? Is it its undeniable achievements or the political exploitation involved? Then what is the particular ideology? Is it the achievements of industrialization? It can't be, for they are undeniable and undoubted! The ideological and the material cannot be so easily separated, and in doing so Dickson finds himself oscillating between a critique of industrialization in terms of its social and environmental consequences and a critique of the ideology of industrialization in terms of its political consequences. And he doesn't demonstrate their inherent connection.

This becomes clear when he discusses alternative technology. He asks "Is it possible to conceive of a technology that is based on non-authoritarian, non-hierarchical relationships?" He immediately proceeds to discuss numerous alternatives to current technology. The problem with this approach is that to suggest a different political approach does not necessarily guarantee fewer social and environmental problems; it may, but that is a different issue. And of course to suggest an alternative technology is not to guarantee a different political framework. He has to choose between whether he is committed to a non-authoritarian political structure or alternative technologies. One does not imply the other. In fact, it is conceivable that the latter could be implemented by non-participatory processes.

This brings us again to Dickson's understanding of politics and ideology. Dickson defines ideology as "a particular interpretation placed on phenomena or events that distorts their essential nature in the interest of political ends". Thus the political

49 Ibid., p.42-3.
50 Ibid., p.95.
51 Ibid., p.41.
virtually comes to equal the ideological, an argument common to capitalist society theorists that there is an 'essential nature', something approximating the truth, which can be theoretically arrived at under the right circumstances, and there is ideology, which distorts the truth. With ideology we are in the realm of politics. Expose the ideology, discover the truth and we get rid of politics! Truth and politics cannot co-exist. Thus Dickson says: "The political perspective indicated above helps us to make sense of the social problems associated with contemporary technology ...Every so often the ideological disguise slips and the contradictions it covers stand nakedly revealed." The suggestion here is that recognizing that technology is political in that it reflects capitalist interests helps explain the problems associated with modern technology; but does it? Furthermore, if the ideology of industrialism is as powerful as Dickson would have us believe, its "disguise" only slipping occasionally, why is it that consciousness of its problems is so widespread?

Dickson does not demonstrate that there is an intrinsic link between the power arrangements under capitalism and the problems of modern technology. Nevertheless, for the issue to be a political one, it is a political one even if there are no ill-effects of technology. If political issues surrounding technology have to do with "the distribution of power and the exercise of social control" then the possible negative environmental effects of technology, for example, make no difference to the fundamental understanding of that issue. The assumption that different control of technology will lead to better technology can be seen as essentially a focus on technology for what is at stake is not politics per se, but "better" technology. The approach is reduced to a form of industrial society theory where the issue is one of providing a politics that can control technology more effectively. It is almost a case of a technologically-required participatory system: politics organized to ensure a better environment.

However, politics is then reduced to a one-dimensional politics, where a particular consensus will be presumed to exist on the value of a particular approach to technology. But this value approach can in itself be seen to be ideological. Thus the

52 Ibid., p.94.
question of ideology cannot be seen to be counterposed to truth but to another ideology. Whereas Dickson argues that the shaping of alternative technology is a better technical solution to contemporary problems and an expression of a non-authoritarian politics, it could be argued that his approach is one which also uses an ideology of participation to "mask" what is essentially a different approach to technology. If his argument that technology cannot be independent of political factors is correct, then alternative technology can only result from an alternative politics with its own ideological commitments. The argument, for example, that alternative technology might be used as a lever to change social relations is not one that Dickson can entertain. For him, the politics determines the technology, not the technology the politics. Yet, his argument has as its end better solutions to technological problems. In fact, Dickson provides far less justification for political change than he does for technical change. Dickson is perhaps right when he suggests that truth and politics cannot co-exist, for as soon as a group claims truth as opposed to an awareness of the ideological nature of all truth claims, then politics is in danger and a new alternative totalitarianism threatens.

Thus, Dickson's understanding that technology is political because it serves to legitimate the power of the dominant class and ensure social control is inadequate. His reference to "the dominant class", virtually a crude elite thesis, obscures the variety and complexity of power and influence within society. Decisions about technological innovation for example cannot be conceived as so one-dimensional. While Dickson recognizes that "any explanation requires a political analysis of the contemporary State", he doesn't attempt it. This is unfortunate for such an analysis may have exposed the weakness in his argument, which is to reduce the political to class struggle (or more accurately, capitalist domination) and to ignore the reality of institutional and other political arrangements. His primary historical examples are drawn from the nineteenth and early twentieth centuries when state intervention in the economy was minimal. The reality of state capitalism today suggests that his reference to the dominant class is too
imprecise to be of any real value in understanding the more complex politics of technological development.53

It is questionable too how far an adequate understanding of the politics of modern technology can be drawn from a model based on technology as industry and linked to "the patterns of production, consumption and general social activity" that maintain the interests of the dominant class. It makes it difficult to draw out the implications of his analysis for such different non-industrial technologies as telecommunications or biotechnology.54 Furthermore, Dickson's primary emphasis is on politics at the point of production with technology being understood as a means of gaining and legitimating control. However, technology is increasingly being understood in terms of its role in consumption and distribution, particularly its ideological role. In this way, technology can, in fact, be seen to be progressive in that its legitimacy depends on its ability to deliver - and this means in social as well as material goods.55 However, Dickson doesn't address this issue. It is also interesting to note that whereas most of the technologies implicated in Dickson's critique of industrialization are essentially production technologies, and as such the traditional site of capitalist/worker confrontation, most of his suggested alternative technologies are in other realms, such as housing, transport and medicine, where class conflict has not been as evident.

Dickson's argument is valuable in challenging the assumptions of a technological determinism which ignores the social and political dynamics involved in all technological change, and his book was a pioneering work in this regard. However, his perception of politics within a capitalist framework, understood essentially as domination, reduces the political to the ideological, the processes by which that domination is reproduced. His essentialist approach to the `stripping away of the veil'

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53 Cf. Gouldner,A., The Dialectic of Ideology and Technology (Macmillan, London 1976) who, within a marxist perspective, prefers to speak of "the several dominant strata" - the 'ruling class', the "administrative class" and the "political class" and the continual tensions between them. Cf. esp. Chs. 11 and 12.
54 Cf. Badham, op.cit, p.110f.
of ideology to discover the 'truth' of technology, as contained in his programme of alternative technology, gives primacy to the 'solution to problems' rather to the processes of politics. With his devaluation of political institutions, all Dickson can call for is "a simultaneous change...in both political and technological consciousness" without any real programme as to how this might be achieved.56

In a very perceptive essay, Langdon Winner attributes the adoption of alternative technology programmes to a reaction to the failure of radical politics in the late 1960's. In a memorable turn of phrase, he writes, "Stemming from the decline of radical politics and from an obvious next step in the critique of technological society, its true purpose was not to produce energy from renewable sources, but to generate the hope of social renewal from the winds of despair".57 While Dickson's work is much more aware of the realities of the politics of technology than many involved in alternative technology, there is nevertheless an ambivalence about the political that makes Winner's observation relevant to his work.

**Harry Braverman**

In the same year as Dickson's *Alternative Technology*, Harry Braverman published *Labor and Monopoly Capital*, subtitled "The Degradation of Work in the Twentieth Century". This work has become a classic in the radical analysis of technology and the labour process. Like Dickson, Braverman argues that within a monopoly capitalist framework, the development and introduction of technology serves to reinforce the control of capital over labour, particularly through the strategy of deskilling.

While Braverman does not discuss the 'politics' of technology explicitly, his thesis has been very influential in discussions about the social and political shaping of technology, and is therefore worthy of examination. Of particular interest is his

56 Ibid, p.95.
interpretation of the role of technology within society and his discussion on the nature of flexibility in the development of technologies.

Following Marx, Braverman reflects somewhat of an ambivalence towards science and technology. He believes "that the transformation of the labor processes from their bases in tradition to their basis in science is not only inevitable but necessary for the progress of the human race and for its emancipation from hunger and other forms of need".58 Indeed he argues that the Marxist view "is hostile not to science and technology as such, but only to the manner in which these are used as weapons of domination in the creation, perpetuation, and deepening of a gulf between class in society."59 Thus there is a science and technology "as such" which is in itself emancipatory and progressive, and there is a science and technology which is "used" to dominate and exploit. We have already had occasion to notice this ambivalence in the analyses of Marcuse and Dickson as to whether the technology itself is political or whether its particular application reflects the politics. And again, we have to ask, what is this "essential" technology and how does it differ qualitatively from that which is used for "domination"?

For Braverman, the necessary emancipatory context is that in which "for the worker, craft satisfaction that arises from conscious and purposeful mastery of the labor process will be combined with the marvels of science and the ingenuity of engineering, an age in which everyone will be able to benefit, in some degree, from this combination".60 However, placing the mastery of the labour process on one side and the employment of science and engineering on the other implies that there is a separation of the two, that science and engineering are neutral and that their application will be determined by the demands of the labour process, a use that will automatically ensure craft satisfaction. Braverman does not make clear how far the very nature of science and engineering are affected by the labour process involving engineers and

59 Ibid.
60 Ibid., p.7.
scientists. Certainly his use of "marvels" and "ingenuity" suggests that these disciplines have significant social autonomy.

What does Braverman understand technology to be? There is little complexity in his definition; it is for all intents and purposes synonymous with 'machinery'. As was noted above, Braverman does not discuss politics as such. Consistent with his marxist perspective, his central focus is not technology and politics, but technology and society. He argues that the problem of understanding the nature of technology within capitalism "can be fruitfully attacked only by way of concrete and historically specific analysis of technology and machinery on the one side and social relations on the other, and of the manner in which these two come together in existing societies".61 Braverman's emphasis on historical case studies here serves as a correction to the more philosophical critiques that we have discussed earlier.62 However, where Dickson argued that technology had no independence of social and political factors, Braverman here argues for a conceptual separation of technology and society that is difficult for his developing argument to sustain.

This confusion becomes evident when Braverman discusses the ways in which machinery might be classified. "Machines may be defined, classified, and studied in their evolution according to any criteria one wishes to select: their motive power, their complexity, their use of physical principles etc. But one is forced at the outset to choose between two essentially different modes of thought. The first is the engineering approach, which views technology primarily in its internal connections and tends to define the machine in relation to itself, as a technical fact. The other is the social approach, which views technology in its connection with humanity and defines the machine in relation to human labor, and as a social artifact".63 Braverman appears to accept that either choice has validity depending on one's purpose, and that each analysis

61 Ibid., p.17.
62 Ironically, however, Braverman has been criticised for his failure to provide the empirical material necessary to support his deskilling thesis. Wilkinson argues that it is impossible to generalize about the effects of new technology on the nature of work. Cf. Wilkinson, B., The Shopfloor Politics of New Technology (Heinemann, London, 1983).
63 Braverman, op.cit., p.184.
can be relatively self-contained. However, it is obvious that Braverman prefers to adopt the social approach and understand technology as a social artifact. But, if that is so, how can he speak of a "technology-as-such"? Does Braverman want to hold that there are legitimate "technical" issues involved and choose to ignore them? Or does he want to claim that all technologies are ultimately "social artifacts"?

Braverman appears to want to hold onto the validity of the central emancipatory role that Marx saw for technology in a socialist society. For him, technology in capitalist society has been distorted by capitalist relations; thus he needs to maintain a conceptual separation between "technical technology" and "social technology". So he writes, "The analysis of the machine by means of purely technical characteristics, such as its power source, the scientific principles it employs, etc., may yield much information of value to engineers, but this study of the machine "in itself" has little direct value for a comprehension of its social role". There appears to be an underlying assumption that technologies under capitalism are social artifacts, whereas in the new order, technology will return to being "purely technical", "machinery-in-itself".

The history of technology is for Braverman the story of progressive deskilling, a process by which the potential for control over the constraints of the labour process which technology possesses and the associated benefits promised for humankind have been subverted by capitalism. "The mass of humanity is subjected to the labor process for the purposes of those who control it rather than for any general purposes of "humanity" as such ... Thus in addition to its technical function of increasing the productivity of labor - which would mark machinery under any social system - machinery also has in the capitalist system the function of divesting the mass of workers of their control over their own labor".

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64 Ibid., p.186.  
65 Ibid., p.193. There are suggestions here of Habermas's two spheres of rationalization - work and interaction, the purposive-rational and the communicative. As we have noted (n.33), Habermas has been criticized for conceptualizing the purposive-rational as separate from the practical and therefore politically neutral; a "species-project". Braverman is open to the same criticism. Cf. Habermas, op.cit., pp.91-2.
However, the irony for Braverman is that this control, while being social, results from technical possibilities within the technology itself. So he can write that "it is in the nature of machinery, and a corollary of technical development, that the control over the machine need no longer be vested in its immediate operator. This possibility is seized upon by the capitalist mode of production and utilized to the fullest extent."66

The question however remains how far it is possible for technology to be so shaped as to serve the interests of control. Is technology infinitely malleable in terms of its applications? Is it possible for there to be no technical possibility to exploit? And is it possible for the technical and the social to oppose each other? If so, then technology must be understood as having a reality independent of its final embodiment in a machine, for the machine could have been different. Braverman acknowledges this but is vague on how he understands the process; "Considered only in their physical aspect, machines are nothing but developed instruments of production whereby humankind increases the effectiveness of labor ...But within the framework of capitalist social relations, all this is reversed. The means of production become the property of the capitalist ...The purely physical relationship assumes the social form given it by capitalism and itself begins to be altered".67 But what does this mean? How does the "social form" differ from the "physical aspect"?

Braverman's thesis has been criticized by a number of authors, not least for his failure to take into account levels of resistance to capitalist activity within industry as well as capitalist motivations other than that of control.68 At the same time, his failure to discuss the political context or to suggest proposals for change is understandable in terms of his marxist perspective.69 His significance for our discussion however is in

66 Ibid., p.194.
67 Ibid., p.227. In this connection, Braverman attacks Ellul for attributing power to the machine rather than to the social milieu of capitalism in which the technology was embedded. He criticizes "Ellul's artificial view ... which is constructed on every level to exonerate capitalism; perhaps this accounts for its being so fashionable in liberal circles". p.229n.
68 e.g. T.Elger, "Valorization and Deskilling: A Critique of Braverman", Capital and Class (No.7, Spring 1979)
69 Braverman does discuss the state briefly but in conventional marxist terms of reducing it to a tool of capital. This is not particularly helpful in assessing the politics of the particular situation (pp.284ff) He also discusses proposals for worker control but
the problems he has with the flexibility of technology and the claims to "social shaping". If technology is said to play a political role in society, then the nature of the technical and its relationship to the social or political must be clarified. In conceptually separating them, affirming the validity of the autonomy of the technical and the social, Braverman does not provide us with the necessary tools.

This survey has highlighted a number of problems in attempting to develop an understanding of what is meant when it is argued that technology is political. First, it is clear that what constitutes "politics" is problematic. For some, "politics" is restricted to those activities to do with the state rather than any and every activity to do with power. For those committed to a more radical critique of capitalist society, however, the concept of "politics" expands to cover the exercise of class power in any of its particular social manifestations. Furthermore, the particular interpretation adopted will determine whether the "political" is understood descriptively or pejoratively, as the focal point of public life or as a conspiracy expressive of capitalism.

Second, the "politics of technology" can refer to the nature of choice and control in the shaping of technology, or alternatively to the loss of choice and control to technology. As we have seen, many critics tend to oscillate between the two perspectives; the key issue here comes then to be the definition of "technology".

For those who are concerned with the decline of the political and the loss of control in the "technological society", technology is generally understood to be either a "spirit" of technical rationality or the constellations of technical systems. For those for whom technology embodies the power and nature of the structural forces which shape it, technology tends to be understood in terms of artifacts, apparatus and techniques. The key problem for those who believe that under capitalism technologies have been dismissed most proposals as "delusory". Real worker control "has as its prerequisite the demystifying of technology and the reorganization of the mode of production". (p.445n) How far Braverman's thesis contributes to such demystification is questionable.
constructed to deskill and oppress, is to demonstrate the inherent flexibility of these technologies and at the same time, the existence of an "essential" technology which is ideologically neutral. The question as to how far technical constraints determine the choices available for technological development is a central one, and one about which there appear to be a good number of unsupported assumptions.

As Winner draws on the insights of these authors, many of these problems become his too. As has been suggested, his analysis provides somewhat of a synthesis of the perspectives discussed in this chapter. His concentration on technology itself owes much to Ellul and Marcuse, but he concentrates more explicitly on what he understands to be the political ramifications of technology. On the other hand, in his later work, his perspective appears to come closer to that of Dickson and Braverman, and yet to go further than them, with his claim that technologies can be understood as political phenomena in their own right. For him, only in this way is it possible to justify adopting technology itself as a focus of political study. However, it will be argued that this synthesis renders his analysis problematic. Winner's key difficulty is that he is explicitly committed to a position which wants to assert the primacy of politics as an activity constitutive of public life, while at the same time wanting to argue that technology itself has politics and has in fact supplanted the political in contemporary society.
Chapter Two

Langdon Winner I: Autonomous Technology

Langdon Winner came to prominence in the field of science and technology studies in 1977 with the publication of *Autonomous Technology*. As its sub-title "Technics-out-of-Control as a Theme in Political Thought" suggests, this work examines the relationship between technology and political theory, more specifically the question as to whether it is possible to speak of the possibility of politics in an age of mass technological systems. While his argument draws heavily on Ellul and Marcuse, he claims that they are inclined to overstate the case in treating technology as a "univocal phenomenon". This chapter will argue that Winner's analysis in *Autonomous Technology* in fact suffers from the same problem. His understanding of technology is so broad as to render a consideration of politics almost impossible. In particular, it is difficult to see how his theory of technological politics differs to any significant degree from their analyses of the loss of human autonomy in the face of widespread technological imperatives.

In reaction to analyses, like those of Dickson and Braverman, which focus on the determining nature of the political and social relations which surround technological development and which thereby imply the possibility of a different technology within a different political context, Winner argues that no conventional political theory, marxist or liberal, is adequate in addressing the problem of technology for contemporary political life. These theories traditionally posit the existence of particular political groups or institutions which control technological developments; but modern experience demonstrates such an understanding to be patently false. "What we lack is our bearings. The contemporary experience of things technological has repeatedly confounded our vision, our expectations, and our capacity to make intelligent judgements. Categories, arguments, conclusions, and choices that would have been

entirely obvious in earlier times are obvious no longer". What Winner attempts is an analysis which takes the constraints of technology as the key problem for modern political theory. However, as will be seen, Winner's understanding of what constitutes both technology and traditional political theory is problematic and as a result tends to contribute to the very reality he is describing - the submerging of the political in the technological. Here, as for Ellul and Marcuse, technology is political because it eliminates the need for politics.

While it is not the intention of this chapter to make a full analysis of Winner's argument in *Autonomous Technology*, there are a number of key issues that are addressed there, an understanding of which are essential for an adequate analysis of his later, more developed work. These issues centre particularly on his understanding of the very terms "technology" and "politics" and the nature and development of his "theory of technological politics".

**Winner's understanding of "technology"**

Winner begins by justifying his decision to focus on technology as the central problem for modern political theory. He argues that "in one disguise or another, technology has been a central theme in political thought for the past two hundred years. Although the definition of the issue of concern has again and again shifted, it has been clear during this time that there is something in the nature of modern technology thinkers can ill afford to ignore". He cites as examples of this "disguise" of technology issues such as the industrial revolution, the rise of industrial society, the

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2 Ibid., pp.7-8.
3 It is important here to note the difficulty in *Autonomous Technology* of knowing when Winner speaks with his own voice or that of the authors he is surveying. Certainly, the theory of technological politics is his term for a central theme in the literature he surveys in his book; as will be seen below, in his later work, it appears to become his own theoretical formulation.
4 Ibid., p.2.
working class discontent and alienation. However, for Winner, "technology itself has seldom been a primary subject matter for social or political inquiries".  

Now, the phrase "technology itself" is extremely significant for the understanding of his argument. He suggests that technology itself as "subject matter" is a focus that has been neglected in studies of industrial society, the emergence of elites, alienation etc. even though "technology has been a central theme". What then is the distinction that Winner wishes to make here between "central theme" and "primary subject matter"? It clearly hinges on the meaning of the phrase "technology itself". In fact, it is on the validity of his claims to be taking "technology itself" seriously, and as central to his analysis, that the distinctiveness of his contribution would appear to depend.

For Winner, contemporary debates which do centre on technology itself tend to interpret it in terms of economics, economic history or the technical sphere alone. As such they are inadequate. They reflect a truncated understanding of the role of technology in modern society, an understanding which ignores the fact that technology's "structures, processes, and alterations enter into and become part of the structures, processes and alterations of human consciousness, society and politics".  

Here Winner's argument suggests a broad cultural perspective on technology that, following Ellul and Marcuse, appears to view technology as a technical rationality totalitarian in its implications for the human personality and for society as a whole. This is a surprisingly broad understanding of technology in the light of his claims to be narrowing the focus from industrial society, alienation etc. to technology itself. Where is the technology itself in this broad understanding? As there is clearly some suggestion of conceptual separation between, for example, alienation and technology itself, how is this maintained in the face of such an understanding of technology as the alteration of consciousness?

5 Ibid.
6 Ibid., p.6.
Surprisingly, Winner does not explicitly deal with this question. He argues that he is not so much concerned with definitional precision as with the ways in which the meaning of the word "technology" has changed and broadened over the last century. While recognizing that "technology" is in danger of coming to mean everything, and therefore nothing, he nevertheless finds more interest for an understanding of the current dilemmas surrounding technology in noting the "chaotic" uses of the word rather than in attempting a formal definition. "For those who would listen to language rather than perform elaborate operations on it, this annoying symptom will not be taken as an occasion to impose an arbitrary definition. It should be seen as an interesting sign".7

However, Winner himself argues that "technology itself has seldom been a primary subject matter" for political inquiry. The use of such a phrase makes claims to some sort of exclusiveness in concept, the implication being that there is an "essential technology" and that there are categories that are not to be considered "technology" or, if so, then only peripherally. It is extremely important that we be clear about what it is that distinguishes discussion of "technology itself" from discussion about such things as the rise of industrial society, the misery of the working class or alienation. Until that is clear, there seems little of distinctiveness in Winner's argument.

Recognizing that some conceptual clarity is required, Winner outlines a four-fold distinction which forms the basis of his discussion of technology:

i) apparatus - "tools, instruments, machines, appliances, weapons, gadgets - which are used in accomplishing a wide variety of tasks...the physical devices of technical performance"

ii) technique - "skills, methods, procedures, routines - that people engage in to accomplish tasks ... purposive, rational, step-by-step way of doing things"

iii) organization - "some(but not all) varieties of social organization - factories, workshops, bureaucracies, armies, research and development teams...all varieties of technical(rational-productive) social arrangements"

7 Ibid., p.10.
iv) network - "Those large-scale systems that combine people and apparatus linked across great distances".  

Now these may be helpful distinctions in heightening awareness of the variety of dimensions in a broad understanding of technology, but they are of little value in enabling us to determine with any clarity what is understood by "technology itself", for either all four categories are to be included in any discussion of technology, which then confirms Winner's own criticism that technology comes to mean everything, and therefore nothing, or else they are to be examined individually, in which case no generalizations about technology are possible.

This is particularly true when attempting to develop an understanding of the political nature of technology. So, for example, the categories of "organization" and "network" are problematic whichever level of analysis is undertaken. If one incorporates into the understanding of "technology" the very social arrangements in which the "apparatus" is embedded, then there is a great deal of difference in the meaning of such a concept as "autonomous technology" than if only the apparatus is meant. Even more important is the implication of this distinction that the social relationships of a technology are to be understood as essentially "technical" relationships rather than as social or political. Is "industry" then to be understood as a component of "technology itself"? Are social constructions such as "factory", "bureaucracy" and "research-teams" to be seen as "technology itself"? If so, then it is difficult to see the distinctiveness of Winner's contribution to the technology debate; certainly his claim to be narrowing the perspective would appear to be spurious, for, as we have seen, an analysis essentially identifying technology with "the factory" and "industry" had already been attempted by Dickson. If, on the other hand, "organization" and "network" are analysed as categories distinct from "apparatus" and "technique", then it is difficult to see what is distinctive about "technology itself" for

8 Ibid., pp.11-12.
social and political analysis, for the social and political organization of a technical environment will then be understood as being distinct and separate from the hardware.

What one is left with, then, common to these "distinctions", is simply the word "technology". However, this is a problem when one tries to develop an analysis of the politics of technology that will be applicable to such diverse "technologies" as biotechnology, manufacturing technologies and communications. What is it that they have in common, what is it that enables us to call them "technology"? Generally, what most political analyses of these technologies have in common are assumptions about particular power elites which develop and apply the technology for their own interests. Ironically, however, this is the very type of analysis which Winner asserts he is trying to balance by reference to "technology itself". Yet his own use of the term "technology" doesn't enable us to identify the "technology itself" in these examples in a way that would enable us to make any useful theoretical generalizations. What we are left with is either an analysis of elites, which virtually ignores the technology, or a micro-analysis of the technology, which has little value for a broader understanding of the politics of technology generally. It is probably for these reasons that Winner in fact rarely uses these distinctions in the body of his argument; the key phrases which recur are "technical-systems", "technics" or "technology". In fact, Winner even sub-titled his book, "Technics-out-of-Control as a Theme in Political Thought", "technics" rather than "technology". It is also probably the reason that his later, more refined argument asks "Do artifacts have politics?" This is a key point and I will return to it below.

Winner's definition of "politics"

The second issue of definition in Winner's analysis is the meaning of politics and political theory. As a result of his determination to follow Ellul and Marcuse in providing a comprehensive analysis of the framework of technology, Winner tends to use "political", "social" and "cultural" almost interchangeably. It is in fact interesting that although his book's subtitle refers to "political thought", most of the literature he
surveys comes, in fact, from social scientists, philosophers or novelists. While this of course is quite valid, it does show that his understanding of "political thought" is quite broad. Nevertheless, as his stated concern is with the implications of technology for political theory, it needs to be clarified what he means by "politics" and "political theory", as opposed, for example, to "culture" and "society".

Interestingly, Winner's understanding of politics is no more precise in terms of definition than is his treatment of "technology". This is not surprising considering that "politics" is such a contested concept.\(^9\) We have already noticed the range of interpretations in the previous chapter. However, while lack of precision may be understandable, lack of consistency is less so. As we will see, Winner operates primarily within an American political perspective and constantly wants to reduce politics to democratic politics. Furthermore, he tends to conflate politics and political theory with the result that his discussion of the practice of politics in relation to technology and questions of political theory in relation to technology become unhelpfully intertwined.

Winner's discussion of the implications of technology for politics begins with the acknowledgement that the understanding that technology is political is not a radically new idea but in fact one that is widely held. "Technological change is now widely recognized as political insofar as its effects are ubiquitous, touch everyone in society, and can, therefore, be understood as "public" in a distinctly modern sense. Understood in this fashion, political questions concerning technology abound at every turn".\(^10\) Politics then can be understood in part as being constituted by a shared and "public" experience of a particular phenomenon. Technology, then, is understood to be political because its effects are experienced by all sections of society within a public context and as such enter the political arena. However, for Winner, this widespread understanding of the "political" significance of technology is not adequate for a comprehensive understanding of the implications of technology for politics for it

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9 Cf. the discussion of the term "essentially contested concept" in Connolly, W.E., The Terms of Political Discourse (Martin Robertson, Oxford, 1983), Ch.1.
10 Ibid., p.135.
narrows the conception of the political to a mere preoccupation with "effects" and post-facto evaluation and experience.

Of vastly greater significance for Winner is the fact that science and technology are progressively usurping the role that he understands was traditionally filled by politics. Technology is political in that both technology and politics are concerned essentially with the exercise of power. "The concern of science and technology with the possibilities of control have often found expression in terms which closely parallel the language of politics. This is perhaps not surprising if one recalls that both politics and technics have as their central focus the sources and exercise of power." 11

Politics and technics then come to be seen as competitors for power and control within a society. The difference for Winner is that technics brings with it a particular model of power: - that of "master-slave". Other possible alternative political responses are rendered invalid by the triumph of technics. "Our thinking about technology, however seems inextricably bound to a single conception of the manner in which power is used - the style of absolute mastery, the despotic, one way control of the master over the slave. Other notions, central to the historical discussion of political power - membership, participation, and authority founded on consent - seem to have no relevance in this sphere. In our traditional ways of thinking, the concept of mastery and the master-slave metaphor are the dominant ways of describing man's relationship to nature, as well as to the implements of technology".12

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11 Ibid., p.20. It is important, at this point, to recognize that this reification of science and technology as "having power" is part of Winner's rhetorical method. His discussion of autonomous technology is not a crude anthropomorphism. "I would be the first to admit that the approach I have chosen is one sided and that it excludes much that is important in political and social life. I would also allow that there are some very real dangers in the view that technology and science are autonomous. ... my justification in taking the present approach is that there are some significant questions here that the more obvious ways of talking about politics and technology have been prone to ignore. One way of raising these issues from concealment is to begin by looking at them in their most vivid outlines." (p.18) While accepting that Winner is using the broad brush however, we should nevertheless be aware of those realities which may be concealed by such an approach.

12 Ibid., p.20.
Winner appears to be suggesting that structures of thinking about technology in such a one-dimensional framework as "master-slave" become the structures for thinking about politics. Habermas suggests something similar when he argues that "we are no longer able to distinguish between practical and technical power ... therefore a peculiar danger arises when the process of scientification transcends the limit of technical questions, without, however, departing from the level of reflection of a rationality confined to the technological horizon".13 Faced with the power of technical possibilities, then, traditional political theory, concerned with questions of participation and consensus, is rendered irrelevant. But how does Winner understand this process? Does he see it to be essentially a function of ideology, as Habermas and Marcuse do? While his language suggests so, his argument does not.

Winner would want to attribute these developments to technology, and yet, in the language of the passage above, it is not "technology" that imposes this one-dimensional form of control on society, but that "our thinking", (as well as "notions" and "conceptions") about technology is bound to that "metaphor". What seems to be a focus on "technology itself" in fact becomes for Winner an issue of "thinking about technology". If this were pursued, important questions might be raised about the sources of "our thinking", the ideology and the power relations involved in the shaping of social and political thought. It is not clear, in fact, whether the shaping of "our" thinking is an example of the inherently consciousness-structuring processes of technology or the result of specific political and social arrangements. Certainly Winner's use of "our" serves to obscure the political. He refers, for example, to "our thinking about technology...". Who is the "our"? The implication is that there is an unproblematic, generalized thinking about technology within society that transcends specific commitments, interests and perspectives or particular inequalities in power and influence. If this were true, such a consensus would ironically deny the very necessity of politics. At the same time, he fails to explore the ideological nature of this assumed

13 Habermas, J., Theory and Practice (Heinemann, London 1974), p.255. In Habermas's usage, "practical" is synonymous with "political".
universal "consensus". As with Ellul and Marcuse, the essential politics centres on the tension between not particular interest groups, but the system and the democratic "us".

Yet, Winner is not blind to the existence of competing interests within the political community. While his understanding of politics is one essentially emphasising public participation and consensus, his understanding of power appears be quite different, involving a more radical awareness of the role of existing power structures and the reality of conflict within industrialized society. Nevertheless, it is not clear that he regards the exercise of such power as "political" in quite the same way as public participation and consensus.

For example, early in the book, Winner refers to the anticipated response to his analysis of those who explicitly benefit from technological change. "Persons who feel sufficiently empowered by the technological systems of our time will find such observations of little help ... My hope is that there will be at least a few to whom the theme will make sense and who will want to consider it". Winner here clearly recognizes that there are groups in society who have power in relation to technological change and who will thus not share his criticisms. Furthermore, he suggests that those who do understand his arguments may then be in a position to do something about them. This surely implies that potential conflict, interest-dominated activity and inequality of power are still important elements in any realistic assessment of politics in an age of technics. As has been suggested, what Winner appears to be really addressing is not so much the decline of politics in technological society, but the decline of democratic politics.

Winner appears to hold that the master-slave metaphor of technics has become the dominant metaphor of political life in a technological age, and that, as a result, democratic principles are undermined. While Winner does not elaborate on the ways in which the metaphor is actually reflected in the technology itself, it could be argued that his own understanding of politics and power essentially reflects that very metaphor.

This particular model of power focusses very much on control. Central to Winner's

whole argument is the question of the possibilities for the control of technology in a
democratic environment; it is a search for limits. The master-slave metaphor then can be
said to be very apposite in describing his position. The master, the sovereign, is to be
"the people", "us".

The problem with technology then can be seen to be not so much its metaphor
of power, but its challenge to the sovereignty of "the people". As long as technology is
"slave" to the "master", the "people", it would seem that Winner would be content.
Why then he should see the master-slave metaphor, as it is embodied in technics, as a
threat to democratic politics is not clear. The central issue for Winner is what he
understands to be the contemporary struggle between technics and (democratic) politics
for sovereignty over the structure of social life. It is interesting to note that Bernard
Crick argues that "not merely the concept of `sovereignty of the people' is un- or even
anti-political, but also the whole doctrine of sovereignty".15 This raises questions
about Winner's understanding of the nature of democratic politics, an issue to which I
will return below.

Central to Winner's thesis about "technics-out-of-control" is technological
determinism, a concept which forms the basis of his theory of technological politics. It
is here that the problems raised by the ambiguity in Winner's understanding of
technology and politics become apparent.

Technological Determinism

Winner argues that there are characteristics of modern technological systems
that justify him claiming that they are "out-of-control". These characteristics include,
among others, the momentum of technological change that has become equated with
modernization, the unanticipated consequences of particular "chosen" technologies and
those technological imperatives that demand the restructuring of their particular
environments. In each of these cases, the technological developments almost take on a

life of their own as a result, Winner seems to believe, of political inaction. "Each case combines an objective state of affairs - an actual process in the world - with a predisposition of men in society to allow the change to continue with little intervention. Together, the process and the disposition create what can be called technological dynamism, a forceful movement in history which continues largely without conscious human guidance. This is not to say that changes in technology and society are never chosen, directed or controlled...The point is that there are important categories of change that simply do not make sense under the ideas of 'chosen' or 'voluntary'."  

Winner then attributes technological dynamism to a combination of the technical developments and a "predisposition of men (sic)" to allow them. What results is a technological system which severely limits, and in fact renders meaningless, claims about the possibility of political choice and control.

How valid is such an argument and how far does such a concept contribute to a more sophisticated understanding of the political nature of technology? In the first place, Winner raises the issue of the human "predisposition" to not intervene in technological change as though it was some kind of anthropological fact. What is this predisposition? Is it psychological, biological or social? Where is the evidence for such a claim? If it is based on political observation, then questions need to be asked about the nature and source of this situation, in particular the relationship between technology and ideology. Secondly, with his reference to "human" control, Winner continues to suggest a universal consciousness about technology which leads him to ignore the dynamics of real politics. As he has acknowledged, some groups are empowered by technological change. Therefore, questions need to be asked about why some groups who may have real concerns about certain technological developments have not the power to be able to gain a hearing or influence developments, and why, in particular, the various democratic institutions are failing to provide the necessary scrutiny.

How useful then is Winner's discussion of technological determinism as a means of developing a more adequate understanding of the relationship between

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16 Ibid, p.105-6.
technology and politics. Winner draws heavily on Marx, not so much his analysis of the inherent contradictions of capitalism, but his insights concerning the link between the productive forces of a society and the development of modes of life and consciousness. "Marx calls our attention to the fact that each generation is strongly *conditioned* or informed by a technological inheritance that it in no sense 'chose'. While it is always possible that a particular generation might wish to review this inheritance, scrutinize the patterns that technics gives to life, and make new choices on the basis of this critique, such a procedure is not in fact something that occurs to anyone to do. In the main, the socio-technical context into which we are born must simply be accepted as given". However, Winner takes Marx too far here in suggesting the result of such a situation is an enforced passive acceptance. Furthermore, it could be argued that he sacrifices a political analysis in favour of a cultural analysis, a confusion noted previously.

There are two different points to be made here. No-one would quibble with the argument that social and technical development is historical, that human beings are born into existing socio-technical frameworks and that such frameworks constrain the range of possible decisions that can be made within them. In questioning Winner's apolitical determinism, I am not making claims to complete metaphysical autonomy or technical mastery. There are significant social, economic, technical and political limitations that constrain action. The issue becomes one of the extent and nature of those constraints. In a socio-technical framework, it needs to be determined how far the social and political arrangements are "given" or constrained by technical considerations, and how far they are politically and ideologically constructed and reproduced. However, Winner wants to go further than this and claim that such frameworks, *in and of themselves*, prevent review, scrutiny and modification. Winner is not claiming such action is in theory impossible but rather that it is rendered impossible by the socio-technical framework itself. He fails to explain how this process operates. This is the totalitarian technical rationality of Marcuse in which human autonomy, and therefore politics, is

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impossible at every level. Moreover, it is again not clear here in what way "technology itself" is the focus. As was noted above, assertions of the shaping of consciousness by "technology" are not particularly helpful in providing a subject for political analysis. It would in fact render such analysis impossible. As was the case with Marcuse, it is difficult to see how Winner was able to develop such a critical perspective and scrutinize technics so closely if such a totalitarian rationality was indeed a reality.

However, a little further in his discussion, Winner appears to change direction and admit that human actors, such as inventors, entrepreneurs, and managers, do indeed make significant decisions. He uses Aristotle Onassis as an example. "Aristotle Onassis did decide to build a fleet of supertankers. Those who designed and built the ships made choices about their physical characteristics and the social organization of work on board".18 Here we are on firmer ground, so to speak. We have an artifact - a ship, a more concrete example of "technology itself". While Winner admits that it is the case that only a few have the power to make those decisions that affect the many, he argues that what is even more significant is that results occur which no-one chooses. "For example, when a badly constructed supertanker breaks up on the shoals, spreading oil on the beaches, we must understand the event has something to do with decades of technical and social change that created the circumstances for the calamity. But does it make any sense to say, as the voluntarist argument suggests that we "chose" the design of the ships, the form of Onassis's corporation, the social and political conditions under which the boats sail, or the eventual crack-up? When we think back on it, we do not remember being consulted".19 Here reappears the confusion in Winner's argument over the nature of "politics". He sets up the voluntarist straw argument to easily knock it down. No one would want to deny that there are unforeseen consequences to decisions about technology. But that is not an factor unique to technology nor technical decisions. Furthermore, to argue for human choice and control in technological decisions is not to argue that "we" chose, but that "someone" chose.

18 Ibid., p.85.
19 Ibid.
Winner's analysis of the exercise of political power comes down to "we were not consulted", that there was no "democratic" choice.

This view represents a version of the "black-box" approach to existing political and technical reality. It abstracts the technology from its historical context. The implication is that as there was no obvious democratic decision-making in the developments surrounding the supertanker, then politics collapsed before the technological imperatives involved in the task. However as we have seen, technology-out-of-democratic-control is not the same as technology-out-of-control. In the case of the supertanker, decisions about quality control, the size of vessels, the primacy of profit, the nature of energy supplies, the power of big business and the nature of risk were made and are being made continually within the context of social and political life. While it may be true that these were decisions made progressively over previous decades, Winner nowhere demonstrates that the developments were "determined" by technological imperatives. Such considerations are essentially political rather than technical, and, as such, they are potentially open to revision and renegotiation.

Technological determinism as a concept has limited value for exploring the relationship of technology and politics. To speak of constraints is one thing; to speak of determination is another. Politics has always operated within constraints, physical and social. Furthermore, when technological determinism is narrowed down to specific cases of technological development, it tends to dissipate as an explanation before more defined examples of political decision-making and choice, not necessarily democratic but choice nevertheless. The problem is Winner's oscillation and ambiguity in his understanding of technology and politics. Moreover, in the politics of technology, as Dickson has noted, technological determinism as an explanatory concept can itself function politically by obscuring those forces whose interests are being furthered by particular technological developments and thereby serve to render democratic politics more difficult to achieve.
Technocracy and "technological politics"

Winner's answer to the failure of traditional political theory to adequately account for the contemporary experience of technology is his theory of technological politics. However, his adoption of this theory has a number of problems. First, it is unclear whether this is a theory to which he himself subscribes or simply his term for the general approach adopted in the literature he has surveyed. While the fact that he explicates it in some detail would suggest that it has become his own, there is nevertheless some ambiguity here. In the second place, it is surprising in the light of his discussion of autonomous technology that he should develop a theory of politics at all. The implication of all that he has written is that technology has supplanted politics in modern society. Here, however, he constructs a theory which in fact affirms the existence of a politics of a particular type, a technological politics. How valuable is this theory, then, in enabling us to understand the political role of technology in the modern world?

Winner argues that there are essentially two ways of seeing technology as a general dilemma in political life - technocracy, rule by a scientific and technical elite, and technological politics. Essentially, they are concerned to address the questions respectively "Who governs?" and "What governs?" While Winner rejects technocracy, the more traditional theory of the politics of technology, as an adequate explanation of the nature of politics in a contemporary technological society, his discussion highlights again the ambiguities in his analysis. I will refer briefly to it before discussing the theory of technological politics in some detail.
Technocracy

Winner describes the traditional technocratic view of society as one in which "power is ultimately the power of nature itself, released by the enquiries of science and made available by the inventive, organizing capacity of technics. All other sources of political power - wealth, public support, personal charisma, social standing, organized interest - are weak by comparison. They are anachronisms in a technological age and will ultimately decline as scientific technology and the people who most directly control its forces become more important to the workings of society". 20

His assessment of such technocratic claims reveals much about his understanding of politics and technology. He comments, "These are, of course, basically unpolitical ideas...If the possibility they express is accurate, one could look forward to a spectacular supersession of politics (whatever its definition). The power described here is the cancellation of all other varieties of power and the cancellation of the historical debate about how power exists and how it works". 21 For Winner, technocratic ideas are "basically unpolitical" and should they succeed, it would result in the "spectacular supersession of politics (whatever its definition)". It is clear from this that even should it happen that rule by technicians should ever eventuate, for Winner such an arrangement would not as such be political. It would represent the "cancellation" of all things political. Authority and power would be exercised but seemingly, not "politically". Thus again it becomes clear that the criteria by which Winner assesses the "political" nature of technocracy are the criteria of democracy; politics is synonymous with democratic politics.

At the same time, however, he refers to "all other sources of political power" as being weak by comparison with scientific power, the implication being that the power of science and technics is a source of political power. Thus, Winner is confused as to whether he regards technocracy as a political theory or not. It involves for him the rule

20 Ibid., p.139.
21 Ibid., pp.139-40.
of science and technics, not the rule of politics. It is true that as a theory and as an ideology, technocracy may represent the supersession of politics, but the theory itself can then be understood as a powerful political ideology in its own right. Politics in this case does not cease but takes on a particular form. Winner does not explore this dimension of technocratic theory. He confuses the ideology of technocracy with the reality of its political claims. Furthermore, it appears that Winner himself believes that science may have a valid claim to political neutrality. He doesn't argue against this, so much as rejecting it on the grounds of his commitment to the value of democratic politics. This is the source of his ambivalence.

This can be seen in sharp relief when Winner explores the implications of technocracy for liberalism and marxism. His analysis is essentially from the perspective of a democratic politics. He rejects a simplistic elite analysis; there is no technocratic elite dominating the political process, but "a multiplicity of kinds of persons who hold power within the political system". However, while he acknowledges the complexity of power within the political process, he regards this as relatively unimportant, because the growing power of technology within the state places in question all political power. However, not only are democratic politics under threat as a result of the growing dependence upon expertise, but all political arrangements are altered through the demands and constraints of large-scale technological systems. Those who have power then have it in name only. His whole argument, then, is weakened by his confusion of the political and the democratic.

*Technological Politics*

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22 *Ibid.*, p.150. For example, Winner's critique of Don Price and J.K.Galbraith (cf.pp.151-172) is based on their failure to maintain a strong commitment to democratic principles, a failure which for him represents a diminution of the political. "Neither author does much to lend hope to the political possibilities of democracy or representative government under the new set of circumstances".(p.171) However, he writes later: "We found that neither of two recent analyses of the matter, Don Price and John Kenneth Galbraith, was able to salvage a distinctive role for *political* knowledge and *political* actors in an age of advanced technical means".(p.261 italics added).
However, for Winner, of more significance than "Who governs" is "What governs?" and this question is the basis of his theory of technological politics. "Here one locates the political essence of technology in its total formative impact on all of nature and human culture. Technological politics, in this manner of seeing, encompasses the whole of technology's capacity to transform, order, and adapt animate and inanimate objects to accord with the purely technical structures and processes ... Political reality becomes a set of institutions and practices shaped by the domination of technical requirements ... My selection of the term technological politics is meant to emphasise ... that the rule of technological circumstances in the modern era does in fact supplant other ways of building, maintaining, choosing, acting and enforcing, which are commonly considered political".  

In his elaboration on this concept, Winner acknowledges that his use of the word "politics" is "beyond its ordinary context", and that such an approach might be better termed "a theory of culture". While it could be argued that he has here moved beyond his narrow perspective on politics which centred on liberal democratic principles, this would be a mistaken view; for this identification of politics with culture maintains his previous emphasis on politics as consensus. Culture is something shared and, as such, it transcends the divisions of politics. The issue of the politics of technology is thus interpreted as essentially a conflict between technology and culture, between the system and "us". As such, this perspective very much maintains his commitment to a democratic framework.

Moreover, his understanding of the means by which technology constrains political choice centres almost exclusively on "large-scale technical systems". It is interesting that this is not strictly one of the four categories outlined at the beginning of his book; it appears to be a combination of "network" and "organization". He acknowledges this and argues that "twentieth-century technical devices" are characterized by "enormous size, complex interconnection, and systemic interdependence. In terms of their own internal structure, most of them require precise

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23 Ibid., p.237.
coordination of the three major elements in our earlier definition. Apparatus almost always requires refined technique: an elaborate, knowledgeable kind of human practice to guarantee its successful working. In the great majority of cases, however, both apparatus and technique require the presence of well-developed, rational, social organization".24

However, there are many unexamined implications here, particularly the political assumptions in such concepts as "successful working" and "rational organization". Despite his explanation, it is still difficult to discern the "technology itself" in this or to know how it is possible to speak about politics and technology as two separate units of analysis when by definition, politics is incorporated in the definition of technology. For Winner wants to refer to "purely technical structures" and "technical requirements" which constrain and determine choice. But what are these structures and requirements? While it may be argued that an apparatus requires a particular technique (argued but not necessarily accepted), Winner does not justify how an apparatus and technique can be said to require large-scale organization. What are the technical imperatives as opposed to political considerations? Did the systems become large-scale because of technical demands or for other reasons? A focus on large-scale systems as "technology", and culture as "politics" makes such a question almost impossible to answer.

A discussion of large-scale technical systems certainly lends itself more readily to a cultural understanding of technical hegemony than does one focussing on apparatus or technique. And, of course, this is the point Winner wants to make. Traditional explanations of the place of technology in political life centred on the apparatus and involved a tool-use conception. As such, technology was seen as neutral and under political control. "Seen as a way of ordering human activity, the total order of networks is anything but neutral and tool-like. In its centrality to the daily activity and consciousness of the 'employee', the function-serving human component, the technical order is more properly thought of as a way of life. Whatever else it may be, a way of

24 Ibid., p.200.
life is certainly not neutral. Technology has become "the technical order" and politics "a way of life". The problem here is that both the technological and the political come to mean everything, and therefore, in practical terms, nothing. It is questionable how far political questions about technology can be addressed within such a framework.

Winner argues that it is by a process of "reverse adaptation", that ends are transformed and all decisions made in order to maintain the functioning of the means. As a result, ends are adapted to the means. His basic hypothesis is "that beyond a certain level of technological development, the rule of freely articulated, strongly asserted purposes is a luxury that can no longer be permitted". It is the relationship between ends and means that Winner sees as central to an understanding of the implications of technology for politics. He argues that reverse adaptation "violates the models of technical practice we normally employ. To the extent to which we employ tool-use and ends-means conceptions, our experience will be out of sync with our expectations". It is that large-scale systems do not fit in with the traditional understanding of the relationship of ends and means, "our" expectations, the models of technical practice "we" use.

A recurring phrase in Winner's analysis is "the traditional understanding" of technology and it is on the validity of his interpretation of "the traditional understanding" of the politics of technology that his argument very much depends. In this and a number of associated issues, Winner demonstrates a degree of naivety and a tendency to idealise the past.

First, what are the sources of this "traditional understanding"? There is an inference here that all traditional interpretations are the same. However, he does not justify his selection of criteria, but almost takes them as possessing universal acceptance. Moreover, he does not examine the ideological power of such "traditional" claims but rather takes them as an expression of historical reality. He claims that "in the

25 Ibid., p.201
26 Ibid., p.238.
27 Ibid., p.251.
traditional interpretation, society has at its disposal a set of technological tools for the achievement of consciously selected social ends. Megatechnical systems are seen to be responsive and flexible. At the command of society or its political institutions, the needed goods and services are produced. Control is one-directional and certain, leading from the source of social or political agency to the instrument." Here is the master-slave metaphor again but with the master in his(?) rightful place. This may or may not be the "traditional interpretation". However, it is open to question how accurate such an interpretation is. While this understanding of the ends-means relationship may accord with the ideological assumptions of liberal democracy generally, it is questionable how far such an understanding has ever accorded with reality.28 Even Winner's own discussion of the weakness of technocratic elite theory highlighted the multidimensional complexity of political power within the state. This is again a case of Winner setting up straw view of democratic theory as political reality.

Winner's understanding of the history of technology, in particular his assumptions about the origin of technical systems, compounds the problems of his analysis. "One can assume that each of the technologies in question - systems of communication, energy supply, transportation, industrial production - was originally founded upon some widely accepted purpose: the accomplishment of a particular goal or the continuous supply of a product or service".29 But can one assume this? It is questionable how far the "widely accepted purpose" gave rise to the technologies and how far the forms the technologies ultimately took were the result of the need to accomplish a particular goal or to supply a service. Recent studies in the history of technology question this simplistic interpretation of political choice.30 A major weakness of Winner's analysis is his failure to provide concrete historical examples that

29 Winner, Autonomous Technology, p.259.
demonstrate his argument. As has been seen, when he does attempt some historical analysis, many of his presuppositions are shown to lack substance.

Winner also argues that traditional public morality has been undermined through the considerable levels of corruption which appear as a by-product of large-scale technological systems. "Whether in patently corrupt or more ordinary, day-to-day manifestations, the influence of technological politics tends to erode the integrity of processes through which modern society charts its course".31 Is this to suggest that corruption had not been present in pre-technological society, or that large-scale technical systems inherently give rise to corruption? Indeed, in some societies, corruption is a significant cultural expression of political life. It is not clear whether such corruption is to be understood as a denial of politics or an expression of it. If Winner's observation is correct, then, at the very least, it raises questions about his claims about the diminishing capacity for human control in technological societies. Corruption would not exist if there were no significant centres of control over which one might wish to exercise some influence. Moreover, what is to count as corruption can be, in itself, a part of the rhetoric of political struggle and thus defined differently by different groups. Ellul in fact argues that corruption, rather than being a manifestation of the influence of technological systems, is the only remaining means by which the increasing technicization of politics can be thwarted.32

For Winner, then, politics as "traditionally understood, is essentially normative and political theory prescriptive. It is a question of bearings and limits. Technology, for him, has rendered those issues irrelevant. He wants to maintain technological politics because he understands that constraints of large-scale technical systems as having become prescriptive and thus normative for social life. Choices have been made politically, he argues, but the results of those choices now constrain us to such an extent that political choice is impossible. It is no longer adequate to think primarily in terms of the political control of technology through legislation, but rather recognize that

31 Ibid., p.260.
32 Ellul, The Technological Society, p.262.
technology itself is legislation. To understand technology itself as a political phenomenon is to "acknowledge that modern technics, much more than politics as conventionally understood, now legislates the conditions of human existence". The sovereignty of technology has replaced the sovereignty of politics. One determinism has replaced another. Here, Winner has moved from a view of politics as dynamic, to a view of politics as equilibrium. Rather than politics being the process by which debates about the good life are carried on, politics has been reduced to a technical constitution establishing order.

However, this is not a distinction that Winner is able to maintain. There is a tension between politics and technology that his discussion continues to highlight even when his theory asserts its disappearance. For example, his categorical assertion of the control over politics exercised by technology becomes "The system controls or strongly influences the political processes that ostensibly regulate its output and operating conditions" (Italics added). There is a considerable difference between control and influence, and it is a decisive distinction when one is arguing about the impossibility of political autonomy in the face of technological systems. This ambivalence becomes even clearer when he writes, "New technologies are institutional structures within an evolving constitution that gives shape to a new polity, the technopolis in which we do increasingly live. For the most part, this constitution still evolves with little public scrutiny or debate. Shielded by the conviction that technology is neutral and tool-like, a whole order is built - piecemeal, step by step, with the parts and pieces linked together in novel ways - without the slightest public awareness or opportunity to dispute the character of the changes underway. It is somnambulism (rather than determinism) that characterizes technological politics".

Winner here argues on the one hand that modern politics is so constrained by technical requirements that political autonomy is no longer a possibility, and on the other, that this situation is due to the lack of political scrutiny. This is highlighted by his

34 Ibid., p.243.
reference to somnambulism being a greater problem than determinism. People are not so much determined as asleep! This assertion tends to place the issue squarely in the area of the awareness and consciousness of the democratic community. As for Ellul, changed consciousness is the only hope for radical change. Yet most of Winner's analysis has in fact been concerned to demonstrate the impossibility of developing an alternative political programme in a world of technological politics. If such an analysis is valid, then whether one was somnambulent or not would make little difference. Political action would be impossible. Again, there is the confusion between the role of technology itself and political attitudes to and public scrutiny of technology. Winner's analysis would have far greater value if he were to explore why public scrutiny is not operative and, as mentioned earlier, why the ideology of tool-use serves to "shield" technological developments.

Conclusion

Winner's argument in Autonomous Technology, and in particular his theory of technological politics, is very problematic indeed for an understanding of the political nature of technology. It is certainly difficult to see how his analysis can be said to focus on "technology itself", for as has been seen, his discussion centres on large-scale technical systems, where it is extremely difficult, using his broad definitions, to distinguish the political from the technical. While Winner argues that this is indeed one of the features of the technological society, he has guaranteed that conclusion by his initial categories of investigation. An analysis of the processes by which technology has come to have such a significant ideological role in modern society is not provided. Furthermore, the theory of technological politics appears to have little application to the smaller-scale categories of "apparatus" or "technique", which also require political analysis. In fact, on the few occasions when he does refer to these, the role of politics becomes much more defined and significant.
At the same time, there is a good deal of ambiguity as to how it is possible to speak of any sort of "politics" in a world of large-scale systems, even "technological politics". Where for Winner's earlier discussion, politics implied a democratic politics of participation and consensus, with the assumption that technocratic thinking means the domination of non-political ideas, with his theory of technological politics, the concept changes to politics as "system maintenance". Even then, however, the power of the system is not in the technology nor in the impossibility of political action, but rather in the failure of public awareness within the democratic community. While he is aware of the interests and power of particular groups within the political community who are further empowered by technological development, he doesn't explore the means by which that empowering is effected.

In fact, as he does regularly throughout his book, Winner ultimately modifies his claims about the novelty and distinctiveness of his approach. He stresses the importance of economics and culture in technical development.\(^\text{36}\) He acknowledges and accepts the criticisms that "orthodox social scientists" and "Marxist analysts" would make of his argument: "The theory of technological politics, as I have presented it, does not set out to discredit or eliminate either of these conceptions. Instead it seeks to illuminate certain gaps and anomalies they contain. It can be used as a supplement to either the pluralist interest model or analyses focussing on class conflict, for what the theory seeks to establish is that a significant deflection and restructuring of human motives occurs when individuals approach technologies for the solutions of their problems."\(^\text{37}\) However, this is a long way from his earlier claims about the politics of "technology itself" and the consciousness-altering capacity of technical rationality which renders political activity obsolete. The theory of technological politics becomes weakened and merely serves to "illuminate" and "supplement" other models of analysis. And yet, at the same time, Winner still wants to talk about the "restructuring of human motives" when "individuals approach technologies for the solutions of their problems.'

\(^{36}\) Cf. ibid., p.236.
\(^{37}\) Ibid., p.263.
problems"; on the one hand an admission of the limits of an analysis with its focus on
technology, while on the other, a sweeping affirmation of the cultural power of
technology.

The tension here arises not only from his focus on large-scale systems as
discussed above, but also from the particular individualist assumptions inherent in his
model of politics and the broader question of motivation. Individuals do not generally
"approach technologies for the solutions of their problems" in the unproblematic way
Winner suggests. Individual motivation and interests can be seen to be very much
shaped by the particular location within the social structure. Technologies too are
developed within particular social and political environments and by various significant
processes introduced into the general life of the community. Brian Wynne claims that
"political processes and language, including technical analysis, can tacitly guide people
into seeing the world in certain ways, influencing what is regarded as an accepted
value, and what is inevitable, possible and desirable, or at least tolerable. Such
processes are not merely instrumental, in the sense of conveying pre-existent ideas, but
they create new cognitions and bring concrete values into public existence from the
inchoate informal substratum: they embody the always unfinished attempt to complete
the moral individual and social being". 38 The central issue then becomes one of the
analysis of these processes and in particular the ideologies that are constructed to
legitimate the various social and political arrangements.

Winner's suggestions for a "truly political technology" include the development
of new technological forms allowing for flexibility and non-expert understanding,
participatory decision-making in the introduction of new technologies, and a renewed
sense of technology as means. However, these suggestions, as he himself says, "have
overtones of utopianism and unreality". This is only to be expected in an analysis
which employs on the one hand a too broad understanding of technology and on the
other, a too restricted concept of politics. Ironically Winner recognizes these

38 Wynne, B., Rationality and Ritual (British Society for the History of Science,
weaknesses in his theory: "This state of affairs is not well suited to political theory in any traditional sense. The theory of technological politics itself, even when it hones its critical edge, usually ends up being little more than an elaborate description. Somehow one has to remember the content of other theories and visions in order to catch a sense of its significance at all." There appears, in fact, to be no normative dimension to his theory at all; it is purely descriptive. His suggestions for a political technology, for example, do not emerge from his theory of technological politics but from a commitment to democratic theory. Any critical edge in the analysis of technology then must come from other theories. It is ironic to see the contribution Winner's own theory makes to the blunting of that critical edge.

Thus, the value of Winner's focus on "technology itself" for an understanding of the political significance of technology must be questioned. It is the recognition of some of these problems that leads Winner to refine his argument and seek to present it with greater force in The Whale and the Reactor.

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CHAPTER THREE

Langdon Winner II: The Whale and the Reactor

Langdon Winner's second book was published in 1986. It covers a wide range of issues on technology and politics and attempts, as its subtitle suggests, to "search for limits in age of high technology". While he continues to explore the broad themes established in Autonomous Technology, his analysis here is more refined and focussed. He ranges over such subjects as appropriate technology, risk assessment, information technology and the language of technological debate. As many of the chapters in the book were first written as articles, there is a good deal of diversity, not only in style and approach, but also in content and argument.

However, while Winner here adopts a more micro focus than was evident in Autonomous Technology, his analysis is still strongly influenced by an understanding of technology that is macro in perspective. Thus, the insights that he gains from a close analysis of the political processes involved in technological development are lost when he wants to continue to grant causative power to technologies themselves. This chapter will argue that what in fact Winner's analysis highlights is not the political nature of the technologies themselves, but very much more the political and ideological nature of the discourse which surrounds those technologies and associated technological debates.

This chapter will focus primarily on Winner's first three chapters, "Technologies as Forms of Life", "Do Artifacts Have Politics?", and "Techne and Politeia", as they explicitly have the politics of technology as their theme. Reference will be made to other chapters as they relate to this central theme.

Winner begins his preface with a familiar theme: "The map of the world shows no country called Technopolis, yet in many ways we are already its citizens. If one observes how thoroughly our lives are shaped by interconnected systems of modern technology, how strongly we feel their influence, respect their authority, and participate
in their workings, one begins to understand that, like it or not, we have become members of a new order in human history...Observing the structures and processes of these vast systems, one begins to comprehend a distinctively modern form of power, the foundations of a technopolitan culture".¹ This opening makes it clear that Winner is continuing his project of seeking to provide an understanding of the novel problems posed by the all-encompassing world of technical systems. At the same time, it raises doubt about whether Winner has progressed in terms of the clarity with which he addresses the issue of the political ramifications of technology.

The last phrase of the quotation captures very well the essence of Winner's perspective. Humans have entered a new phase in the history of human culture; they have become "members of a new order". Winner indeed uses political terminology - "power", "citizens", "authority" - yet within a context of technology as culture. So Winner continues where he left off, with a significant conceptual confusion in his use of the terms "culture", "power" and "politics". While his next chapters do tend to a more narrow perspective on technology and politics, Winner never abandons his broad understanding of technology as culture, and as a result, his analysis of the political is continually rendered problematic.

"Technologies as Forms of Life"

Winner's first chapter is very much a rehearsal of his argument in Autonomous Technology.² Emphasising the urgent need to develop a critical philosophy of technology, Winner continues to argue that the central focus of such an enterprise must be "the many ways in which technologies provide structure for human activity".³

² It is a significant that while his argument continues that of Autonomous Technology, it is an important step towards conceptual clarity that Winner refers to "technologies" as opposed to "technology", as for example, in "autonomous technology". The plural form recognizes the fact of the variety of technologies and thus the requirement of possibly different types of analysis. Cf. below, the discussion of "Do Artifacts have Politics?".
³ Ibid., p.6.
Again, Winner's bete noir is the "deceptively reasonable notion" of technology that understands it as a neutral tool, whose moral value is assessed essentially in terms of its use. He wants to move beyond an understanding of technology in terms of "cause" and "effect". However, here, he promises to provide somewhat of a corrective to the broad, impressionistic sweep of his first book by narrowing his focus to "the ways, both obvious and subtle, in which everyday life is transformed by the mediating role of technical devices". With the emphasis on "technical devices" and the transformation of "everyday life", there appears to be a solid basis for analysis here that was lacking in his earlier work. Attention is to be given not to the fact that technologies are powerful agents of transformation, but rather how they come to have the power they do. Such an analysis is vital for any real understanding of the political implications of technology.

However, Winner's analysis does not fulfill this promise. He is extremely vague on what it is that is transformed and therefore, what it is that is to be the focus of study. In some cases, for example, he refers to the "reconstitution of the conditions of life", and, at other times, simply to "human activity". It is important to be clear about exactly what it is that he is referring to. One may be quite happy to agree that a technology transforms activity in some way, without necessarily accepting that such a transformation is one involving "conditions of life". The introduction of a photocopier into an office, for example, may alter activity there without necessarily being said to "transform the conditions of life". Moreover, while Winner's reference to the mediating role of "technical devices" appears to offer a far more precise use of "technology" than that of his earlier work, and one providing at least the possibility of some empirical investigation, he, however, refers in the same chapter to "devices, techniques and systems" as a cluster term for technology, thereby making an adequate analysis very difficult for reasons spelt out earlier. Thus, at the end of his discussion, one is no clearer as to what is to constitute the focus of an analysis of the "mediating role of technical devices".

4 Ibid., p.9.
**Political choice and "forms of life"**

Winner's adoption of Wittgenstein's concept of "forms of life" to convey his understanding of the ways in which technology structures social and political life compounds this difficulty. It is interesting that whereas in *Autonomous Technology*, he used a political metaphor (technology as legislation) to express his understanding of the contemporary significance of technology, here he uses a more comprehensive philosophical formulation. Nevertheless, Winner finds himself confronted by the same problems he faced in his first book. At the same time as he wishes to highlight the threat to politics posed by technology, his particular description of the nature of technology often threatens to eliminate the possibility of politics altogether.

Such is the case with his use of Wittgenstein's concept of "forms of life". Now "forms of life" as generally understood, refer essentially to the given structures of social existence which determine how one is enabled to understand meaning. There is a givenness about such forms that one is unable to break. Now, while Winner admits to using the concept "suggestively", there is a contradiction at the very centre of his argument, one that featured in *Autonomous Technology* and which appears in most critiques of totalitarian technical domination. On the one hand, technology "reconstitutes the conditions of human existence" and on the other, members of society need to be aware of, and in some way make decisions about, that process of reconstitution. Thus, "Individual habits, perceptions, concepts of self, ideas of space and time, social relationships, and moral and political boundaries have all been powerfully restructured in the course of modern development". Yet, "it seems characteristic of our culture's involvement with technology that we are seldom inclined to examine, discuss, or judge pending innovations with broad, keen awareness of what those changes mean".

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7 Ibid.
The essential point about "forms of life", however, is that they are generally understood to be so much a part of human consciousness that it is impossible to stand outside them and coolly assess them. Forms of life are not something that one can choose to accept or reject. The very processes by which one makes "choices" are an expression of those very forms of life. This relates to Winner's references to somnambulism in his earlier book. In fact, he again claims in this chapter that the problem is not determinism so much as somnambulism. However, as I discussed previously, it must be one or the other; it cannot be both. It is either a "form of life" or not. If it is a form of life, then no alternative response is possible.

Winner argues that the understanding of technologies as forms of life had its roots in Marx's understanding of productive activity as a "mode of life". His discussion in this context appears promising with his comment that Marx's interpretation "includes a place for a more microscopic treatment of specific technologies in human experience". However, beyond this, Winner's discussion throws little light on the means by which technologies come to occupy this place of central cultural significance. What is notable is that his discussion focusses on the role of the productive forces, which he understands to mean technologies, in the formulation of human consciousness. He does not mention the capitalist framework of power nor the class struggle.

The location of "the political"

His adoption of the concepts of Wittgenstein and Marx then does not contribute greatly to a clearer understanding of the political implications of technology but rather serves to obscure the issue. This is reflected in the conclusion Winner reaches, and one that in fact features the first specific reference to the political in the chapter where he insists "that we pay attention not only to the making of physical instruments and processes, although that certainly remains important, but also to the production of

8 Ibid., p.16.
psychological, social and political conditions as a part of any significant technical change.9

This statement highlights the difficulty Winner has in being able to identify where the political is to be located. Only when that question is answered, however, can the political implications of technology begin to be validly explored. Here, Winner in fact counterposes "the making of physical instruments and processes" to the "production of psychological, social and political conditions" associated with any technical change. He wants to conceptually separate the construction of technologies from the conditions produced by them. However, if it is not in the construction of these instruments and processes that the social and political conditions are produced, then where? He needs to explain how the particular political conditions come to be associated with the technologies, if not in their construction. The implication here is that the political conditions are separate from the technology, yet resulting from it.

In fact, this approach appears little different from one which he earlier rejected - a focus on the "effects" of a particular technological development. Winner certainly appears less interested in the politics of the construction of technologies than in the political effects of those technologies, however these are to be understood. It is certainly difficult to see how Winner can maintain that his thesis constitutes an analysis focussed on the politics of "technology itself", when here the political is understood to be separate from the technical.

"Forms of life" as ideology

The ambiguity of Winner's analysis is highlighted when he asks: "Are we going to design and build circumstances that enlarge possibilities for growth in human freedom, sociability, intelligence, creativity and self-government? Or are we headed in an altogether different direction?"10 Here Winner implies that what "we" are designing

9 Ibid., p.17.
10 Ibid.
and building are not "technologies", but "circumstances"! What does this mean? How are "technologies" and "circumstances" linked? And of what value is this claim for an analysis which takes as its focus technology itself? The central question Winner identified at the beginning of his chapter remains unaddressed: how do technologies structure and transform human life? It will be difficult to answer while the focus is on circumstances rather than the technologies!

Furthermore, if technologies are "forms of life" structuring our understanding of what it means to be human, what is the source and basis of Winner's commitment to "growth, human freedom, sociability, intelligence, creativity, and self government" and how are such non-technological values possibly arrived at when such technological "forms of life" dominate consciousness? As was noted earlier, such commitments need to be justified, especially in the context of a discussion of the consciousness-creating power of technologies as forms of life.

The weakness of Winner's argument is the adoption of "forms of life" as an explanatory philosophical concept, when his stated project is a focus on the specifically political nature of technology. This results in his neglecting to focus on what is the seemingly obvious, yet unexamined implication of his argument - that particular ideological explanations play a central political role in debates about technological development. "Forms of life" could just as well be understood to have the same function as "ideology". Winner's repeated reference to the "structures", "conditions" and "circumstances" of technology can in fact be seen to be a recognition of the means by which such "forms of life" associated with technology may be ideologically constructed. Winner's ambiguity in wanting to locate the political in the technology, but at the same time wanting to acknowledge the role of "forms of life" and circumstances in the technological order, could be resolved by a focus on the source and nature of the particular ideology involved in debates about technology.

However, Winner does not pursue this line of analysis. This is ironic because his discussion of Wittgenstein does in fact include a discussion of the nature of
language as social construction. However, Winner is more concerned with the impact of technological forms on our thinking than with the effect of our thinking on our technological forms. Winner's failure to explore the nature of ideology in technological debates results in his subsuming the political under a general philosophy of culture which tends to obscure the political nature of technological change rather than open it to investigation.

"Forms of life" and political change

However, while Winner's analysis in this chapter continues the broad cultural perspective of technology that informed *Autonomous Technology*, it is not characterized by the same political despair. Even though his argument is at times somewhat ambiguous, he does not claim that technologies as forms of life cancel out political choice. In fact, he now rejects technological determinism for being "much too strong, far too sweeping in its implications to provide an adequate theory. It does little justice to the genuine choices that arise, in both principle and practice, in the course of technical and social transformation". At the same time, Winner has modified his model of the rational citizen using the democratic process to make well-defined choices, by recognizing the constructedness of much political behaviour. However, as has been discussed above, he continues to attribute this process of construction to the technology itself, even when his own analysis suggests that it has more to do with particular attitudes to and interests in technological development.

Nevertheless, Winner still wants to hold that the task of reform is a political one. "The study of politics offers its own characteristic route into this territory. As the political imagination confronts technologies as forms of life, it should be able to say something about the choices (implicit or explicit) made in the course of technological innovation and the grounds for making those choices wisely". For Winner then, the

political task is both descriptive and normative. Political theory should be able to provide the basis for "wise" decisions. Choice and control, dimensions of political life whose possibility had been questioned in Autonomous Technology, are now resurrected as co-workers with political theory in providing for a freer and more creative society. For Winner, decisions about technology are to reflect political "wisdom". The implication of his argument is that there is the wise choice, the criteria of which are "possibilities for growth in human freedom, sociability, intelligence, creativity, and self-government". He proposes then a model of politics, which is essentially substantive, a politics which will make decisions which conform to a particular political perspective. However, as has been noted, he fails to justify this commitment and, as will be discussed more fully below, can be said to unwittingly promote an anti-politics.

Nevertheless, it is to this mission of developing wiser political and technical choices that Winner directs his attention in his chapter "Do Artifacts have Politics?".

"Do Artifacts have Politics?"

As was noted above, Winner's opening chapter does not bring much clarification to the concepts of technology and politics. However, very significantly, he does affirm the possibility of politics within the technological order. It is in the important second chapter, "Do Artifacts have Politics?" that Winner explicitly addresses the relationship between technology and politics. As this chapter represents Winner's most developed position on this subject, I will discuss it in some detail.
Winner's definitions of "politics" and "technology"

As opposed to his earlier discussion, Winner is concerned to make his use of concepts clear: "By the terms 'politics' I mean arrangements of power and authority in human associations as well as the activities that take place within those arrangements. For my purposes here, the term "technology" is understood to mean all of modern practical artifice, but to avoid confusion I prefer to speak of "technologies" plural, smaller or larger pieces of hardware of a specific kind".14 This focus on "technology" understood as "hardware" is a much more useful analytical tool than his previous broad understanding. However, as will be suggested below, some reference to "technique" might also have been valuable.

Winner's definition of "politics", on the other hand, appears to have been broadened and generalized. The term has been largely divested of its normative dimension; no longer does it appear to be a synonym for "democracy". Politics is "the arrangements of power and authority in human associations". The site of politics then is no longer seen to be the state, but any "human association". Winner then incorporates these definitions in the central question for a political philosophy of technology: "At issue is the claim that the machines, structures and systems of modern material culture can be accurately judged not only for their contributions to efficiency and productivity and their positive and negative environmental side effects, but also for the ways in which they can embody specific forms of power and authority".15

While technology understood as "machines, structures and systems of modern material culture" suggests a focus that is daunting in its comprehensiveness, his formulation of the central issue emphasises that he is less interested in questions about the efficiency or effects of technology, than in the implications of the latter for political arrangements. It is significant that whereas Dickson understands these aspects to be linked, Winner sees them as conceptually separate.

14 Ibid., p.22.
15 Ibid., p.19.
Winner attempts to provide an analysis of the politics of technology which is different from, yet complementary to, what he calls "the social determination of technology". He characterizes this latter approach, which is essentially that adopted by Dickson and Braverman, as being concerned to argue that "what matters is not the technology itself, but the social or economic systems in which it is imbedded". While acknowledging the importance of such a view, he argues that it is inadequate because "taken literally, it suggests that technical things do not matter at all". The implication of this approach, he suggests, is that there is nothing distinctive about the study of technology. Analysts can then "return to their standard models of social power - those of interest group politics, bureaucratic politics, Marxist models of class struggle, and the like - and have everything they need. The social determination of technology is, in this view, essentially no different from the social determination of, say, welfare policy or taxation".

Against this, Winner argues that there are "good reasons to believe that technology is politically significant in its own right...". Important insights are to be gained by a focus on "technology itself". The vehicle for such an analysis is again his theory of technological politics. However, in line with his changed perspective on technological determinism, this theory has developed from its earlier form in Autonomous Technology, where it appeared to represent the end of genuine politics, to a broader formulation here referred to as "an odd mongrel of notions often crossbred...".

16 It is interesting to compare this term with that of the "social shaping of technology" as in MacKenzie, D. and Wajcman, J.(eds.), The Social Shaping of Technology (Open University Press, Milton Keynes 1985). From his discussion, Winner appears to exclude much of what supporters of the latter approach would want to understand by "social shaping". It is interesting then that an earlier draft of this chapter appears in MacKenzie and Wajcman.
17 Ibid., p.20.
18 Ibid., p.21.
19 Ibid.
20 Ibid.
with orthodox liberal, conservative and socialist philosophies'. He explicitly defines as its starting point "a decision to take technical artifacts seriously. Rather than insist that we immediately reduce everything to the interplay of social forces, the theory of technological politics suggests that we pay attention to the characteristics of technical objects and the meaning of those characteristics...this approach identifies certain technologies as political phenomena in their own right".

It is important to grasp Winner's distinction here. He is arguing that the political significance of technology cannot be understood simply in terms of the "social shaping" model; that it is qualitatively different from the social determination of other aspects of political life such as taxation. While it is unfortunate that he should have chosen as a comparative example what is essentially a state responsibility, he nevertheless makes clear the distinctiveness he claims for the political significance of technology. The focus of analysis is to be the characteristics of technical objects and their" meaning", rather than "immediately" reducing everything to the "interplay of social forces". However, there are a number of problems with this approach.

First, as he did in his previous chapter, Winner assumes here that the characteristics of the technology can be examined prior to, and therefore separately from, a study of the associated interplay of social forces. The use of "immediately" suggests that the analysis will have as its ultimate focus those social forces, but that there will be aspects in which the technology itself can be said to have politics prior to and distinct from such a focus. In such a way, technical phenomena will be seen to be political "in their own right". However, if Winner's methodology is followed and the analysis is not "immediately" reduced to the social forces involved, what then is the object of inquiry? One is left with a set of artifacts. But what then are the questions one is to ask in order to gain an understanding of the political nature of these artifacts?

The very term "political" involves questions of power and authority; these by their very nature are "social forces". Therefore, to even begin a political analysis of a

21 Ibid.
22 Ibid. pp.21-2.
particular technology means bringing a particular theoretical understanding of the nature of power and authority, that is, of social forces, to the very questions that one asks. It can only be within such a framework that an inquiry can be undertaken. Therefore to argue that the analyses can be separated is fallacious and raises immediate problems for an understanding of what might be meant by artifacts being political "in their own right". Moreover, Winner appears to imply that, irrespective of what this might mean, the ultimate focus will always be the social forces involved. If this is so, it raises doubts as to how central a focus on technology itself really is to an adequate analysis of the politics of technology.

There are also problems with an analysis concerned with the "meaning" of a particular artifact. Not only is the determination of what is to constitute "meaning" a difficulty, but so also is the question of the determination of meaning for whom? The fact that the social construction of meaning might itself be a political issue appears not to be considered.

In his study of symbolic politics, Murray Edelman suggests that "(m)eaning and response are not the same for everyone, but a function of group interest or mutual role-taking".23 Meaning is understood to be a result of the political process, not autonomous of or prior to it. The implication of Winner's argument, however, is that there is an essential meaning which is able to be "discovered", a meaning that transcends existing inequalities in power or differences of interest. Such an understanding severely limits Winner's investigation. Again he fails to address issue of the ideological nature of technological debate. In fact, "meaning" in Winner's use of the term appears to relate primarily to the nature of the consequences of particular technical decisions. This is somewhat of a problem for this "effects" analysis is the very approach he has rejected as being too simplistic.

There are two broad frameworks in which Winner believes artifacts might be said to have politics. "First are instances in which the invention, design or arrangement of a specific technical device or system becomes a way of settling an issue in the affairs of a particular community...Second are cases of what can be called 'inherently political technologies', man-made systems that appear to require or to be strongly compatible with particular kinds of political relationships". I will consider Winner's discussion of each category in turn before evaluating how far he succeeds in demonstrating that artifacts do indeed have politics.

**Politically flexible technologies**

Winner bases his discussion of the first of these categories on three case studies - the overpasses of Robert Moses, the moulding machines of Cyrus McCormick and the tomato harvester of southern California. While each of these examples highlights different aspects of the the politics of the artifact, Winner links the first two as being essentially more "conspiratorial" in nature than the third and their politics therefore more easily visible. I will follow him in treating the first two together before looking at the third.

Robert Moses controlled New York's public works programme between the 1920's and 1970's. Winner maintains that Moses sought to exclude poor people and blacks from gaining access to his public parks by ensuring the overpasses were built in such a way as to prevent public buses from passing beneath them. "They were deliberately designed and built that way by someone who wanted to achieve a particular social effect". As a result, specific political relationships have become permanently embodied in the technical environment of the everyday world of New Yorkers. Moses' personal power has gone but his politics live on through the shape of the public life he created through his artifacts.

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25 Ibid., p.23.
In the case of the McCormick reaping manufacturing plant, less efficient and more expensive moulding machines, which could be worked by unskilled labour, were introduced into the firm in order to destroy the power of skilled workers whose union was challenging management control. Thus, Winner argues, "if we suppose that new technologies are introduced to achieve increased efficiency, the history of technology shows that we will be sometimes disappointed".26

For Winner, these two examples clearly demonstrate the means by which certain individuals or groups used artifacts for particular political purposes. His use of actual historical examples of technological change is to be welcomed. However, does he succeed in demonstrating that these artifacts are political phenomena "in their own right"? It is important to notice here that Winner argues that he is not simply talking about the ways in which technologies "enhance the power, authority and privilege of some over others". Such is too narrow an understanding of the politics of technology. His argument is more sophisticated than that. The relevant passage needs to be quoted at length.

"In our accustomed way of thinking technologies are seen as neutral tools that can be used well or poorly, for good, evil, or something in between. But we usually do not stop to inquire whether a given device might have been designed and built in such a way that it produces a set of consequences logically and temporally prior to any of its professed uses... If our moral and political language for evaluating technology includes only categories having to do with tools and uses, if it does not include attention to the meaning of the designs and arrangements of our artifacts, then we will be blinded to much that is intellectually and practically crucial".27

This is a key passage for an understanding of Winner's argument. He argues that the politics of the artifact does not simply consist in the fact that it may enhance the power of some over others. The politics appears in the fact that some technologies may have been constructed in such a way as to produce a set of particular political

26 Ibid., p.24.
27 Ibid., p.25.
consequences and that such consequences, being built into the artifact, actually precede its "professed" or obvious uses. However, it is not clear how such a political focus differs in any real sense from a concern with the enhancement of the power of "some over others", especially when his definition of "politics" is "arrangements of power and authority in human associations".

**Winner's understanding of "artifact" and "use"**

The confusion in his analysis arises from the ambiguity in his use of "artifact" and "use". He argues that the view that technology is neutral and therefore to be evaluated in terms of its use is inadequate. And yet, he can speak about particular consequences being guaranteed by the design of the artifact, the suggestion being that the artifact could have been built differently. In fact, his description of this category of artifact speaks of the invention, design or arrangement of a technology becoming "a way of settling an issue", a political intention preceding the production of a particular artifact.

There are two understandings of artifact here: one, which refers to the completed technology, and a second which appears to refer more accurately to "technique" or concept. How "use" will be understood will depend on which understanding of artifact is adopted. If the first, then "use" will be determined by the completed artifact itself and will apply particularly to the use by the "consumer" of the finished product. If the second, the "use" will refer to the ways in which the concept or design is realised in the artifact and will apply particularly to the motives of the developer of that artifact. In this latter case, it could be argued, and in fact Winner implies as much in his discussion, that the technique or concept may in fact be understood as being neutral, but "used" for good or evil ends (whatever one's particular political perspective). To imply that a technology might be developed differently is not too far from suggesting it could be "used" differently. His claim, then, that artifacts have politics in a way different from that suggested by the arguments of
the social determination theorists would seem to be based on the first understanding of artifact, whereas their focus is primarily on the second understanding. This may explain why Winner insists on referring to artifacts "having politics" rather than "being political".

Winner's two examples highlight this ambiguity about "use" and "artifact". The political significance of the bridges and the moulding machines lay in their "use", which can be seen as the effects either of their design, as in the case of the bridges, or of their implementation, as with the moulding machines. These particular consequences, which are political, are understood to be intended. That is, it can be argued that these consequences issue from the ways in which the particular technologies are employed or "used", the very interpretation Winner is seeking to challenge. Thus, the bridges' professed use was to "carry automobiles from one point to another", the mouldings "to make metal castings". However, as Winner's reference to "professed uses" suggests, these artifacts could be said to have other "uses", those meeting the interests of those who control such technologies in the first place. Thus, it is possible to see technologies as neutral techniques or "tools" used for good or evil.

In the case of the McCormick moulding machines, for example, the issue is clear. There was a technical process of some potential, predating the conflict, which was introduced into the plant primarily as a means of solving an industrial dispute. The politics in this example, however, is to be located not in the machinery itself, but in the decision and power of management to develop and introduce the new technology in order to resolve the issue to their advantage. There was nothing in the moulding machines themselves that guaranteed a particular outcome; it was in the particular application of that technology by management.

In the Moses example, however, Winner argues that the design of the bridges themselves did guarantee a particular outcome. The important question is where is the artifact to be located here? Is it in the technology of a bridge, or of Moses' particular bridges. While public transport and their "consumers" could not use Moses' bridges because of their particular design, it is obvious that Moses could have used the
technology of "the bridge" in other ways. Neither the height of the bridges nor the introduction of the moulding machines can be said to have been determined by technical considerations; they were a result of the social and political context in which those technologies were applied. Thus they could have been used differently or, in the case of the moulding machines, not at all. There is a real sense, then, in which bridges and moulding machines are neutral artifacts, which, in the examples given, were used for particular political purposes. It is difficult to see then that arguing that these technologies "have politics" is to be saying anything more than that through them, those in power consolidate (enhance) their power and authority; but then that can be said of any political decision, not simply those involving the technical.

Politics as prior to and distinct from the artifact

In both examples, then, power cannot be seen to be vested in the particular artifact except as one aspect of a broader framework of power relations. The power, authority and privilege of Robert Moses enabled him to "use" the bridges in such a way; the powerlessness of the marginalised led to them being so constrained by those bridges. In no way can it be argued that it was the bridges themselves that rendered the marginalised powerless. In fact that tautological construction, "the powerless marginalised", highlights the irony of the claim that artifacts have politics. The tautology consists in the argument that blacks and the poor were prevented from visiting Jones beach because the buses could not pass under the bridges; whereas, in truth, they were prevented by the very social structure which distributes power in such

28 Winner implicitly acknowledges these two understandings of artifacts, albeit with decisions being seen to be made democratically, when he writes that "within a given category of technological change, there are roughly speaking, two kinds of choices that can affect the relative distribution of power, authority and privilege in a community". These are a yes/no decision where "the fundamental choice...is whether or not the thing is going to join society as a piece of operating equipment"; and the second "has to do with specific features in the design or arrangements of a technical system after the decision to go ahead with it has already been made".(p.27) The significance of the phrase "affect the relative distribution of power, authority and privilege" is noted in the following discussion.
a way that Robert Moses had such power and they very little. In Winner's argument, however, the political issue comes to be centred in the artifact and reduced to the question of access to public parks. The real political issue of the nature of the inequalities in wealth and power which allowed such decisions to be made in the first place is ignored.

An important associated issue which Winner raises but does not explore is what could be called "the politics of the non-artifact". He notes that "Moses made doubly sure of this result by vetoing a proposed extension of the Long Island Railroad to Jones Beach". In terms of Winner's thesis, it could be asked "Do non-artifacts have politics?" The absence of an artifact may be as politically significant as its presence. So, the lack of a railroad can be seen to be as significant as the height of the bridges. However, there is no rail-road to "have politics". So if one focussed only on existing artifacts, one is likely to miss the broader political realities involved. What is common to the artifact and non-artifact is the politics involved in the decision-making process that allowed the particular result. The real political significance then is not the artifacts themselves but in the intended consequences of their development.

Winner in fact acknowledges these points: "In all the cases cited above the technologies are relatively flexible in design and arrangements are variable in their effects. Although one can recognize a particular result produced in a particular setting, one can also easily imagine how a roughly similar device or system might have been built or situated with very much different political consequences". The emphasis here is on the flexibility of the "device" which could have had different consequences. Thus after all his discussion about the problems of "our accustomed way of thinking", he comes back to a view of technology as "flexible device", and of "use" and "effects" as determining the politics of a particular artifact.

Thus it is important that one be clear about which understanding of "use" and "artifact" is being employed, for if one concentrates solely on the "use" by the

29 Ibid., p.23.
30 Ibid., p.29.
consumer, then it is possible to see the constraints on possible action being embodied essentially in the completed technology itself and therefore to argue that it is the artifacts that have politics. But if the focus is on the use of a particular technique by the designers or owners of production, then the constraints are essentially to be located within the decisions of those groups. Attention then will be given to those groups and the nature of their power rather than to the technology itself. As Winner's focus is invariably on the "receivers" of the completed artifact and its "meaning" for them, he fails to adequately address the issue of the power of the producers and their particular interests.

Technology and Ideology

However, Winner wants to address a more complex issue in his analysis - the fact that political decisions can be disguised as the "merely technical". This seems to be at the basis of his argument that analysis of technology should therefore involve a process of deconstruction. He comments, for example, that "some of the most interesting research on technology and politics at present focuses upon the attempt to demonstrate in a detailed, concrete fashion how seemingly innocuous design features in mass transit systems, water projects, industrial machinery, and other technologies actually mask social choices of profound significance".31 His use of the terms "seemingly innocuous" and "mask" highlights what is essentially a claim about the ideological role of science and technology. Winner implicitly recognized this in his earlier reference to the "professed uses" of individual artifacts but did not elaborate. The important question then becomes which uses of the particular technologies are "professed", which are hidden and why and how each comes to be so. The implication of Winner's argument is that the political comes to be hidden in decisions which are claimed to be technical, and therefore neutral. The neutrality of the technique becomes

31 Ibid., p.28.
claimed for the completed artifact and technocratic ideology serves to legitimate particular political decisions.

Although this argument has greater force than his thesis that artifacts themselves have politics, Winner continues to fail to pursue the issue of the ideological construction of technology. He continues instead to locate the politics in the artifacts themselves rather than in the discourse about artifacts, and about science and technology generally. He is right to examine the nature of political decision-making obscured behind technical demands; but his desire to focus on the artifact means that he ignores the significance of the defining power of discourse and the processes by which that is realised. As a result, his view of what separates the technical from the political is problematic. In fact, as I have discussed previously, contrary to his own claims, Winner's understanding of the political is linked very much to the nature of the consequences of particular decisions. He argues, for example, that "(h)istories of architecture, city planning and public works contain many examples of physical arrangements with explicit or implicit political purposes"\textsuperscript{32} and he mentions here the boulevards of Paris, built wide to limit the possibilities of street fighting.

*Technology as "conspiracy"*

However, the assumption implicit in Winner's discussion is that there can be artifacts without political purposes - that certain motivations in technical construction are in a sense legitimate while others are not. Thus, Winner appears to be arguing that Moses was acting politically when he made certain decisions limiting the height of bridges, where had he made decisions allowing the buses to pass under, it would not have been political in quite the same way. Had the railroad been extended to Jones Beach, that would not so much have been political, as the "correct" decision. It seems fair to say that Winner would also hold that a decision to develop a moulding machine which incorporated skill would not be seen to be political in the same way either. The\textsuperscript{32} *Ibid.*, p.23.
artifact would not be said then to have politics; it would have simply been a machine built to do the job more "efficiently".

However, in each of these cases, his definition of politics would have still applied - "arrangements of power and authority in human associations". Yet Winner appears to understand artifacts to possess politics primarily when the rights of blacks, workers, the poor - in fact, citizens generally - are threatened. He doesn't appear to recognize that power and authority are involved in technical decisions which have no obvious threats to democratic rights and freedoms. He seems to believe that there are two types of decisions: "legitimate" technical decisions, and "distorted" decisions made "politically". However, all decisions can be understood as being constituted by the interplay of the forces of power and authority. All debates about the "technical" are infused with political assumptions about such things as the understanding of "efficiency", the nature of energy requirements, and the nature and value of work. Unless this is recognized, the study of technological developments will remain "problem-centred"; the weakness of such an approach is that even the very definition of what constitutes a "problem" is a political issue in its own right.

Winner thus ironically ends up arbitrarily separating the political and technical, rather than combining them as his analysis implies. Furthermore, when no group can be identified as responsible for the threat to democratic freedoms posed by a particular technology, that is, where there is no identifiable conspiracy, Winner proceeds to locate the politics in the technology itself. However, this results from his failure to recognize that power is exercised in and through the very ideological constitution of a society. Within such a framework, technological developments will be seen to be an expression of that constitution rather than embodying power in their own right.

"Non-conspiratorial" technology

That such is the case becomes clear when Winner briefly touches on the problems of the handicapped. To demonstrate that "to recognize the political dimensions
in the shapes of technology does not require that we look for conscious conspiracies or malicious intentions", he cites the situation of the handicapped, who were effectively excluded from involvement in American public life due to the discriminatory technical arrangements that structure social and political life.

However, as I have said, to speak of power being exercised, whether in ways openly discriminatory or not, is not necessarily to speak of conspiracy or malicious intent. It is simply to acknowledge the reality of the inequality of power in social and political life. In the case of the handicapped, the relatively powerful (in this case, the non-handicapped) were able to ensure that technologies were used in their interests. As Murray Edelman writes, "(C)onspiracies and scheming are not nearly as useful in maintaining inequalities as the more pervasive actions that flow from the logic of the social situations in which people find themselves. Elites take advantage of the resources available to them, and most support the institutions that allocate resources unequally because their situations make those courses of action look rational".34

Thus, it was not until the handicapped movement became more visible and militant that technologies were developed in their interests as well. But the political change could not be said to have been centred, nor embodied, in changed technology, but in the mobilisation of social and political forces which were then able to redefine what was to constitute the "rational course of action" and effect the necessary technical changes. The technology in no way constrained political action. The issue was one of the relativity of access to power rather than one of the politics of the artifact; the result was essentially a "redesign", a different and non-discriminatory use of the artifact; the artifact used in a different way.

Winner acknowledges the political and social inequality involved but continues to locate it in the technology: "There are instances in which the very process of technical development is so thoroughly biased in a particular direction that it regularly produces results heralded as wonderful breakthroughs by some interests and crushing setbacks 33 Ibid., p.25. 34 Edelman, M., Constructing the Political Spectacle (University of Chicago Press, Chicago 1988), p.125.
by others...one must say that the technological deck has been stacked in advance to favour certain social interests and that some people were bound to receive a better hand than others".35 Winner does not explore why it is that the "technological" deck has been stacked in favour of certain social interests as against others. Surely the technological deck is a reflection of the political deck, not a result of the nature of the particular technologies themselves. The ways these technologies are used is an outcome of the particular power arrangements within society.

*Technology and corporate capitalism*

These issues become clearer in Winner's third example - that of the tomato harvester. As has been noted, this example takes a slightly different perspective, one that Winner is keen to see as less conspiratorial or malicious than the first two and yet equally political. He outlines the changes accompanying the introduction of mechanical harvesting of tomatoes in California in the late 1960's. These include the development of a sturdier breed of tomato to cope with the rougher mechanical process, the increasing concentration of tomato growing in fewer hands and the resulting loss of jobs, and the growth in productivity and profits. The harvester, he writes, was "the occasion for a thorough reshaping of social relationships involved in tomato production in rural California".36 How valid then is it to claim that this artifact has politics?

Winner seeks to argue that these developments were in no sense the result of a plot, as the previous two examples could be said to have been. In fact, a number of scholars have exonerated the original developers of the machine and the hard tomato "from any desire to facilitate economic concentration in that industry". As discussed above, however, it is by no means the case that the exercise of power need be malicious or conspiratorial; in fact, it could be argued that the greater the power, the less the need for "conspiracy". That means that the pursuit of economic interests need not be seen as

36 Ibid.
part of a plot but as fundamental to the nature of capitalist society. Winner in fact recognises the complexity involved. "What we see here ... is an ongoing social process in which scientific knowledge, technological invention and corporate profit reinforce each other in deeply entrenched patterns, patterns that bear the unmistakable stamp of political and economic power".37

While he notes the particularly close ties between large corporations and universities, Winner fails to explore its significance or to draw out the implications for such interpretations as the "no plot" thesis. The idea of "pure researchers" in universities "developing" and "breeding" particular scientific techniques, for whose applications they are not responsible, is no longer tenable. Targetted funding directs research, "discoveries" become patented and knowledge comes to be used primarily in the interests of large corporate enterprises.38 In this example, Winner in fact fails to examine and explain the processes by which the harvester moved from its development in the university to its application to the fields of rural California. In focussing on the machine, he obscurres the political realities that gave rise to its development in the first place and which led to its being applied in the ways it was.

Winner nevertheless argues that "the harvester is not merely the symbol of a social order that rewards some while punishing others; it is in a true sense an embodiment of that order".39 But how does the harvester embody that order? By describing first its seemingly unproblematical development in the university and then its consequences for the farmers of southern California, Winner conveys the impression that the politics, the constraints, are in the artifact itself. However, a discussion of the forces of production behind the development and the processes by which it was decided how, when and where the harvester was to be introduced, would have highlighted the inherent flexibility of the technology, which was noted above, and focussed on the exercise of power which produced the final product and its associated results. Winner

37 Ibid., p.27.
38 Cf., for example, the discussion on the relationship between the Green Revolution and the Rockefeller Foundation in Albury, D. and Schwartz, J., Partial Progress (Pluto Press, London 1982), pp.48-57.
39 Winner, The Whale and the Reactor, p.27.
acknowledges this: "Once the mechanical tomato harvester had been developed in its basic form, a design alteration of critical social significance - the addition of electronic sorters, for example - changed the character of the machine's effects upon the balance of wealth and power in California agriculture".\textsuperscript{40} But he does not explain why this alteration was made.

More importantly, the conceptual problem, discussed above, of what is meant when one refers to the artifact "tomato harvester" needs to be addressed. There was a tomato harvester, and then a tomato harvester with electronic sorters. Winner appears to be arguing that the early tomato harvester had less "impact" (was less political?) than the later model. Is the political nature of the artifact then simply a matter of its effects? If so, the effects of which artifact - the early model or the later one? In a passage noted above, Winner in fact comments that "one can easily imagine how a roughly similar device or system might have been built or situated with very much different political consequences." Again, it is the political consequences that are at issue here; how the artifact is "used". Yet in fact Winner interestingly avoids attributing these consequences directly to the artifact itself. The artifact was simply the "occasion" for the changes, not the "cause". Similar to his reference to "circumstances" above, such a vague term makes it very difficult to determine in what ways the artifact itself can be said to "have politics".

\textit{Two models of political analysis}

As he tended to do in \textit{Autonomous Technology}, Winner confuses two models of political analysis in these three examples. In his discussion of Moses and McCormick, he centres his attention on the politics of technological construction with the associated issues of motivation, interests and intended results. In the tomato reaper example, he ignores the question of motivation in construction and focuses instead on the politics of results, the political implications of the effects of a particular technology.\textsuperscript{40} \textit{Ibid.}, p.28.
The claim that the first model represents a more conspiratorial model of politics than the second is far too simplistic. At the very least, the difference results from Winner's methodology rather than from any intrinsic differences. For Dickson and Braverman, indeed, these three examples would be evidence of the oppressive nature of capitalism. For Winner, however, the capitalist framework does not appear to be an issue.

Moreover, only the McCormick example is true to Winner's initial claim that the development of the artifact was political in the sense of "settling an issue in the affairs of a particular community". It is certainly difficult to know how the design of Moses bridges can be said to have "settl(ed) an issue" in the community. It was in fact the very "settledness" of the power arrangements that allowed this decision in the first place. The tomato harvester, in Winner's own argument, can be seen in fact to have unsettled affairs in the tomato-growing community of southern California. He does not mention what particular issue was settled by the introduction of the harvester. While the McCormick example does fulfil this criterion, however, it is in some senses an unfortunate choice for such an analysis because it took place in the late nineteenth century when union power was just emerging. To have relevance to the contemporary political experience of technology, a more current example would have been more relevant. Yet, as will be discussed below, political institutions of any sort do not play a leading role in any area of Winner's analysis.

His discussion of the politics of artifacts concludes with Winner returning to the themes of "forms of life" and the necessity for human choice. "Consciously or unconsciously, deliberately or inadvertently, societies choose structures for technologies that influence how people are going to work, communicate, travel, consume, and so forth over a very long time." Yet again the slippage in his argument becomes apparent. The discussion has been about artifacts yet he wants to conclude that "societies choose structures for technologies". How does choosing "structures for technologies" differ then from choosing artifacts? He cannot resist returning to technologies as forms of life. However, his use of "influence" implies a far

41 Ibid.
weaker claim than that of "structure" or "determine". Clearly artifacts influence human events; how far they "determine" human experience is a different, and more important, question. As has been noted, Winner oscillates between these two claims.

Moreover, what is meant by "societies choose"? The examples which Winner has just finished discussing are clear evidence of the fact that "societies" do not choose in any meaningful sense. He acknowledges that such an understanding masks the complexity of power involved: "In the processes by which structuring decisions are made, different people are situated differently and possess unequal degrees of power as well as unequal levels of awareness".42 This is a more fitting conclusion to his discussion. However, again, the issue of the ideological nature of the debate is raised and then dropped. He again fails to address the question as to why there are unequal levels of awareness. Certainly, the suggestion that there is a technological form of life that structures responses is shown to be fallacious when some groups have heightened awareness about technical realities and others do not. The issue is not one of consciousness itself, but the very power relations that result in the consciousness of some being so diminished that they may be unaware of the issues and which render them powerless to act even if they were.

Inherently political technologies

It is difficult then to see how the technologies discussed by Winner could qualify as political phenomena "in their own right". Rather, they seem to fall more appropriately into the category of the "social determination of technology" where the politics is understood to be located in the framework of decisions about technological developments rather than in the artifacts themselves. It would appear that only the second category, then, that of "inherently political technologies", could really do justice to Winner's claim that "technology itself" has politics. This category suggests "that

42 Ibid., p.28-9.
some technologies are by their very nature political in a specific way. According to this view, the adoption of a given technical system unavoidably brings with it conditions for human relationships that have a distinctive political cast - for example, centralized or decentralized, egalitarian or inegalitarian, repressive or liberating.\textsuperscript{43}

Winner's discussion of inherently political technologies begins with an outline of Engels's argument that authority is necessary for the successful operation of such technical systems as spinning mills, railways and ships at sea. These technologies cannot be run democratically because "by their very nature", they need authoritarian control. It is not a question of social organization, but technical imperatives. If Engels's observations are correct, then "one would expect that as a society adopted increasingly complicated technical systems as its material basis, the prospects for authoritarian ways of life would be greatly enhanced".\textsuperscript{44} Winner notes however, that Engels was not the first to make this claim. "Attempts to justify strong authority on the basis of supposedly necessary conditions of technical practice have an ancient history".\textsuperscript{45} With these references to "justify" and "supposedly necessary conditions", there is already a question as to whether Winner's discussion will really be focussing on the technologies themselves or rather on claims about the technologies.

\textit{Two versions of technical constraints and political choice}

Winner argues that there are two versions of this theme, one which claims that the adoption of a particular technical system "actually requires" a particular social arrangement, and a second "somewhat weaker" version which argues that a certain technology is "strongly compatible with, but does not strictly require" particular political and social arrangements. As an example of the first version, Winner cites arguments over nuclear power plants, and of the second, claims about solar energy. Winner argues that the political has very much more to do with the wider implications

\underline{43}\textsuperscript{Ibid.}
\underline{44}\textsuperscript{Ibid.}, p.31.
\underline{45}\textsuperscript{Ibid.}
of the authority structures which these technologies appear to require than the possible environmental or health risks associated with them. "The issue has to do with ways in which choices about technology have important consequences for the form and quality of human associations".46

Winner also makes a distinction between what he calls the "inner" and "outer" conditions associated with technologies, and their implications for politics. Here, there is a qualitatively different understanding of the "political" than in his earlier discussion. He wishes to make a distinction between the "internal" forms of power and authority associated with a technology within an organization and the "external" implications of those forms for the broader political context of the state.

There is, then, a "public" politics and a "private" politics. He argues, for example, that it is important to analyse technologies in terms of not only political democracy but also industrial democracy and the relationship between them. He claims that "One attempt to salvage the autonomy of politics from the bind of practical necessity involves the notion that the conditions of human association found in the internal workings of technological systems can easily be separated from the polity as a whole".47 However, he argues that to stress political democracy while at the same time allowing that technologies require authoritarian forms of organization is to seriously throw into question the wider commitment to democratic principles. While this is a valid observation, Winner does not explore the nature of the relationship between this "public" and "private" politics. It is important that he do so, for each understanding of politics may in fact require a different form of analysis. It is one thing to suggest that a system is political because it is compatible with a particular form of work organization; and quite another to suggest that it has implications for the state as a whole. The linkages must be described and justified.48

46 Ibid., p.33.
47 Ibid., p.36.
48 For example, it is this which the work of G.D.H.Cole and Carole Pateman attempts to do. Cf. Pateman, C., Participation and Democratic Theory (Cambridge University Press, 1970). It is interesting that Winner didn’t raise this issue in his earlier discussion of flexible technologies, particularly in relation to the McCormick case.
As a prime example of inherently political technologies, Winner gives the example of the atom bomb and its particular constraints. He then moves on to an examination of the hypothesis that large-scale technical systems of production, transportation and communication, for example, railways and oil refineries, in fact require a particular social form. Winner suggests that it is possible that "decentralized, democratic worker self-management could prove capable of administering factories, refineries, communication systems and railroads as well as or better than the organizations (this hypothesis) describes". However, he refuses to make any judgements about this. What he wants to affirm is that large-scale technical systems are "highly compatible with centralized, hierarchical managerial control", and yet, "the interesting question is whether or not this pattern is in any sense a requirement of such systems".

There is a continuing tension in Winner's work which is evident here and that is the problem of his being able to raise questions about the threats to the democratic control of technological development, while at the same time avoiding making such control a practical impossibility. So, it is not surprising that he refuses to make a judgement about whether technical systems require a particular political arrangement. To have answered in the affirmative would have been to eliminate the possibility of political choice. He is therefore content to simply raise the question.

It is important to note that in his discussion of inherently political technologies, Winner focusses on the technologies in their completed form. He does not apply the same type of analysis to their development as he did, for example, to the McCormick moulding machines. To examine the political and social context of the development of the particular technology may have illustrated an unacknowledged flexibility in its shaping. As it is, the politics with which Winner is more concerned here is that related to the political circumstances accompanying the technology.

49 Ibid., p.35.
50 Ibid.
Technology and political discourse

Winner's discussion of inherently political technologies is characterized by the same tendency to focus not on the technical system itself but rather on the discourse of technological debate. He continues to discuss claims about technology, rather than technology itself. He refers, for example, to the fact that in such debates "the moral claims of practical necessity" have greater weight than "moral claims of other sorts". However, he fails to elaborate on his understanding of the morality of practical necessity. In what way is necessity moral? At the very least, morality is usually understood to involve some element of choice; however, by definition, necessity does not allow choice. Here Winner appears to accept the very ideological assumptions which undergird claims that some technologies require authoritarian forms of control.

That Winner has adopted many technocratic assumptions is evident when he goes on to argue that "it is characteristic of societies based on large, complex technological systems, however, that moral reasons other than those of practical necessity appear increasingly obsolete, "idealistic", and irrelevant. Whatever claims one may wish to make on behalf of liberty, justice or equality can be immediately neutralized with arguments to the effect 'Fine, but that's no way to run a railroad' (or steel mill, or airline, or communication system, and so on)". Here Winner falls into the trap of referring to "societies based on large, complex technological systems" and in so doing, defines societies precisely in terms of their technologies rather than by their politics or values. He employs the very discursive assumptions that he seeks to criticize. To define the society in such a way is to concede the dominance of the very conceptual framework that he wishes to challenge. It is to adopt a "form of life" by which everything else is to be judged.

While Winner does recognize that the problem is very much one of the nature of the discourse surrounding the issue, he fails to explore the fact that "necessity" may be

51 Ibid., p.36.
52 Ibid.
seen to be part of the rhetorical vocabulary used in attempts to close the argument about the morality of particular technological developments. To speak about the "morality of necessity" then is to play the game of those who use such terms as "necessity" and "efficiency" as if they were technologically defined rather than politically defined terms. In fact the phrase "moral claims of practical necessity" has the force of reducing the political (moral claims) to the technological (necessity).

The continuing irony is that Winner does appear to recognize that the inherently political quality of technologies is very much constituted by language about technologies - essentially the ideological nature of science and technology referred to above. He writes "In many instances, to say that some technologies are inherently political is to say that certain widely accepted reasons of practical necessity - especially the need to maintain crucial technological systems as smoothly working entities - have tended to eclipse other sorts of moral and political reasoning". It is important to notice how different this is from any claim about the "technology itself". Here the key issue is not the inherently political nature of a particular technology but claims made about the requirements of that technology. The technology then comes to be understood as inherently political if those claims become the dominant discourse surrounding that technology, put crudely, if those claims win the technological debate.

It is in fact in these terms that Winner admits that "it is still true that in a world in which human beings make and maintain artificial systems nothing is "required" in an absolute sense. Nevertheless, once a course of action is underway, once artifacts such as nuclear power plants have been built and put into operation, the kinds of reasoning that justify the adaptation of social life to technical requirements pop up as spontaneously as flowers in the spring". Thus, there are no "inherently political technologies". There are decisions which have been made which lead to "kinds of reasoning" to justify particular political arrangements. However, to suggest that they "pop up as spontaneously as flowers in spring" is to ignore the political processes by

53 Ibid.
54 Ibid., p.38.
which a particular ideological perspective becomes the dominant one in any technological debate.

It is interesting, too, that despite his reference here to a nuclear plant as an "artifact", Winner chooses in this discussion to speak primarily of "technical systems" and move away from a concentration on technology as "hardware". As mentioned in the previous chapter, a concept such as "inherently political" or "autonomous" technology is more easily justified when one includes in the very definition of technology the political organization of the particular artifact or technique. The need to clarify the understanding of "use", "artifact" and "technique" discussed above, becomes lost in this systems approach.

Technology - inherently authoritarian or democratic?

In fact, Winner's conclusion to his discussion of inherently political technology highlights the ambiguity of his claims about the political nature of technology. "In the second instance we examined ways in which the intractable qualities of certain kinds of technology are strongly, perhaps unavoidably, linked to particular institutionalized patterns of power and authority. Hence the initial choice about whether or not to adopt something is decisive in regards to its consequences. There are no alternative physical designs or arrangements that could make a significant difference; there are, furthermore, no genuine possibilities for creative intervention by different social systems - capitalist or socialist - that could change the intractability of the entity or significantly alter the quality of its political effects". 55

Winner here actually links certain technologies to "particular institutionalized patterns of power and authority". He suggests that certain technologies serve to reinforce existing patterns of authority. How far can they then be said to be "inherently" political? "Inherently political" would seem to suggest that the political formation issues forth from the technology itself, rather than being linked with any existing political

55 Ibid.
formation. Rather than focussing on nuclear power which for him reinforces a hierarchical, centralized, and bureaucratic form of control, in short, existing power arrangements, Winner would have been more convincing if he had provided an example of a technology that is inherently liberating, decentralized and democratic; that is, a technology that could not be said to simply "reflect" the existing power relations. If technologies are to be said to be inherently political, evidence must be provided from a wide range of political expressions. Unfortunately, Winner, like Dickson, here appears to use "political" in a slightly pejorative manner - to describe tendencies to domination rather than liberation.

However, the idea that there can be inherently democratic characteristics in a particular technology is one that Winner finds difficult to accept. As we have seen, due to his tendency to conflate the political and the ideological, to argue that technologies are inherently political is to argue that they are inherently anti-democratic and authoritarian. So, while in his discussion in "Do artifacts have politics?", he leaves the question open, in a later chapter entitled "Mythinformation", his position becomes much clearer. I will briefly refer to it.

"Mythinformation"

The issue Winner addresses in this chapter is the claim of information technology enthusiasts that a computer "revolution" is in the process of transforming social and political life. After examining the appropriateness of applying the metaphor "revolution", with its obvious political connotations, to the various technological changes, Winner proceeds to examine the explicit political claims made for the new technologies by their proponents. His conclusion here appears to be far more definite than in his earlier discussion and is worth quoting at length:

"Current developments in the information age suggest an increase in power by those who already had a great deal of power, an enhanced centralization of control by those already prepared for control, an augmentation of wealth by the already wealthy.
Far from demonstrating a revolution in patterns of social and political influence, empirical studies of computers and social change usually show powerful groups adapting computerized methods to retain control. That is not surprising. *Those best situated to take advantage of the power of a new technology are often those previously well situated by dint of wealth, social standing and institutional position*.56 (Italics added)

Here Winner clearly locates the politics of technology within the framework of power within specific social relations. The claims by computer enthusiasts that information technology may be inherently democratic are dismissed, not in terms of what might be "compatible" with the technology or what it may "require", but in terms of the realities of existing power structures. However, many authors have argued that recent technical developments in information technology are in fact "highly compatible" with democratic social arrangements, more compatible than with hierarchical and centralized forms of organization.57 Yet Winner refuses to acknowledge that such technologies might be said to be inherently political. Here he shifts his ground from his earlier discussion where he argued that the technical demands determine the political arrangements. Now, he argues that whatever the technical potential of computer technology, the political realities will thwart them. In fact, he appears to imply that what a technology might require is either irrelevant in the light of the power arrangements within a particular community or in fact determined by those power arrangements.

Why there should be this ambivalence relates again to Winner's understanding of the political nature of technology as essentially the expression of anti-democratic sentiments. This is made clear when he argues that "if there is to be a computer revolution, the best guess is that it will have a distinctly conservative quality".58 The reason for this lies not in the technology but in the political and social context in which these changes will take place. So, although Winner grants that it is possible that "a society strongly rooted in computer and telecommunications systems could be one in

56 Ibid., p.107.
which participatory democracy, decentralized political control, and social equality are fully realized"59, he argues that there would need to be conscious political action. However, such action would need to centre on "shaping the institutions of the information age in ways that maximize human freedom while putting limits upon concentrations of power".60

However, there is a paradox here. If the very technologies empower further those already with power, as Winner claims, how is it to be possible that limits can be placed on those concentrations of power? Winner still appears to see the solutions to problems surrounding technology as located in debate about the ends of those technologies rather than in terms of the power relations that shape the technology in the first place.

59 Ibid.
60 Ibid., p.107-8.
Technology and ideology

In this chapter, however, Winner does make explicit what has been implicit in his whole discussion of technology and politics - the role of ideology. He defines "ideology" as "a set of beliefs that expresses the needs and aspirations of a group, class, culture or subculture". He recognizes that the debate about the democratic possibilities of computer technology is very much shaped by an ideology serving the interests of those who have most to gain from the growth of the computer industry.

However, Winner continues to refuse to grant that this is essentially a political issue. He attributes this instead to the demands of the system. "In this instance the needs and aspirations that matter most are those that stem from operational requirements of highly complex systems in an advanced technological society; the groups most directly involved are those who build, maintain, operate, improve, and market these systems". The power of these groups is located in "the operational requirements of highly complex systems in an advanced technological society". This is reminiscent of the post-industrial thesis of Daniel Bell who makes a similar distinction between the power of the technicians of the newly-emerging post-industrial society and the "polity" whose responsibility it is to determine the "political" goals of these technical capacities.

Thus the fruitful analytical possibilities raised by Winner's discussion of the nature of ideology are ignored in favour of a subtle adoption of a type of technocratic ideology, in order that he might maintain a focus on "technology itself". He certainly does not pursue the argument that all claims about technology may be ideological, whether they argue for the inherently democratic nature of computer technology or the demands for centralized authority in the nuclear industry. It is not then a question that can be addressed in terms of naivety or conspiracy, but rather of value commitment.

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61 Ibid., p.113.
62 Ibid.
It is interesting to note that since Winner is unable to demonstrate the undemocratic nature of computer technology "itself", he returns to a discussion of effects to justify his concern. Previously, the effects of technology were relegated to the fringes of Winner's argument, as his central concern was the political nature of the technology itself. However, in this case, Winner returns to effects; "The efficient management of information is revealed as the telos of modern society, its greatest mission. It is that fact to which mythinformation adds glory and glitter. People must be convinced that the human burdens of an information age - unemployment, de-skilling, the disruption of many social patterns - are worth bearing".64 Whereas artifacts which reflected hierarchical and centralizing tendencies were previously considered political because of their shaping of political and social arrangements, here the political issues surrounding potentially non-hierarchical artifacts are their effects on employment and skill.

In his later chapters on appropriate technology, risk and decentralization, Winner continues to reject claims for the inherently democratic nature of technology. Rather than welcoming this emphasis, he criticizes their proponents for their naivety. Again, for Winner, to understand technology as political is to understand it as reflecting existing non-democratic power relationships, rather than it requiring certain political arrangements. Therefore, for all the claims to be focussing on the technology itself, Winner's analysis is in fact essentially a focus on the social and political context in which technology is located.

"Techne and Politeia"

With the emphasis in the first chapters of The Whale and the Reactor on technology as forms of life, Winner's commitment to democratic politics has been implied rather than stated. It was noted above how an understanding of technology as culture has democratic assumptions. However, Winner's analysis continually confuses

64 Winner, The Whale and the Reactor, p.115
a focus on technology as culture with claims that artifacts have politics. While it is clear that for Winner there are the greatest possibilities for politics when technology is understood as artifact, his commitment to technology as culture leads him to locate the politics in the artifacts themselves rather than in the social and political context in which they are situated. This dichotomy corresponds with Winner's oscillation between the politics which shape the technologies in the first place and the politics defined by the resulting constraints of technical systems. This is a continuation of the tension between politics as process, and politics as system maintenance noted in *Autonomous Technology*. This tension characterizes not only the change of perspective within "Do Artifacts have Politics?" but also between this chapter and Winner's third chapter, "Techne and Politeia".

The central argument of this chapter is that technical systems have become like constitutions or "regimes of instrumentality". As it is essentially a repeat of Winner's thesis in *Autonomous Technology*, I will not discuss it in any great detail. However, I wish to briefly discuss those arguments in which Winner makes explicit the political commitments which undergird his whole thesis and which explain the somewhat ambiguous analysis of "Do Artifacts have Politics?".

For Winner, a political understanding of technology will mean that "all varieties of hardware and their corresponding forms of social life must be scrutinized to see whether they are friendly or unfriendly to the idea of a just society".65 Central to his concern is that decisions about technology be more consciously guided by a political theory which provides a commitment to such political ends as freedom and social justice. His conclusion is worthy of quoting in full.

"What I am suggesting is a process of technological change disciplined by the political wisdom of democracy. It would require qualities of judiciousness in the populace that have rarely been applied to the judgement of instrumental/functional affairs. It would, presumably, produce results sometimes much different from those recommended by the rules of technical and economic efficiency. Other social and

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65 Ibid., p.40.
political norms, articulated by a democratic process, would gain renewed prominence. Faced with any proposal for a new technological system, citizens or their representatives would examine the social contract implied by building that system in a particular form. They would ask, How well do the proposed conditions match our best sense of who we are and what we want this society to be? Who gains and who loses power in the proposed change? Are the conditions produced by the change compatible with equality, social justice, and the common good?"^66

This conclusion is consistent with the understanding of democratic politics that has informed Winner's analysis of technology and politics through both books. However, it is difficult to see in what ways this process would have affected those decisions which Winner discussed in his previous chapter. Would this approach have affected the height of Moses' bridges, the introduction of the moulding machines or the tomato harvesters? The central issue in these examples was that the particular decision issued from political power which lay outside the accepted parameters of formal democratic institutions. As Winner himself acknowledged, the politics in these cases was a reflection of the institutional forms of hierarchy and centralization. The reality of the internal "requirements" of the technology clashed with the external ideological commitments to democratic principles. However, neither in that discussion or here, does Winner suggest how this clash ought to be reconciled.

As was noted previously, in fact, Winner's commitment to democracy is almost represented as non-political. The centrality of consensus to his notion of politics can almost be interpreted as the end of politics. For example, he writes, "Insofar as the possibilities present in a given technology allow it, the thing ought to be designed in both its hardware and social components to accord with a deliberately articulated, widely shared notion of a society worthy of our care and loyalty."^67 The problematic

66 Ibid., p.55-6.
67 Ibid., p.55. In language reminiscent of Habermas, Winner suggests the development of democratic institutions where non-distorted communication can take place: "To nurture this process would require building institutions in which the claims of technical expertise and those of a democratic citizenry would regularly meet face to face. Here the crucial deliberations would take place, revealing the substance of each person's arguments and interests".(p.56)
issues here are the nature and source of the particular consensus, the institutional means by which such evaluation is to take place and the level of flexibility in any particular technical development. No assumptions can be made about these issues because each is itself the subject of political debate and negotiation. While it might be argued that a particular commitment "ought" to be made, the realities of politics frequently undermines the prescription of political theory. I will return to these issues in the conclusion.

Despite Winner's claim to be treating technologies as political phenomena in their own right, his own analysis in fact demonstrates that the politics of technology is to be located in the institutional power arrangements which allow technologies to be developed and used in particular ways and the discourse which justifies them, rather than in the technologies themselves. His analysis has raised but not explored the ideological nature of technological debate and the means by which language, in particular, defines and shapes political perceptions about the possibilities of technological development. Winner's failure to develop these insights results from his commitment to a narrow perception of politics understood as democratic consensus. In the final chapter, I will explore these further and then try to assess the value of Winner's contribution to the understanding of the politics of technology.
CONCLUSION

Thomas Misa, in his study of technological determinism, opens with the following words: "If machines make history, they do so only with the assistance of others. For the most part, machines are mute and illiterate, and it is historians (and others) who decide the extent to which technology acts as an independent force to shape history".¹ He demonstrates how studies of the politics of technology have tended to fluctuate between the arguments of philosophers who, taking a macro perspective, argue that technology determines social life, and the arguments of labour historians who, taking a micro-perspective, highlight the power of workers to blunt the political uses of technology. "The principal argument is that those historians (and others) adopting a 'macro' perspective are the ones who allow technology a causal role in historical change. They deploy the Machine to make history. This causal role for the Machine is not present and is not possible in studies adopting a 'micro' perspective".²

Misa places Langdon Winner in the former category, and yet the argument of this essay has been that Winner tries to incorporate both arguments in his thesis; and it is this that leads to his analysis being ambivalent in its understanding of the ways in which technology is understood to be political. It was argued in the previous chapters that Winner in fact moves from the broad cultural perspective on technology and politics, which he adopted in Autonomous Technology, and which owes much to Ellul and Marcuse, the "philosophers", to a more critical position in The Whale and the Reactor, where his perspective tends to be closer to that of Dickson and Braverman, the labour historian.

However, it is true that even in this latter work, Winner continues to oscillate between a more macro perspective treating technology as culture and a more micro analysis of technology as artifact, with the understanding of the political being

² Ibid.
determined by whichever particular perspective is adopted. Winner's analysis confirms Misa's point that the greater the concentration on technology as culture, the more force is added to the conclusion that politics has lost its relevance; and conversely, the greater the emphasis on the artifact, the greater the recognition of the importance of the political. The emphasis of the first is how technology shapes political and social life; the second, is how political and social life shape technology.

If Misa's claim that historians and others help machines make history is correct, then the key question for this analysis is how Winner's work has helped technology to be understood as making history. He has done so by claiming that technologies "have politics" in their own right.

In this conclusion, I want to summarise and expand on what this thesis has suggested are the three key weaknesses in his argument: his failure to properly identify what he means by "technology itself"; his ambivalent understanding of "politics"; and his failure to draw out the implications of the ideological nature of the discourse surrounding technological decision-making.

**Winner and "technology itself"**

While it was recognised earlier that there are a variety of ways in which "technology" might be understood, it is important that, for analytical purposes at least, there be consistency in the particular use adopted. This is even more essential when one takes as the focus of one's analysis, as Winner explicitly claims to do, "technology itself". Here, Winner wants to go further than the "social determination" school and explore the political implications of the "things themselves".

As discussed in the previous chapters, however, Winner finds it difficult to justify what constitutes "technology itself". On the one hand, he claims that particular interest groups can "use" technologies for their own particular political ends. The argument is that those technologies are flexible enough to enable them to be employed for different political ends. The implication here, as was evident in Braverman particularly, is that
there is an "essential" or "purely technical" technology which can be "manipulated" politically.

On the other hand, when he wants to claim that some technologies are inherently political, he ignores this perspective and focusses on technologies as completed artifacts, arguing that the "technology itself" may require particular political arrangements. The historical development of technology is ignored in favour of a focus on the technological constraints of the present. Misa's judgement can be applied to Winner's analysis: "Withal, showing how technology was at once socially constructed and society-shaping is difficult to achieve".\(^3\)

The ambiguity in Winner's understanding of "technology" results in him obscuring genuine political activity by a focus on the "things" themselves. This is most evident when he adopts the phrase "technical systems". He fails to demonstrate that "technical systems" are a result of particular technical imperatives. It is difficult to see then how the political and social arrangements within the "system" can be understood as "technology itself". This confusion might not be particularly significant in a general discussion of technology. But when the focus is on the politics of technology, then clarity and consistency are important.

An important question raised by Winner's four-fold definition of "technology" as technique, apparatus, system and network, but one which he doesn't really address, is whether these various dimensions can be better understood as stages in the development of a particular technology, and if so, how then do they link together? For example, what processes are involved in the move from the conception of a particular technique to its execution in physical form, and how much choice does the process allow in terms of formulation and direction? Is there any part of the process that can be said to be essentially technical, or are there, at every stage, political and social interests determining the particular direction taken?

\(^3\) Ibid., p.319.
Studies in the sociology of scientific knowledge suggest that all scientific knowledge is infused with values and interpretation. In the same way, it can be argued that there can be no "neutral" or "essential" technology, for such a definition implies a particular framework or view of the world, which inevitably involves particular value commitments shaping that perspective. What is "neutral" from one perspective may not be neutral from another. As Brian Wynne comments: "Different social groups hold different visions of what is inevitable, what is open to manipulation, and amidst this, what human purposes can be constructed and achieved, and how". All techniques then can be understood as reflecting particular social values; and all technologies can be understood serving particular political purposes.

Thus, where Winner's emphasis is on the technology itself, a more fruitful focus would be on the processes by which that particular version of technology comes to be politically dominant and regarded as "given". As was noted above, his analysis does raise these questions implicitly, but does not pursue them.

The central assumption of Winner's argument, and the reason he wishes to go further than the "social determination" theorists, is that if one does not acknowledge that technologies "have politics", then one is saying that the things themselves do not matter at all. However, that is not necessarily so. To argue that particular technologies might serve particular political ends is not the same as arguing that the technologies are political in their own right. Such a confusion arises from Winner's understanding of politics.

4 Cf., e.g. Woolgar, S., Science: The Very Idea (Ellis Horwood/Tavistock, London 1988).
5 Wynne, B., Rationality and Ritual (The British Society for the History of Science 1982), p.12. At the same time, Wynne is not consistent in this claim. Discussing claims of technological determinism, he writes "Although this is a fundamental dilemma, it ought to be possible to distinguish foreclosure of choice, by institutional momentum, from genuine material entailments". (Italics added) He appears to concede here that there are "genuine" technical constraints.
Winner's understanding of "politics"

As has been mentioned, Winner's ambiguity in his understanding of "technology" results in a similar ambiguity in his treatment of "politics". Focussing on "technology itself" suggests that, for some purposes, technology can be isolated from the political and social context in which it is embedded. As much as Winner argues that he is supplementing the social determination approach, he in fact either reverses that approach by conceptually isolating "technology" from any context or defines technology so broadly as to identify it with culture, so that politics, technology and culture become functionally identical. As a result, Winner finds it difficult to justify in what ways technology can be said to "have politics".

While it has been noted that "politics" is very much a contested concept, Winner is nevertheless inconsistent in his use of it. It is unclear, for example, when he is referring to the formal processes of democratic government or the state, and when he is referring to the exercise of power within any institution or set of human relations. As was noted, his understanding of the concept changes from Autonomous Technology, where politics appears to be concerned primarily with democratic institutions, to a more general perspective associated with any use of power in The Whale and the Reactor.

Yet even these two alternatives do not exhaust the varieties of interpretation Winner wants to put on the term. So when he focusses on technologies as forms of life, the politics is understood to be located primarily in the fact that they serve to shape social self-understanding. However, while this is a central theme in his argument, he does not explain how this occurs. In fact, with Winner's strong emphasis on consciousness and self-understanding, the very possibility of genuine political action becomes questionable. However, as was noted above, much of Winner's analysis in this regard is not centred on technology as such, but on language and discourse about technology. Furthermore, as much as he wants to argue that technologies determine political choice, he often, in fact, tends to move away from an emphasis on "determination" to a much weaker claim that technologies "strongly influence" or
"significantly constrain" political choice. The nature of the politics of technology here is difficult to define.

However, when Winner focusses on the politics of "artifacts" rather than on systems or "forms of life", he identifies politics as the means by which the interests of certain groups or individuals are served by particular technological developments. At the same time, however, he oscillates between a concentration on the causes of technologies, namely the motives and interests of those in positions of power to shape the development and application of particular technologies, and the effects of technological developments, namely a description of the constraints of the technologies once they are in place. As a result, his use of "political" is confused. The former are political in that they serve particular interests; the latter are political because they constrain political choice.

Winner's first argument that technologies have politics in that they serve particular interests is, of course, essentially the same as that of Dickson and Braverman. And like them, he appears to treat this as a misuse of technology. However, that is not necessarily a valid conclusion. As noted above, the implication of this claim is that there is a "pure" technology which is being distorted for political ends. However, politics is at the very least concerned with competing interests. Winner's own definition understood politics as having to do with the arrangements and exercise of power and authority. If this is the case, then all technologies can be said to serve political purposes for the building of every artifact can be understood as a political act, reflecting the arrangements of power and authority and involving debate and discussion about priorities and values. However, who is involved in this debate and discussion is another issue altogether. Evaluation of that question will be based on particular commitments, for example to democratic principles, and so will be decided by factors other than the artifact. No artifact ever determined who might be involved in such a decision.

Winner's argument that artifacts have politics because they settle a particular issue within a community is not one that he was able to justify either. In the examples
he discussed, only the McCormick case could be judged in this way. In the rest, there was no issue that was settled; simply power relations expressed. In none of them did the artifact ensure or guarantee the authority of a particular group or individual and alternatively ensure or guarantee the powerlessness of an individual or particular group. The artifact was an expression of the relative degrees of power or powerlessness. The source and nature of the political arrangements lay elsewhere.

The second argument that an artifact could be inherently political led Winner back to a concentration on systems, where the social organization is already defined by the particular understanding of technology-as-system. But more significantly, his discussion highlighted the fact that what was political was not the technology itself, but the assumptions about technology and the role of associated justifications such as "efficiency", which are so commonly employed in discourse about technology that they almost come to be understood, as Winner understands them, as "inherent" in the technology itself. In this case, it was the rhetorical claims about technology that constituted the politics, not the technology itself.

In both cases, it would be more accurate to argue that technologies reflect the existing political power arrangements. However, if this is the case, it is important to recognize that this is not a feature confined to technological developments. The same might be said of social welfare policies, education and urban planning.

However, the difference for Winner is that these latter areas are not considered neutral but obviously the outcome of political debate. The burden of his argument is that technology should be recognized as such as well, but is not. His thesis is basically a reaction to a particular view of technology - the use/abuse model - which for him obscures the political significance of technology. Dickson argued the same way; but he was prepared to locate the politics within the context of capitalism. Winner, however, wants to maintain his focus on the politics of the technology itself. Ironically, that cannot be done without a consequent denial of the political.
Politics and democracy

As has been mentioned, what complicates Winner's analysis even further is his tendency to be ambivalent in his understanding of the difference between the political and the democratic. At times he identifies the former with the latter, so that where there is no democratic politics, he understands there to be no politics. This confusion was evident in *Autonomous Technology*, particularly in his discussion of technocracy. At other times, he appears to define the political as that which is non-democratic. So, for example, he appears to suggest that technological developments which serve entrenched interests are understood to be political, whereas those which are seen to serve the "public good" are not. The implication here is that the political tends towards the ideological, with technical necessity being used as a mask for what are in fact "political" decisions, that is, decisions which serve to promote particular sectional interests.

For an argument about the political implications of technology, it is surprising that Winner's analysis pays so little attention to the place of political institutions in technological decision-making. In the final chapter of *Autonomous Technology*, for example, he draws a distinction between two political responses to the challenges of technological development. The first, he argues, sees the political response as essentially legislation where "what must be studied are not the technologies but their implementing and regulating systems. One must pay attention to the various institutions and means of control - corporations, government agencies, public policies, laws, and so forth - to see how they influence the course our technologies follow". Winner argues that this has been the most common approach, adopted by consumerism, the ecology movements and technology assessment advocates. His own perspective, however, sees technology as politically problematic because "it enters into and becomes part of the fabric of human life and activity" and therefore requires "a much more extraordinary, deep-seeking response than the utilitarian-pluralist program can ever

provide”. He cites as examples of responses which take this second approach seriously movements such as the school of humanist psychology, encounter groups, and advocates of alternative technology. However, one wonders how these movements are recognizing technologies as political phenomena in their own right! In fact, they tend to be more concerned with consciousness than politics or, perhaps more accurately, with consciousness as politics.

By contrast, in The Whale and the Reactor, Winner criticizes the advocates of such solutions for their failure to take political institutions seriously. "In retrospect it may seem that these writers were naive, that they underestimated the power of the dominant institutions of the late twentieth century. But clearly, that is not true...It was not naivety their writings expressed, but rather total contempt for these institutions combined with a sense of powerlessness. To avoid the cynicism and gloom toward which their thinking carried them, it was necessary to perform a high-wire act along very slender threads of hope". He recognizes that these responses might be said to be non-political because of their rejection of the more institutional political processes. Yet, nowhere does Winner's own analysis deal with the role of political institutions, such as trade unions or political parties, in technological decision-making nor explore why the dominant institutions within democratic communities are unable to properly regulate technological developments. His own analysis, in fact, locates the problem more at the level of consciousness than at the level of institutions. At the same time, however, he can dismiss these social movements for not taking existing institutions seriously enough.

**Democracy as consensus**

One explanation for this confusion is Winner's particular view of democracy as consensus. I have already noted his failure to justify his commitment to democratic

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7 Ibid., p.320.
principles and to define the source of his particular understanding of democracy. This is very significant because the variety of particular theories of democracy does not allow one to speak so freely as Winner does of "democratic principles". His references, for example, to participation suggest that for him such a democratic principle is unproblematic. However, Carole Pateman introduces her comprehensive study of the concept with the comment that "(i)t is rather ironical that the idea of participation should have become so popular, particularly with students, for among political theorists and political sociologists the widely accepted theory of democracy (so widely accepted that one might call it the orthodox doctrine) is one in which the concept of participation has only the most minimal role". Winner's references to "democracy" and "participation" then require elaboration. His constant reference to "we" and to "society choosing" implies a similarly unproblematic view of consensus. For him, consensus appears to be understood as the essence of genuine democracy.

This is made clear when Winner outlines his response to the political problems associated with technology. He argues that what is required is "a deliberately articulated, widely shared notion of a society worthy of our care and loyalty", and a rejection of technologies "incompatible with the kind of society we deliberately choose". In the past, "our society has, in effect, delegated decision-making power to those whose plans are narrowly self-interested". He does not explain to what this refers or in what way this delegation was effected. Clearly, however, the ideal is one where self-interest will be transcended. Not only will a consensus be reached through the outworkings of democracy, but that consensus will be based on "wisdom". "What I am suggesting is a process of technological change disciplined by the political wisdom of democracy". And again: "As the political imagination confronts technologies as forms of life, it should be able to say something about the choices (implicit or explicit)

10 Ibid., p.55.
11 Ibid., p.57.
made in the course of technological innovation and the grounds for making those choices wisely".13

However, there are a number of significant difficulties for him in placing consensus at the centre of his political analysis. First, the assumption in the claims made above is that wisdom will be an automatic outcome of the operation of democratic processes. A brief glance at history will demonstrate the naivety of this assumption. Moreover, the very question of what is to constitute a wise decision is in itself a political issue involving interests, commitments and value positions. No consensus exists on what is to constitute wisdom.

Linked to this problem is the assumption that there exists an essential truth about "right" choices. It appears, then, that not just any consensus will do. For example, Winner describes prevailing common attitudes to technological change as "somnambulism", which implies something close to "false consciousness". Is Winner, then, really committed to consensus as such, or a consensus based on "wise" decisions? As noted above, one does not necessarily guarantee the other. This problem was at the heart of the analyses by Ellul and Marcuse.

In their criticisms of the technological society, Ellul and Marcuse each highlighted the impossibility of dissent within the technological order. Politics had been rendered irrelevant because of the totalitarian nature of technical rationality. For Marcuse in particular, the triumph of technology had led to the disappearance of class struggle, the "end of ideology". However, what is significant for the present argument is that these criticisms were directed at the prevailing consensus in advanced industrial societies - a consensus of "democratic unfreedom". Of course, for Ellul and Marcuse, the source of this consensus was the technological order which provided no opportunity for opposition. However, there was consensus, but not one which they regarded as good or "wise".

In much of Autonomous Technology, Winner shares the same perspective. True politics is impossible because of the order and rationality imposed by technology.

13 Ibid., p.18.
People are aware of the costs involved in living in a technological order, but "their awareness has an intuitive, largely passive quality. The influence of large-scale technical networks is so pervasive and indelible that few of us find occasion to wonder at their effects. We know that 'this is how things work'. We know that 'this is how I do my job'. The technological order includes a notion of citizenship, which consists in serving one's own function well and not meddling with the mechanism". This is consensus functioning at its most effective.

Indeed, Winner's preoccupation with technology as culture can be seen to be in fact a recognition of the power of the prevailing consensus about technology in modern society. As culture and language provide the means by which a society understands itself, they also provide a powerful tool of consensus, shaping consciousness in particular directions. And yet, with Marcuse, Winner wants to argue that this is a false consensus, produced by technologies functioning as forms of life. Thus, people are somnambulists, unconscious of the reality of their unfreedom. Only "genuine" democracy can "wake people up" and produce a "wise" consensus based on the common good.

Winner's emphasis on consensus is in fact a denial of politics. What he is in fact calling for is not, as might appear, a renewal and strengthening of the political, but the establishment of a new consensus. While this claim is couched in democratic language, there are authoritarian implications here which raise significant questions about the validity of the whole enterprise.

The common good

To talk of wisdom and the common good is to imply a particular view of political rationality, which is problematic indeed. It almost suggests a form of democratic positivism. Similar sentiments were noted in Dickson. However

Schumpeter has written: "There is ... no such thing as a uniquely determined common good that all people could agree on or be made to agree on by the force of rational argument. This is due not primarily to the fact that some people may want things other than the common good but to the much more fundamental fact that to different individuals and groups the common good is bound to mean different things".\(^{15}\) He suggests that even if a common good, such as "health", could prove acceptable to all, this would not imply any definite answers to individual questions. So for example, a common commitment to health does not automatically sanction the introduction of fluoride or genetic screening, because the relationship of these to the broader issue of health is a matter of debate - a debate in which the interests of different groups conflict.

In fact, it is not clear whether Winner understands the common good as residing in the democratic process or the outcome of that process, as formal or substantive, as ends or means. The "ends" he refers to throughout his discussion are such things as growth in human freedom, sociability, intelligence, creativity, self-government, equality, social justice. If these are considered ends in themselves, it is certainly open to debate and disagreement what they in fact mean in practice. If, on the other hand, they are understood to be qualities characterizing the process of decision-making, then questions still have to be raised about the incompatibility involved in their realization; between for example, freedom and equality, or between intelligence and self-government. The natures of both ends and means, then, are in no way "given" but are constituted by the political process in all its untidiness.

The nature of Winner's commitment to democracy is important here. It is not clear whether he is committed to democratic practice per se or as a means by which technological development can be better shaped and directed. Again, as was noted with Dickson, there is an ambivalence in Winner's analysis. On the one hand, he wants to argue that the implications of technology for political arrangements is of as much significance as any effects on, for example, the environment, health or unemployment.

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On the other hand, there is the implication that democracy will be wise in its decisions. Again, there is the confusion of the formal and the substantive, the means and the ends.

To suggest that the democratic process will result in a consensus by which technological developments can then be evaluated is in fact to deny the basic commitments of the democratic process and indeed politics in general. Sheldon Wolin claims that "the final term of political logic is not q.e.d., because finality is the most elusive quality of a political solution. The order of problems with which political judgement has to deal is concerned with the achievement of tentative stabilities within a situation of conflict. Hence an adequate political logic must be framed to cope with contraries and dissymmetries out of a mobile and conflict-laden situation".16

But even if a consensus were in fact possible and desirable, how would it be achieved? Winner suggests that "to nurture this process would require building institutions in which the claims of technical expertise and those of democratic citizenry would regularly meet face to face. Here the crucial deliberations would take place, revealing the substance of each person's arguments and interests. The heretofore concealed importance of technological choices would become a matter for explicit study and debate".17 There are similarities here to Habermas's understanding of undistorted communicative competence as being the foundation of a rational consensus. And the same difficulties prevail. What form will these institutions take and how will they avoid the powerlessness of existing political institutions? How far would they involve participation, and participation by whom? How are "technical expertise" and a democratic citizenry to communicate? What is to be the common value language?

Discussing the British nuclear debate, Brian Wynne noted that "different sides interpret the same reality (for example, accidents, or the neglect of research on alternative energy sources) in opposite ways. There is apparently no frame of reference common to both sides as a basis to reach agreed conclusions".18 Winner does not suggest how this might be addressed. Linked to this is the power of the existing

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17 Winner, The Whale and the Reactor, p.56.
18 Wynne, op.cit., p.11.
consensus on technology. If technologies as forms of life are so powerful, how might such perspectives be changed and "wiser" decisions made?

Decision-making and the "effects" of technology

Nor does Winner explain how decisions about technology might be made, and in particular, on what basis the "importance" of the decisions might be evaluated. It is interesting to note that, in his suggestions, the focus of disclosure is on "each person's interests". Here technological development is understood to be essentially "interest-based", an argument however he was concerned to challenge through his attention to the "technology itself". The suggestion is that as interests are revealed, they will somehow be conformed to the general good. How this is to be achieved is unclear. In Winner's own examples, it was difficult to see what was to be done once the interests involved were recognised. What action would he recommend about the tomato harvester or McCormick's moulding machines? How would the identification of the particular interests result in a more acceptable technological decision?

The reality, as mentioned above, is that no decisions are made without reference to particular interests. A democratic politics is no less committed to an interest-based decision process. The key issue is at what level decisions are to be made and who will be involved in them. This is where the nature and role of political institutions become an important issue. Certainly a democratic politics can be understood to be informed by interests in the value of the process as much as in the nature of the particular decision reached.

Moreover, it is difficult to see how decisions about technological projects can be made unless the possible results of proposed action are established. And yet Winner has been concerned to go beyond a concern with effects. "The important task becomes, therefore, not that of studying the "effects" and "impacts" of technical change, but one of evaluating the material and social infrastructures specific technologies create for our
life's activity". But how are these evaluations to be made? Much of Winner's own analysis has been concerned to demonstrate the impossibility of foreseeing the implications of much technological development. Moreover, he wants to argue that there may be an inherent political quality about proposed technological developments. But how is that inherent quality to be identified other than by reference to potential effects? The politics of Moses's bridges, the McCormick moulding machines, and the tomato harvester were seen in the effects of these artifacts: restricted access, the breaking of a union, unemployment and a concentration of wealth in fewer hands. And in the first two cases, they were intended consequences.

There is an ambivalence in this argument that is very significant. It is clear that a concentration on effects requires an understanding of technology as a completed artifact, for Winner wants to see effects as a result of the technology itself. Yet he has demonstrated in his examples that the effects were in fact anticipated, "built in" to the artifact by the very interests which controlled its development. Therefore, Winner is happy to speak about effects in these cases because it had been identified that they were intended. The implication is that different "effects" could be (should be?) built in to accord with more democratic criteria.

When he argues then that to concentrate on effects is to miss the politics of the artifact, he is making a false distinction. He himself only identified the politics involved in the development of the artifact by looking at the effects. So, for example, if Moses's bridges were a height enabling buses to pass beneath, he would not have identified that as an issue requiring political analysis. It was only by observing the denial of access to public transport, that the political significance became apparent. Thus Winner only identified the politics by first seeing the negative effects of the particular use of the technology. However, if what he is in fact suggesting is that all technologies are shaped politically and need to be analysed on that basis, even if they have no (negative) effects, then one can only agree. However, as has been noted, that is not an argument that Winner has been keen to advance.

Politics as problem-solving

It could be argued, however, that the political arrangements of a particular technology may only be recognised when a particular problem arises and, in seeking to take remedial action, one's lack of power becomes obvious. Where there are no problems, there is no consciousness of the realities of political power. As was noted above, the key issue is whether Winner's concern is with the particular nature of political arrangements in themselves or rather as a superior means of solving particular social problems. His emphasis on democracy providing "wise" solutions makes one wonder. If, for example, technological development within authoritarian structures brought prosperity and contentment to all, would arguments for more democratic arrangements have equal force? This of course is essentially the issue addressed by Ellul and Marcuse.

However, if the focus is on technological problems as most political analyses of technology appear to be, then the understanding of politics will always be problematic. This is due to the fact that politics is then seen to be concerned primarily with the search for particular solutions. There will be an assumption of consensus on an agreed path. Problem-orientation will call for a crisis abandonment of true politics with all its diversity and difference, in favour of a uniform approach which will ensure a solution to the crisis. Thus the very process of defining the "problem" and its solution, while essentially political, will be seen as the justification for an end to politics.

Edelman in fact argues that an exclusive focus on problems has significant ideological ramifications: "What is the political import of terms that emphasize troubles and conceal benefits? They certainly mute conflicts of interest between social groups. They also reassure victims of problems and those who sympathize with them that concern for their plight is widespread. In these subtle ways language forms help
moderate the intensity of social conflict". Winner's analysis can be seen to have these characteristics.

However, if the focus of analysis is the development of technology separate from any possible negative connotations, then the political dimension of all technological development will be recognized and subjected to investigation. What will be gained here is a symmetry of analysis, with an acknowledgement of the reality of politics as central to the nature of human community. There is no assumed right way that can be discovered, but judgements, negotiation and debate that will construct the political solution.

**Winner and "Ideology"

The question of consensus and the political definition of what is to constitute a "problem" and its "solution" raises the broader issue of the ideological nature of all debates about technological questions and, in particular, the ideological construction of a consensus about technology. Winner's failure to address these issues is an inexplicable weakness in his analysis, because, as has been noted, his is a perspective which wants to treat technology, along with language, as a social structure which shapes human consciousness. However, his argument treats technology ontologically rather than ideologically.

In an essay contrasting the approaches to ideology of Althusser and Foucault, Cousins and Hussain claim that "In a functional sense the notion of ideology is polyvalent, it is the point of intersection of philosophical, political and epistemological concerns. It is the notion of ideology, which enables one concern to be transformed into another". This understanding of ideology in fact very much describes the nature of Winner's ambivalence in attempting to incorporate a philosophical emphasis on

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"forms of life", a political emphasis in terms of "consensus", and an epistemological concern for the reaching of "wise decisions" and waking from "somnambulism". These not only highlight his own particular ideological assumptions, but also reflect his failure to recognize that common to each was an ideological interpretation of the nature of technological change.

Thus rather than consensus being the source of political decisions, it can be more validly claimed that it is in fact created by political activity. As Schumpeter writes, "the will of the people is the product and not the motive power of the political process". The important question then is how such consensus is built; and Winner does not address this.

So while Winner recognizes that the meaning of technology should be analysed, he doesn't consider that "meaning" might be understood as an ideological construct reflecting particular political arrangements. He describes as somnambulism what might legitimately be regarded as consensus. He regularly refers to "our thinking" about technology, where his discussion centres not on technology itself but on the dominant discourse about technology.

Winner's own work can be seen as part of a project to create a new consensus about technology. However, a focus on the ideological nature of language used in discussions about technology would have provided a more effective tool in its creation than a focus on technology itself.

It is important to note that "ideology" here is not used in the traditional marxist understanding as meaning "false consciousness". The difficulties in attempting to establish a "true" technology or a "true" consensus have already been discussed. Ideology, as understood here, has to do with the social construction of beliefs, not with their truth or falsehood. Such an approach wants to focus on the processes by which a particular ideology, which Winner treats as "consensus" or a "form of life", comes to provide a particular framework for political discussion.

22 Schumpeter, op.cit., p.263.
A central process here is that of language. Michael Shapiro has written: "Politics and language are intimately commingled. Because our linguistic habits tend to be shaped by a relatively passive language membership, we are apt to neglect the political import of our characteristic modes of speaking. If we ignore the rules that create what we speak about and how we speak about it, this passivity spills over into our political membership, promoting an insensitivity to much of our political life. To enlarge the realm of politics - to politicize more aspects of human relations - one must analyze language as a domain of political relations and thereby use it rather than be used by it".24

Winner recognizes the value of this approach, as seen particularly at the beginning of Autonomous Technology, when he argues that the ways in which "technology" is understood may say more than being prescriptive in one's definition of the term. Nevertheless, he fails to apply this perspective explicitly to the rest of his analysis, particularly to his proposals for a more effective politics.

From this perspective then, it is understood that what Winner has been addressing are the issues raised not by technology itself, but by the rhetoric about technology and the way such claims define the political processes surrounding technological change. A more fruitful analysis could be made then of the means by which the dominant discourse surrounding technology has been constructed and maintained.

Edelman has written: "Accounts of political issues, problems, crises, threats, and leaders now become devices for creating disparate assumptions and beliefs about the social and political world rather than factual statements ... The conventional distinction between procedures and outcomes loses its salience because both are now signifiers, generators of meanings that shape political quiescence, arousal, and support or opposition to causes. The denotations of key political terms become suspect ... (T)he uses of all such terms in specific situations are strategies, deliberate or unrecognized,

for strengthening or undermining support for specific courses of action and for particular ideologies". Such a perspective on the language of concepts as tools enables many of the ambiguities of Winner's analysis to be resolved. It allows the elaboration of insights concerning technologies as "forms of life". It provides a deeper understanding of the role of consensus. It resolves the question as to whether democracy is to be understood as process or ends and it focusses on the politics of technology as characterizing particular discourse. It is just such a perspective which Winner's argument continually suggests, but does not develop.

The work of Langdon Winner has been very important in drawing attention to the challenges of technology for contemporary life. What has perhaps made his analysis particularly popular is his explicit commitment to democratic politics. His descriptions of technology as culture are powerful and he is a perceptive critic of the ideological claims made by optimistic advocates of technological development. His work is at once narrower than that of Ellul and Marcuse and broader than that of Dickson and Braverman. When he recognizes the realities of political power which serve to shape particular technologies, he is at his most penetrating. He is not as successful when he tries to locate the political in the technologies themselves.

The great value of Winner's work is in his explorations of technology as an idea, and in his attempts to develop a comprehensive philosophy of technology. These

26 An approach which does adopt some of these perspectives is what has come to be known as "the new sociology of technology". It argues that "science and technology are not politics, but politics pursued by other means". (Latour) Its methodology involves micro-analysis and the processes by which micro-actors constitute the macro-world. It involves the rejection of such conceptual distinctions as "technology", "society", "economics" and even "democracy" but seeks to treat them as different expressions of network alliances - whether with human or non-human allies. Social causes do not result in technical effects; everything is effects. Analysis must then examine how such alliances are constructed by microbe, word, atom or electric wire. For a concise statement of this approach, cf. Latour, B. "How to Write 'The Prince' for Machines as Well as for Machinations", a paper to the conference, Technology and Social Change, Edinburgh, June 1986. For a critique of this approach, particularly its failure to give adequate attention to the political context, cf. Russell, S., "The Social Construction of Artefacts: A Response to Pinch and Bijker", Social Studies of Science, 16, 1986, pp.331-46.
are worthy tasks. Yet, as has been seen, neither of these projects sits easily with his particular focus on politics. For they themselves are to be understood, not as the source of politics, as Winner suggests, but rather as constitutive of the political process, and indeed as political constructions themselves. It is Winner's failure to recognise this that renders his analysis of the politics of technology problematic.
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