Mastery and Enslavement as Themes in Modern Discourses on Technology

by

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ABSTRACT

The author calls into question the primacy of the optimism/pessimism split within modern discourses on technology and suggests rather that the dominant thematic division in these discourses is that between mastery over and enslavement to technology. Each of these is criticized with respect to the faulty conception of control it implies. The author concludes with a view of technology as a social practice in order to move beyond mastery or enslavement.

RESUME

L'auteure remet en question la validité de l'un des principaux débats au sein de la philosophie de technologie: celui qui dresse les optimistes contre les pessimistes. Elle soutient que le conflit fondamental est plutôt celui qui oppose les partisans du thème de la maîtrise de la technologie aux partisans du thème de l'asservissement à la technologie. Aucun de ces thèmes n'offre de moyen efficace par lequel la société pourrait contrôler la technologie, en admettant que cela soit possible. L'auteure propose une solution à ce dilemme: la technologie en tant que pratique sociale.

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Introduction

New approaches to thinking about technology have arisen in the context of an increased scepticism about the benefits of technology, and in the context of economic and social transformations associated with microelectronic technology. New questions have arisen too, including how technology interacts with the workplace, cultural life, and politics, as well as how technology can be directed, and what effects new technologies will have on society; they have involved calling into question what were formerly self-evident categories and explanations.

One common thread in this questioning and theorizing has been the repeated--though not fully articulated--connection between modernism and postmodernism, and industrialism and postindustrialism, or the significance of new information technologies to the moment of postmodernism. This is a broad and challenging area of inquiry, and sorting it out would be beyond the scope of a Master's thesis. Instead, this paper takes the present moment of crisis and technological change as the background to calling into question the dominant modern languages of technology, laying out a map, as it were, of languages of technology. It also hopes to explore what the implications are of these languages and finally, to suggest the bare bones of what seem like hopeful new theoretical directions. One of the themes weaving through this analysis

of languages of technology is control; that is, what conception of control is implied by these discourses.

The subject under investigation is necessarily broad, almost encyclopaedic in scope. This orientation reflects the intention of the thesis, which is to explore the dominant ways of writing about technology in order to question the generalizations made about microelectronics and the new centrality of information.

There are a number of ways in which the modern languages of technology might be divided up: reification vs. embodiment (Finlay), technological vs. dialectical optimism (Baudrillard), megatechnics vs. polytechnics (Mumford). The most common, however, is the perceived debate between technological optimists and technological pessimists, or those who feel technology is improving life for us, and those who feel it is not. Certainly, this is a significant division, and debates between these groups become especially important when looking at a particular technology and trying to gauge its likely effect. This division, however, should be questioned because it seems that beneath this distinction, both optimists and pessimists tend to share certain assumptions.[1] In the course of this investigation, the point

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[1]This kind of challenge is being made more frequently, as the insufficiency of the optimism/pessimism split comes into focus. See for example, Langdon Winner, Autonomous Technology Technics-out-of-Control as a Theme in Political Thought (1977: MIT Press, Cambridge, Mass.), p. 52. Winner then identifies the distinction addressed in this thesis in which "one side affirms freedom and the reality of 'choice', while the other sees mankind as a pawn in the

will not be to label technology as good or bad, but rather to come to a richer understanding of the role technology plays in our lives, and what it means to live in a 'technological society'.

In challenging the centrality of the optimism/pessimism split this paper will divide the modern discourse on technology into two basic models, which will be termed the master and slave models. On this reading, the significant debate in the modern discourse on technology is between those who write about technology as essentially a neutral instrument over which the individual or collective subject does or can exercise complete control (the master model), and those who maintain that technology has either always determined social structure and self-perception (technological determinism), or, in the late modern period, has come to exercise a role independent of our will and guidance (technological autonomism). These last two forms represent variants of the slave model. Optimistic and pessimistic writers are to be found in both of these models. In the context of the master model, optimists believe society presently exercises this controlling function; pessimists (more common now) tend to believe that more democracy, or more expertise is needed in order to direct technology according to society's will. In the context of the slave model, optimists would assert that technology, or a technology, is taking society in a positive

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indelicate hands of history." ibid., p. 53.

direction while pessimists would suggest that these technologies are negative. Any formulation of models and any polarization of discourses is something of an imposition on the theorist's part, and is bound to leave out of count a range of distinctions within and amongst these languages. By dividing the discourse in this way, this thesis aims to explore one aspect of the problem: that is, how these two models pose problems for an adequate understanding of control with respect to technologies, and hence limit our ability to think creatively about acting politically in technological matters.

In calling into question the premises and implications of the dominant discourses, this paper draws on issues discussed by a small number of critical writers. It draws in part on Finlay's critique of the language of abstraction which unites most writers on technology: optimists and pessimists, and those who feel technology is inherently good/bad/neutral.[2] It strives, however, to incorporate this notion of abstraction within a more all-inclusive framework: that of the competing themes of mastery and enslavement. Castoriadis summarizes the extremity of these positions in

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[2]This argument, which will be treated in further detail in the body of the thesis, is found in Marike Finlay, Powermatics A Discursive Critique of New Communications Technology (1987: Routledge and Kegan Paul, London); "William Leiss on Technology: a Foucauldian and Habermasian Reading," in Canadian Journal of Political and Social Theory, vol. 10, no. 1 (1986); "Technology as Practice and (so) What About Emancipatory Interest," in Canadian Journal of Political and Social Theory, vol. 11, no. 2 (1987).

which technology is treated "comme pur instrument de l'homme (peut-être mal utilisé actuellement) et de la technique comme facteur autonome, fatalité ou 'destin' (bénéfique ou maléfique)."[3] This formulation offers, in a very general way, a guide by which to consider this central issue of control.

The first chapter will consist of a discussion of the features of the master model, discussing some of the difficulties inherent in it, at the philosophical level and as it is reflected in certain contemporary practices. Chapter two will examine the basic tenets and shortcomings of the slave model and how they are manifest in popular and scholarly works on microelectronics. The final chapter will try to explore several ways critical theorists of technology have described and tried to move beyond the models described in the first two chapters, discussing the advantages and disadvantages of various approaches. Again, undergirding these discussions is the concern with ways of thinking about control of technologies.

Two clarifications are necessary at the outset. First, technology will be considered to comprise not only artifacts--concrete machines and objects--but also modes of organization (techniques or procedures). Second, in keeping with the purpose of this thesis, the major work of this paper has been in sifting through a wide variety of types of literature, and

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[3]Cornelius Castoriadis, Les carrefours du labyrinthe (1978: Editions du seuil, Paris), p. 222.

organizing a different way of understanding the rules these languages play by rather than a detailed critique of particular philosophies of technology. It is hoped that this has been achieved without doing damage to the richness of the texts.

CHAPTER ONE: The Master Model

Recently, there has been widespread concern about the dangers of certain technological developments. The earlier assumption that technological progress would necessarily lead to social progress was based on the understanding that technology was completely under our control, and therefore could be used 'for good instead of evil'.[1]

One common articulation of this concern has been to question not the technology itself, or the process of invention, but how to control or direct technologies: that is, what must society do to bring technology wholly under control so that it can be manipulated for the social good?

This kind of response has taken two forms. The first assumes that the problem lies essentially outside of the technological sphere. In this case there is a political or moral problem to be addressed--how to get the right people into power, directing the uses to which technology is put. A second position finds fault within the technological realm itself. Here, technologies need to be more carefully monitored because their effects cannot simply be assumed to be good. It is this kind of belief that underlies technology assessment. Cutting across this division is the question of

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[1]This is not to suggest that there have not been periods in the past when the presumed benefits of technology have been questioned--the Luddites' debates with the new entrepreneurs, for example.

democracy vs. technocracy, that is, whether democracy is necessary to this process, or how much of a sacrifice in efficiency should be allowed in order to foster democracy. Much of this kind of questioning goes on in the context of what has been referred to as the master model.

The master model suggests that modern technology is simply a tool over which we have complete control, or can bring under complete control. Winner describes this notion as the language of use, or what could be termed the "tool-use" model.[2] This conception of simple use and control presupposes that technologies in some fundamental way lie outside of the social world but are applicable to it. Technology thus emerges as something essentialized and abstracted, rather than wholly and completely realized only as a "material occurrence in the social world."[3] Thus, related to this conception of

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[2]Langdon Winner The Whale and the Reactor (1986: University of Chicago Press, Chicago), pp. 5-6.

[3]This tendency towards abstraction is what Finlay describes as one of two epistemological camps. According to her division of the modern discourse, more central than the distinction between optimism and pessimism is that between those who see technology as abstracted or essentialized, and those who see it as wholly embodied. She terms this philosophy of technology's "epistemological problem," a problem that dividing the discourse along the axis of optimism/pessimism cannot address. What differentiates her interest from that explored here is that in looking at the abstracted/embodied distinction, technology as inherently good, bad, or neutral all fall into the abstraction discourse; this thesis is concerned to investigate the distinctions within the languages which are primarily those of abstraction (technology as neutral vs. technology as inherently good or bad) within the context of mastery and enslavement. See Marike Finlay, "William Leiss on Technology: a Foucauldian and Habermasian Reading", p. 176.

tool-use is a tendency towards reification. Against this dominant view, it will be suggested why this notion of a subject and a society wholly removed from their creations is flawed. As the paper progresses, the work of writers who question the presuppositions of this model from the perspective of a theoretical framework aimed at capturing the embodied character of technology, the limitations on control of our technologies, and the more realistic view of political action that comes out of such an understanding will be explored.[4]

This chapter, then, will examine the philosophy of Francis Bacon, not with the intention of exploring the particulars of his thought, or as the founder of a certain conception of the role of technology, but rather as emblematic of a certain way of writing about technology. It will explore his justification of the launching of his new scientific project, the assumptions of neutral instrument status that he grants to technology, and the difficulties that this position poses. The second part of the chapter will focus on how this view of technology as abstracted from us and wholly subject to our control is manifested in current practices of a more critical nature. To do so it will examine the use of technology assessment as a means of controlling technology and predicting unwanted consequences, and it will demonstrate why this view

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[4]A starting point in the literature would be Winner, Carey, Castoriadis, Finlay, Leiss, Foucault.

is inadequate. From a discussion of the rise of the modern technological project with Bacon, and later in technology assessment, it will be clear that the master model is grounded in an image of complete control/domination of the natural and social world for the purposes of improvement using technology as the means. This conception has proved to be inadequate since 1) we do not exercise the kind of complete control over technology that the model presupposes and 2) the view of technology as separate from the social world seems to be untenable. The master model still holds to these two tenets, and even a more critical view of technology that adheres to this implicit framework, such as that of technology assessment, should be called into question.

Francis Bacon: The Master Model as Philosophy

Bacon's works are intended to put forward his case for a new picture of the role and purpose of science and technology. It is a project which requires the restructuring of the methodology of science, and the aims for which it is practised. The Baconian project is typical of the modern faith in the potential for science and technology to improve 'man's estate'.[5] It also assumes a faith in humanity's

[5]"Bacon prejudiced the understanding of the implications contained in the conquest of nature by abstracting it from the actual historical situation in which it was developing and by suggesting that the conquest of nature was intrinsically related to a harmonious social order." William Leiss, "The

ability to use technology rationally to accomplish this improvement. As Leiss has shown, the Baconian position fits snugly with the view of technological control of nature as containing two related elements: elimination of scarcity, and the establishment of social tranquillity.[6]

Because of this emphasis on the practical uses to which technology is directed, the Baconian model is pragmatic in its purposes; its concern is not with pure contemplation for its own sake, but with a cumulative, progressive improvement of the conditions under which human beings live and labour; in this way, it fits into a more general humanist concern with usefulness as a guiding principle of intellectual endeavours.[7] This emphasis on use points to a hallmark feature of Bacon's work, and of the master model more generally: the link

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Social Function of Knowledge in the Liberal Tradition," in Michael J. Gargas McGrath, ed., Liberalism and the Modern Polity Essays in Contemporary Political Theory (1978: Marcel Dekker Inc., New York), as quoted in Finlay, "William Leiss on Technology," p. 178. Note also Carolyn Merchant's discussion of the Baconian scientific project as a fundamentally middle class undertaking, The Death of Nature Women, Ecology and the Scientific Revolution (1980: Harper and Row Publishers, San Francisco), pp. 179-80.

[6]William Leiss, The Domination of Nature (1972: George Braziller, New York), p. ix. The progress of science and the development of new techniques are useful not only for control of the environment, but for social improvement; as such, they might be applied to the resolution of social problems as well as problems of management or control of nature.

[7]See Lisa Jardine, Francis Bacon Discovery and the Art of Discourse (1974: Cambridge University Press, Cambridge), p. 98. See also Carolyn Merchant, The Death of Nature, p. 180, on the connection between humanism and the belief in social betterment through technological progress.

between knowledge and power. Knowledge, even in its more theoretical form (science as opposed to technology), is directed toward the control of nature and human nature. Bacon's work, then, must be seen in light of the rhetorical power behind his belief in the virtue and success of this strong, pragmatic valuation of the purposes to which scientific knowledge and its products should be directed.[8]

In order to make a convincing case for his approach, Bacon has to show the possibility of working within a new type of inquiry that will foster the kinds of benefits he seeks. First, however, he will have to demonstrate the desirability of the project of progressive control. To do this, Bacon argues for an 'internal' type of justification, and an 'external' one.

The first justification could be called a religious one. In Bacon's view, it is the knowledge of good and evil, not the knowledge of and control over the natural realm (as symbolized by Adam's power to name the animals) that was the cause of the Fall. Our return to grace is to be achieved through a moral

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[8]This notion of the link between power and knowledge in the modern scientific project can be expressed more forcefully as a link between technological rationality and domination of nature. The theme of domination of nature (through science and technology) in Bacon's work has been explored thoroughly by Leiss, Domination of Nature, Max Horkheimer and Theodor Adorno, Dialectic of Enlightenment (1972: Continuum Publishing Co., New York), and from a somewhat different perspective, by Merchant, The Death of Nature. In addition, Leiss' work and Dialectic of Enlightenment attempt to articulate the connection between domination of nature and social domination. See, for example, Leiss, Domination pp. 15-16.

life, and working to achieve that 'pure' knowledge that we had before.[9] Thus the pursuit of scientific learning is sanctioned by Christianity.

As a second motivation, Bacon suggests that there is a point of honour connected to this pursuit of power over nature. He writes that it would be a "disgrace" if the physical world were to open up (through the exploration of the new world) and not the intellectual world.[10] He also suggests that these two phenomena were destined to happen at the same time.[11] In this way it is not simply that humanity has a duty to perform, but that there is something about this point in European history that makes it the propitious time for the expansion of human powers.

Although the physical world/intellectual world parallel would suggest that science and technology are the European destiny, the pursuit of control over nature is described as being somehow more universal; it is humanity's highest ambition because of its power to benefit the whole of humanity, as opposed to those ambitions which benefit only

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[9]Francis Bacon, New Organon and Related Writings, Fulton H. Anderson, ed. (1960: Bobbs-Merrill Co., New York), Bk. II, LII. See also Paolo Rossi, Francis Bacon. From Magic to Science, Sacha Rabinovich trans. (1968: Routledge and Kegan Paul, London), p. 162, and Leiss, Domination, p. 49. As we will discuss further below, this separation between the moral life and technological development is later undercut by Bacon's subjection of ethics to technique.

[10]Bacon, New Organon, Bk. I, LXXXIV.

[11]ibid., Bk. I, LXXXIV.

the individual (the ambition of the alchemist) or the nation. The extension of human power through science and technology lasts longer and resists the divisions of political power.[12] Bacon does not discuss, even in New Atlantis, the political context in which the scientific and technological innovation takes place except that it occurs in a context which is amenable to scientific development. The improvement of 'man's estate' can occur without much concern for nations or classes.

The third justification is what we might term an epistemological one. Bacon stresses, pragmatically, that the belief that all our efforts in the realm of technology are simply vain imitations, or conversely, that a single magician or alchemist would discover the key to nature, are just not helpful ways to think about our situation.[13] His slow and steady approach is a useful way to think about our place in nature (or vis a vis nature). At the same time, however, Bacon stresses that his methodology is intended to purge the mind of its preconceptions and create a 'true' picture of reality.[14]

These justifications recall the common defenses given for the continuation of the scientific/technological project. Optimists no longer rely on religious sanction for

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[12]Bacon, New Organon, Bk I, CXXIX.

[13]Francis Bacon, The Advancement of Learning and New Atlantis, Arthur Johnston ed. (1974: The Clarendon Press, Oxford), p. 33 and p. 36. Rossi, Francis Bacon, p. 26.

[14]"For I am building in the human understanding a true model of the world." Bacon, New Organon, Bk. I, CXXIV.

technological endeavours, but neither does it provide any brake on technological development. What contemporary technological optimists share with the Baconian position is the belief that science and technology, when directed by properly informed forces, will benefit society. Optimists also continue to valorize scientific and technological development as what defines us as modern, or developed, or advanced.

Having shown that the pursuit of control over nature is both sanctioned by Christianity and a feature of the dignity of modernity, Bacon discusses the role of technology in this new project. It seems that technology and philosophy work together to produce what is practically desirable for progress. Although it would seem that Bacon's ultimate concern should be with technology, concerned as he is about the practical betterment of our lives, his main concern seems to be with systematizing and 'scientizing' inquiry in order to overcome the chance element associated with earlier periods.[15]

Technology is necessary in this programme of control of nature. Bacon writes that the tendency so prevalent in the philosophical tradition to downgrade the "mechanical arts" must be avoided.[16] This valorization, so necessary to

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[15]See Leiss on Bacon's plan for organized research and its reception in Domination of Nature, p. 46.

[16]Bacon, Advancement of Learning, p. 70

grounding a programme of progressive improvement, was also part of the general increased interest in the practical and mechanical arts at the time.[17] Bacon asserts the importance of mechanical arts and technique through two moves; he assimilates the 'man made' world into the natural world, by asserting that natural history should include the history of inventions.[18] Second, he blurs the traditional distinction between science and technology. In order to do this, he refutes the Aristotelian distinction between theoretical, practical, and productive sciences, and replaces it with a distinction among three faculties of mind (memory, imagination, and reason).[19] The distinction becomes, for Bacon, that science is the mode of inquiry, but it is directed towards the ultimate production of practical goods. Technological artifacts and techniques are employed in the service of the new philosophy. The notion of two entirely separate fields of inquiry is denied by Bacon, since theory is judged according to its applicability.[20]

In addition to this respect for the mechanical arts which help the course of philosophy and extend human power, Bacon is also interested in designing a technique for producing

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[17]Rossi, Francis Bacon, pp. 1-2.

[18]Bacon, New Organon, Bk. I, XCIII and Rossi, Francis Bacon, p. 2.

[19]Rossi, Francis Bacon, p. 61.

[20]"all the contents of philosophy, is to be judged by its effectiveness in action." Jardine, Francis Bacon, p. 98.

correct mental processes. The methodology of his new philosophy is itself a technique. Left on its own, the mind is prone to flights of fancy, to draw conclusions too quickly, and to see more patterns in nature than actually exist.[21] Although there can be little accomplished when unaided, 'man' can do much when, starting from perception, he is guided by instruments of the mind and hand. Bacon goes so far as to say that with his methodology, the mind will be guided "as if by machinery."[22] A striking aspect of this position is the easy movement between application of technology to non-human nature and application to human nature.[23] This technique of the mind, although designed for reasoning about nature, and the creation of artifacts, can also apply to the realm of ethics.[24] It is through the subjection of human reason or human nature to a technique that human beings exert power in the world, and control nature. As will be explored below, Bacon has faith that technology is neutral and will be used for good as long as it is guided by ethical practices. The problem with subjecting the technical realm to this guidance is that ethics and reason have themselves come to be subject to technique,

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[21]Bacon, New Organon, Bk. I, XX.

[22]ibid., p. 34.

[23]See also Jardine, Francis Bacon, "Man's body and sensible soul (spirits) are susceptible to the same sort of analysis as all other natural bodies." p. 95.

[24]Bacon, New Organon, BK. I CXXVII, and Advancement of Learning, p. 103 and p. 191.

therefore the assumption that an external check on technological development exists is eroded.

To ground his vision of a new society founded on the measured pursuit of control over the environment, Bacon launches a new philosophy, which carries along with it a new epistemology. Bacon believes that the influence of the Scholastics and Aristotelians has to be, if not eliminated, then historicized.[25] Bacon takes two approaches to this dethroning: he insists on the separation of science and religion, and on the end to the priority of contemplation over action.[26]

Once Bacon has established the desirability of control through technological and scientific knowledge, he must establish the possibility of such knowledge. As seen above, this pursuit of knowledge requires a strict methodology; underpinning this methodology is a theory of the mind. According to Bacon, the mind is beset by four types of "idols": of the cave, the theatre, the marketplace and the tribe.[27]

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[25]According to Jardine, "What Bacon objected to in the Aristotelian account was not the general theory of knowledge which it implied, but the naivety of the means by which it supposed such knowledge to be discovered." Francis Bacon, p. 79.

[26]Rossi, Francis Bacon, pp. 43-4.

[27]On the idols, see Bacon, New Organon, Bk. I XXXIX, and Rossi, Francis Bacon, pp. 161-2.

The idols of the cave and the tribe are inherent in humans and cannot be corrected, although it seems their negative effects can be minimized or controlled through a proper reliance on Bacon's method. The only idol that can truly be eliminated is that of the theatre--that of Scholastic and Aristotelian philosophy. With these idols the mind is like an "enchanted glass" which perceives and understands only in a distorted fashion. However, from the relatively limited claims Bacon initially makes about overcoming language and the body, he also writes that his method will purge humanity of these idols in order to receive an accurate reflection of the world, or as he writes, to reestablish contact between man and nature and set up the mind as the true mirror of the world.[28] The means to achieving this mirroring is the careful practice of the Baconian inductive technique.[29]

Although Bacon has suggested that three of the four idols could not be eliminated but only acknowledged and accounted for, he later maintains that there is a state of pure knowledge in which the mind can be said to mirror the world, no longer the "enchanted glass." He connects this to a return to an older state, before the epistemological "fall from

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[28]Bacon, New Organon Bk I, CXXIV.

[29]According to Jardine, Bacon's method is not what he would term "puerile induction," since it relies on some first principles. See Francis Bacon, p. 85.

grace."[30] In this way, Bacon's epistemology is connected to his moral perspective about the role of scientific knowledge and reason in man's moral life. The image of the mind as mirror is connected to the pure innocent knowledge of Adam prior to the Fall, as symbolized by his power to name the animals.[31] The pure state of knowledge, then is already inextricably linked to the control over nature, just as understanding is already beset by certain 'idols' inherent in being human. The Fall comes about not because of this pure knowledge, but as a result of the acquisition of knowledge of good and evil. Bacon writes that the road back to redemption is to be achieved through a striving towards pure scientific knowledge on one hand and through righteousness on the other.[32] A further implication of this position is that scientific knowledge is separated from its application (which is subject to ethical guidance and moderation). This is perhaps a tenable claim if pure knowledge is conceived of as contemplation, but is problematic if knowledge is combined with use. With this basic understanding of Bacon's goal and

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[30]Frances Yates, The Rosicrucian Enlightenment (1972: Ark Paperbacks, New York), p. 119.

[31]Rossi, Francis Bacon, p. 162.

[32]Bacon, New Organon, Bk. II, LII. Leiss suggests that Bacon at times comes close to suggesting that grace is to be achieved itself through scientific activity, Domination of Nature, pp.49-51. Leiss also discusses Bacon's distinction between "natural knowledge" and "moral knowledge"; ibid. pp. 52-3. As Leiss points out, for Bacon, science is always innocent, even when applied, ibid. p. 50.

the view of science and technology which underpins it, the implications of this view for the master model more generally can be drawn out. First, Bacon supports the position that technologies are neutral instruments; he draws a distinction between invention and use, where the only real objection that can be made to a technology is that it is used for the wrong ends. Although he suggests that there is some kind of dynamic to technological progress, with one knowledge/power development building on the next, he does not appear to see any conflict that might arise between an internal dynamic to development on one hand, and humanity's ability to subject the uses to which our technologies are put to the guidance of the non-technological realm, on the other. This view is made more problematic by the fact that the pure knowledge is already linked to control over nature.[33] The checks on the uses of technology are twofold: moderation and the ethical life. Bacon's response to the argument that technologies may have detrimental effects is that with the direction of these two checks, technology can be applied to charitable, not vain, ends.[34] In this way, the technology is not seen as inherently good or bad (even if it is inherently controlling). The

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[33]cf. Max Horkheimer and Theodor Adorno, Dialectic of Enlightenment (1972: Continuum Publishing Co., New York) on the relation between instrumental rationality and domination of nature. Dialectic of Enlightenment perhaps shares with Bacon an inability to distinguish clearly between control and domination.

[34]Bacon, Advancement of Learning, p. 10 and p. 103, and New Organon, Bk. I, CXXIX.

problem with this position is that the process of invention and the technological dynamic is viewed as going on wholly independent of the social world but applicable to it. The 'social' aspect, direction for good or ill, comes at the last instance. Furthermore, the process of direction itself, i.e. ethics, is subject to technique. Bacon has not really attempted to address the question of how this directing of technology would take place.

Where Bacon does discuss the political context of the scientific project (in New Atlantis), he points to the existence of a politico-scientific elite. If it is true that technologies are neutral instruments, then surely Bacon is right; all that is necessary is that the non-technological realm be checked in order to insure that technology is put to proper uses. The kind of faith Bacon exhibits in the power of the scientific/technological class to distribute the benefits of innovations to all classes is replicated in the faith that the 'historically privileged' societies of Western Europe can unproblematically use the new technologies to the benefit of humanity as a whole.

The subject that confronts its technologies as neutral instruments over which it exercises complete control is a 'disengaged' self; that is, it is a subject seen to be standing apart from the world and the objects of its

creation.[35] This model exhibits a faith in humanity's ability to keep itself and its values separate from technology, while at the same time engaging in a subjection of itself, its social organization, and ethics to techniques of various sorts for collective and individual betterment. Another facet of this disengaged self is the belief in control that it implies. On this reading, humanity exercises complete control in two senses: first, through control over technologies as neutral instruments; second, technologies, when properly used, offer the opportunity for perfect control of the social and natural worlds.

The checks on technological and scientific development that Bacon has included in his project are insufficient. Because of the belief in technology as a neutral instrument, and the concomitant belief that there can be a clear separation between society and its technologies, adherents risk losing a sense of the problems involved in subjecting themselves to techniques. Predicting the outcomes of technologies on society will always be problematic as long as humanity is seen as disengaged from them.[36] That is, a

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[35]See also James Tully, "Progress and Scepticism 1789-1989," Symposium on Progress, Universite Laval, June 6, 1989, p. 10. Transactions of the Royal Society, June, 1990,

[36]Laurence Tribe has discussed the difficulties of the view of the controlling subject for making choices about our technologies, a point to be discussed below. See "Technology Assessment and the Fourth Discontinuity. The Limits of Instrumental Rationality," in Southern California Law Review, vol. 46 (1973).

recognition of the ways technologies shape us (as one of the practices which constitute us) is needed for an adequate view of the sense in which meaningful control of technologies is possible.

Technology Assessment: The Master Model in Practice

The kind of unquestioned faith in the ability of technology to lead to social betterment that writers like Bacon exhibited has of course dissipated, particularly in the twentieth century in light of the growing ecological crisis. For some, this dissipation has expanded into a general questioning about the ability of technology to answer the kinds of social questions and desires for improvement that have characterized the modern period. In some mainstream quarters, however, these concerns about negative impacts of technologies have been restricted to an awareness that technological interventions are now so massive that there is a serious problem in trying to anticipate all the consequences of a technology. Negative effects might not only be that the technology is not profitable, or that there are some purely technical problems with it (that it produces some harmful byproduct, for example); it may also be that a technology has certain positive benefits, but also certain tradeoffs that

should be evaluated in accordance with the concerns of all the relevant parties, or with the social good.

Technology assessment[37] is a particular language about technology, but it is also a technology itself, a technique for evaluating the costs and benefits of particular moves.[38] Paradoxically, then, although it is designed as a means of responding to criticisms about technology, as a technology it demonstrates a faith in the ability of technology to solve social problems. One writer in the field elaborates this paradox:

> "To fulfil the promises of the human condition, science and technology will be needed still more than before not only to solve problems that technology has caused by its precipitation or inadvertence but essentially to strike new directions for a more harmonious social development."[39]

In exploring the explicit and implicit assumptions of technology assessment, it will become clear how the kinds of

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[37] For good summaries and discussions see Goodpaster and Sayre, Armstrong and Harman, Monroe and Woodhouse. Also, see writings by some of those involved in environmental law, including Tribe, Stone, and Sagoff.

[38] Tribe points to an explicit belief amongst assessors that assessment is itself a technique. "Technology Assessment," p. 622.

[39] François Hetman, Society and the Assessment of Technology. Premises, Concepts, Methodology, Areas of Application (1973: OECD, Paris), p. 46.

issues that posed difficulties in Bacon's philosophy play out in actual social practices. An exploration of technology assessment will show how its assumptions structure the thinking and approach of a range of critical writing on technology, and how a claim that it can direct technology fully is rooted in a misguided notion of the kind of control that can be exercised over technologies. The primary areas of concern or limitation in technology assessment are the persistence of the tool-use model and its implications for establishing the 'societal context' in which a technological intervention will take place, and the faulty conception of control it implies.

The Nature of Technology Assessment

First, it is necessary to give an account of the project and methodology of technology assessment. According to one writer, the "objective of a TA strategy is to enable policy and decision makers to determine how to intervene more effectively in the development of a prospective technology."[40] It assumes that technology can be directed according to "conscious social choices" and that technologies are

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[40]Joe E. Armstrong and Willis W. Harman, Strategies for Conducting Technology Assessments (1980: Westview Press, Boulder) p. 2. This will be the primary text for the account of technology assessment, because it seems to be the most advanced, and socially sensitive discussion.

essentially neutral.[41] In order to make these choices, however, the decision maker must have a clear understanding of as wide a range of impacts and potential alternatives as is reasonably possible. Thus it "is expected to provide specified stakeholder groups with comparisons of the broad range of advantages and disadvantages of at least the most likely alternatives presently available."[42] The decision maker is thereby able to make informed decisions about the benefits and costs of various technological options based on information about how each option will affect the environment, or various social groups.

Technology assessment is a branch of policy analysis, drawing on cost/benefit analysis, and legal and environmental economics. Although technology assessments are often environmental impact studies, which monitor the effect of a particular technology on an environment and the relevant community, they can also concern technologies that can be said to have a greater effect on humans than on the natural world, such as technologies for life extension, or computers in the workplace. Likewise, although technology assessments most often concern actual technological artifacts, they may concern what are termed 'social technologies,' that is techniques or modes of organization. An assessment of flexible work schedules would be an example of this type.

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[41]ibid., p. 2.

[42]ibid., p. 3.

Technology assessment has become more systematic as a result of its modification by cost/benefit analysis. Just as rational choice models use efficiency to evaluate action, the economic approach uses overall social efficiency as the criterion for evaluating which is the preferred technological option. In this way, it is supposed to be an answer to the unbridled use of microeconomic efficiency as the exclusive criterion for whether or not to invest in a particular technological venture.[43]

In relying on cost/benefit analysis, technology assessment does not always use decision analysis (assigning monetary values to preferences), but it is true that as the technology assessment project has taken on the task of evaluating ever-broader social consequences of technologies, it has come to evaluate impacts in terms of benefits and disbenefits to interested parties.[44]

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[43]According to Tribe, the goal is to extend rational planning "to alter the institutional matrix of choice in ways calculated to inject the considerations that have been left out." "Technology Assessment," p. 621.

[44]The actual process is not all that quantitative. For example, the influential MITRE/Jones model (1971) simply divides the process into seven quite commonsensical steps: define assessment task, describe relevant technologies, develop state of society assumptions, identify impact areas, do preliminary impact analysis, look at possible action options, finish impact analysis. As quoted in Joe E. Armstrong and Willis W. Harman, Strategies for Conducting Technology Assessments (1980: Westview Press, Boulder), p. 7. Armstrong and Harman comment that the use of "formal, quantitative, or semiquantitative predictive techniques was considerably less common than that of ad hoc intuitive approaches." Strategies, p. 40.

In one of its most sophisticated forms,[45] technology assessment attempts to account for the difficulty inherent in considering intangibles like societal values by describing them as "cross cutting elements" that interact with the three functional elements of an assessment (descriptions of the possible alternative technologies, impact analysis, policy analysis).[46] This development seems to be an attempt to recognize that public values will have an effect on the possible technologies and on what is considered beneficial, detrimental, or a non-issue.

In terms of measuring or taking into account societal values, one of the most difficult problems is how to make the interests and values commensurable. As Beauchamp has pointed out in his defence of technology assessment, even the most intuitive decision making involves an element of choice between incommensurables.[47] Of course, the problem with incommensurables is not that they exist, but that assessors try to make incommensurables commensurable.[48] Technology

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[45]Armstrong and Harman, Strategies. See chart p. 13.

[46]ibid., p. 13.

[47]Tom Beauchamp in Larry Hickman, ed., Philosophy, Technology, and Human Affairs, pp. 359-60.

[48] Alasdair MacIntyre points out that the need to make incommensurables commensurable is a feature of the time and organizational constraints of bureaucracies. See "Utilitarianism and Cost-Benefit Analysis: An Essay on the Relevance of Moral Philosophy to Bureaucratic Theory," in Kenneth Sayre, ed., Values in the Electric Power Industry (1977: University of Notre Dame Press, Notre Dame), pp. 218-9.

assessment workers generally use unitless scales rather than actually trying to quantify such 'value laden' factors as attachment to a certain ecology.

Methodological Objections

Before considering the major objection in principle to technology assessment, four methodological objections should be summarized. One such objection concerns who is given status as a stakeholder. It is only possible for those who are labelled interested parties to make claims in this process. In order to be accorded the status of a stakeholder, a group must be able to participate in the assessment; hence questions of power and accessibility become relevant here. Obviously, there are also parties that cannot express themselves in this process, such as future generations, or the 'interested' natural object."

A second problem, and one that seems implicit in the master model more generally, concerns the point at which the assessment is conducted. As mentioned above, assessments will generally take a particular innovation or technology, robotics, for example, then consider various possible

"For an attempt to accord legal standing to natural objects see Christopher Stone, "Should Trees Have Standing? Toward Legal Rights for Natural Objects," in Southern California Law Review, 45 (1975) MacIntyre also questions whose considerations of harms and benefits are going to count. MacIntyre in Kenneth Sayre, ed., Values in the Electric Power Industry, p. 222.

technological options for how to develop or alter the technology based on benefits and disbenefits of pursuing certain options. This strategy, however, relies on a faulty separation between innovation and implementation which comes close to paralleling the Baconian distinction between technology and its use. Certainly, there are distinctions between different ways of developing or implementing technologies, and social implications of those differences, but this is not to say that it is advisable to draw a clear line between an essentially neutral innovation and positive or negative applications of the technology.[50]

There are difficulties associated in practice with designing a technology assessment flexible enough to consider a variety of possible options. Even those involved in the technology assessment project acknowledge that the assessor will already have an idea of what the most likely technological alternative is based on past experience.[51] Clearly, the difficulty with relying on past experience is that it tends to remove a certain criticality from the process. One assessor writes, apparently without irony:

> a current TA of the 'cashless-checkless' society might well underestimate the potential for opposition to a technology that appears to be such

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[50] Langdon Winner has an interesting discussion of the different types of social impacts a technology can have in the whole course of its development and implementation using mechanical tomato harvesters as an example. See The Whale and the Reactor, pp. 26-8.

[51] Armstrong and Harman, Strategies, p. 24.

> a natural (and hence obviously desirable) extension of past and current trends.[52]

Although the author is attempting to deal with the problems posed by the assessor's bias, there is an acceptance of the naturalness of a continuation of technology in directions that it has already gone in. This point also raises questions about the characterization of technology as 'essentially neutral'; the technology here is not neutral, but rather inherently good. Only the unintended consequences are bad.

A final interesting set of criticisms that should be noted has been made by MacIntyre. He argues that cost benefit analysis generally is subject to the same criticisms which plagued classical Utilitarianism, or at least the John Stuart Mill version. Briefly, the argument is that just as Utilitarian analysis requires a "background of beliefs and of evaluative commitments"[53] in order to answer certain basic questions implied by its method, so these problems resurface in cost benefit analysis where, in order to make decisions within a limited time frame, all factors involved must be made calculable.[54] In order to make the kind of calculations implied by cost benefit analysis, the background must remain

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[52]ibid. p. 75, emphasis added.

[53]ibid., p. 224.

[54]According to MacIntyre, there are five basic questions that cost-benefit analysis has to answer: the range of courses of action to be subject to the test, how to compare incommensurable goods, whose evaluations of benefits and disbenefits are to be considered, what should be held to be consequences of an act, and what is the correct time frame to be considered. See pp. 221-3.

implicit, because if it were made explicit, certain questions of values arise, questions that a bureaucratic structure is not designed to deal with.[55]

While MacIntyre is surely right to point out the decisions that must be made by the assessment team--for example, how long a time frame the assessment should cover--it is a difficulty assessors seem well aware of. With respect to considering the values implicit in making assessments, sophisticated assessment workers have attempted to go a certain way in accounting for this problem, at least at a theoretical level. Armstrong and Harman, for example, have used their "cross-cutting elements" as a way of minimizing the assessor's control over such factors. In considering alternative technological projections, for example, factors such as societal values "cross cut." The difficulty in technology assessment is not so much MacIntyre's point that there are implicit, unacknowledged values underlying what passes for 'scientific' analysis, but rather that assessors attempt to account for this difficulty precisely by turning values into a set of explicit features.

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[55]ibid., p. 236. MacIntyre points out that the structure of bureaucracy is such that the value of a decision is supposed to stand separate from the decision maker. The anonymity of the bureaucratic structure mitigates against decision makers arriving at conclusions that might be different if someone else were the decision maker.

Objections in Principle: Technologies and Values

As was pointed out at the start of the discussion of technology assessment, the assessment project begins from the premise that technology is neutral and is or can be made subject to 'conscious social choices'. Thus the initial premise of technology assessment accepts the Baconian position on the direction of technology: that it is separate from the realm of human values and subject to it for direction. This supposition is what can be termed TA Model One. It relies on a notion of disengagement from and direction of the products of our activity. The most sophisticated workers in the field, however, recognize that technology and values do not stand separate from each other in this fashion. They have moved to an acceptance that technologies and values interact more extensively:

> It has become commonplace to note the impact of technology on societal values...(e)qually important to the TA process are the effects of values on the development of technology.[56]

In writing of the effect of values on technology, these writers do not just mean that values can be used to direct the ends to which a technology is put, they mean that the values that exist in society will, in part, determine the kinds of technology that are developed, and thus that the

[56]Armstrong and Harman, Strategies, p. 62.

technology is not neutral. The "impact of technology on societal values" means that a given technology or ensemble of technologies will change the list of what count as costs and benefits (which is how they understand values for the purpose of this analysis). This view, which relies on a notion of feedback[57] between technologies and values/preferences, can be described as TA Model Two. Clearly Models One and Two are in tension with one another.[58] The tension is not simply that Model One is unidirectional (values influencing technology), and Model Two moves in two directions; rather that the way technologies and values interact is different: in Model Two, values affect the technology in its very origin. In turn, the values that obtain are not independent of technology, directing it, but are themselves determined by (among other things) technology.

There is, however, a further difficulty with Model Two even if Model One is rejected (thus overcoming the tension described above). Legal theorist Laurence Tribe discusses the limitations of instrumental rationality in making choices about the direction of technology.[59] By looking to this account, the problems with even the best possible account of

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[57]ibid., p. 63.

[58]And yet, they may appear together. Armstrong and Harman begin their book with the position that technologies are neutral and subject to conscious social choices (p. 2) and later take on the feedback model discussed above.

[59]Where instrumental rationality is defined as the best means to achieve a predetermined end.

the way technologies and values are related, emerges. In brief, it is precisely because technology assessment is a technology that it is constrained to see technologies and values as related in the way it does, that is, as a feedback loop, with technology determining values and values determining technology.

Recall the features of Model Two. Major technological innovations influence context, including such contextual features as who constitute victims and beneficiaries of technologies.[60] At the same time, context, as expressed in a set of societal values, influences the direction technology takes.

Tribe objects to technology assessment on the grounds that choices, in this case choices about the direction of technology, are not simply instrumental but also reform the values and the identity of the chooser. Techniques like technology assessment "fail to be illuminating to the precise extent that a choice is of this...sort."[61] Technology assessment is, as noted above, a technology. It is a method which relies on instrumental rationality in order to find the best means to achieve a given end. Instrumental rationality concerns reasoning about means, not about ends. In the case

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[60]Armstrong and Harman, p. 58. Technologies alter values, where values are conceived of as preferences, and when preferences change, what is considered a benefit or disbenefit also changes. See Tribe, "Technology Assessment," pp. 636-7.

[61]Tribe, "Technology Assessment," p. 635.

of technology assessment, the assessment is intended as a method for discovering the best way to use a given technology in order that it will line up with a predetermined set of ends (the preferences based on which costs and benefits are determined). If Tribe is correct about the role technologies play in reforming our values and ourselves, then choices about technologies concern not only means but also ends.

To what extent does the picture Tribe has sketched of technology assessment correspond to Model Two? Model Two acknowledges that the choices made, or at least the products of those choices (technologies) can not only be directed according to a preformed set of values, but can also reshape those values. It is not clear that assessors see values (in the limited sense of 'preferences' that they ascribe to the term) as constitutive of the identity of the chooser. They do understand values as reshaping the assessment's valuation of who counts as a beneficiary and who counts as a victim.[62] It is clear that Tribe and the Model Two adherents would agree that the first account (Model One) was inadequate. Tribe's point can be extended, however, to suggest that even Model Two cannot offer an account of how choices are constitutive of our values and ourselves because it treats values as essentially arbitrary; it does this because it is in the nature of

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[62]Tribe acknowledges this. "Technology Assessment," pp. 636-7.

assessment as a technology not to question ends.[63] Tribe tends to focus on why a view of technology assessment that separates technology and values (Model One) is inadequate. He comments, however, that any time assessors treat ends as essentially arbitrary, they come up with what he calls a 'series of selves'.[64] This criticism seems particularly apt for Model Two, in which there is no continuity between the society and the products of its choices.

In order to get beyond the 'series of selves' associated with the instrumental approach, Tribe posits that choices do not just work instrumentally, in order to achieve a preset system of ends, but that these choices also clarify and at time remould our values and identity.[65] Furthermore, this aspect of choices is in their nature qua choices; it is not correct to draw a dividing line betweeen operational/instrumental and self-forming/constitutive, with instrumental techniques appropriate to the former but not the latter.[66] Tribe points to extreme examples from neuropsychology and biotechnology to show how technologies

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[63]At a certain level, it is simply counterintuitive to treat ends as wholly arbitrary. If ends are just 'what people want' at a given moment, and what people want is moulded by technologies, why bother with an assessment that tries to accomodate technologies to people's (current) values or preferences?

[64]Tribe, "Technology Assessment," p. 652.

[65]Tribe, "Technology Assessment," p. 634.

[66]ibid., p. 635.

affect our very identity, but also notes that this is a feature of major technologies more generally; quoting Marx in Capital vol I he writes that "man 'changes his own nature' by 'acting on the external world and changing it'."[67] The examples drawn from biotechnology and neuropsychology are particularly clear, if extreme, examples of the way the choices made about directions that technologies are to take can reshape our identities, but they are by no means the only examples.[68]

Tribe suggests that a "necessary ingredient of a mode of thought fully adequate to the assessment of any major technology, therefore, must be a realization that to develop the technology in any given direction is to 'remake' its developers and users in a particular way."[69] Surely, the proponents of Model Two would argue that this is exactly what their scheme does; however, it encounters limitations. Tribe asks, rhetorically, whether a view of technology that accepts the role technology plays in shaping values necessarily implies a kind of technological determinism in which we become the products of our tools. And in fact, this seems to be the position Model Two finds itself in, wherein values are endlessly redetermined by successive technologies. Tribe

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[67]ibid., p. 649.

[68]Tribe uses the example of the airplane, which could be said to alter not only what we do but what we are. "Technology Assessment," p. 650n.

[69]ibid., p. 650.

argues, however, that it is the very reliance on instrumental rationality (in the form of the assessment technology) that prevents us from reasoning about ends, and thus engenders the 'series of selves'.

Tribe concludes with some (necessarily vague) suggestions about what should replace technology assessment. In order to get beyond the series of selves, the notion of instrumental rationality as the only or sufficient means to make choices about the direction of technology has to be rejected. His proposals include three elements that must be rejected: "the choosing subject as independent of its chosen objects," "ultimate ends as inevitably subjective and arbitrary," and "morally significant reason as necessarily universal to all of humanity and invariant throughout history."[70] In a curious way, Model Two does see the chooser as independent of the object chosen, because each 'unit' of chooser and object chosen is treated separately; there is no continuity of choices.

Tribe's exercise is important in suggesting that setting aside the untenable model of control of technologies suggested by Bacon and Model One does not mean surrender to a kind of technological determinism, wherein technologies remould the self and social values in a way that is wholly beyond the control or participation of social actors. The next two chapters will take up this question of the implications of

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[70]ibid., p. 653.

setting aside the view of control implied by the master model.

CHAPTER TWO: THE SLAVE MODEL

Now that the features of the master model of technology as expressed in Bacon's philosophy, and its assumptions about the nature of control, have been articulated, this chapter can explore the opposite side in this debate: the slave model. This model can contain two related but not identical tenets: technological determinism and technological autonomy. As Winner has written, technological determinism makes two claims: that the technological base is the fundamental condition "that affects all patterns of social existence" and that technological change is the most important source of change in society.[1] The technological autonomy position, by contrast, asserts that technology has

> developed a momentum that expresses certain laws of development that are both inherent in it and inevitable--that is, over which human beings no longer have any control.[2]

Stated in this way, the notion of technological autonomy suggests that there is something distinctive about modern technology or about society, that has allowed it to get out of control. Those who hold a technological autonomy position often assert, then, that technology develops according to an internal dynamic. Theories of technological determinism,

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[1]Langdon Winner, Autonomous Technology, p. 76.

[2]Larry Hickman, ed., Philosophy, Technology and Human Affairs (1985: IBIS Press, College Station), p. 217.

unlike technological autonomism are intended to be transhistorical.[3] The distinction between the two is often blurred, perhaps because the two positions are united in their opposition to the master model and its assumptions about the nature of tools and control.[4]

In both technological determinism and autonomy, technology is removed from the influence of the kind of human agency/control that is a feature of the master model. Initially, it would seem that the distinction between the two types of slave theories lies in the degree of importance ascribed to technology. It would seem consistent to suggest that the developments in technology are not subject to human control, without suggesting that the technological realm colonizes or determines all other areas (social relations, ethics, etc). And yet, this is not the view of most writers who hold this position; they suggest that the technological realm cannot be limited.[5]

This slave model has become increasingly powerful in the last twenty years, finding its home in futurology and

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[3]On the historical conditions of a theory of technological determinism, see Robert Heilbroner, "Do Machines Make History?" reprinted in Hickman, ed., Philosophy, Technology and Human Affairs.

[4]For an example of this confusion, see Hickman, ed., Philosophy, Technology, p. 218.

[5]Jacques Ellul is the strongest proponent of this view, arguing that efficiency comes to be the standard against which everything is judged, although perhaps only because his definition of technique is so broad.

predictions about the 'computer revolution'. These predictions may be optimistic or pessimistic, left- or right-wing, but they share the view that it is microelectronic technology that is going to change the character of our economic, social, and political worlds. There are several reasons why this approach is so appealing, particularly for the study of contemporary social transformations, but it may seem particularly promising at a time when traditional tools of analysis, adequate to analyzing the industrialization/modernization process, no longer seem appropriate for understanding the kind of changes occurring in Western industrialized countries.[6]

Instead of focusing on the agent, the willing subject (humanity) which transcends and hence controls the technological realm, the slave model takes the technological object as the basic unit of analysis. The question for theorists of this type is: what are the inherent characteristics of this or that central technology and what social impacts flow from, or are caused by those characteristics? Typically, researchers investigate the impacts on the political realm (more democratic or less), the world of work (more or fewer jobs, decentralized or

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[6]See, for example, Baudrillard's move from the categories of political economy to those of semiology in Mark Poster's Jean Baudrillard Selected Writings (1989: Polity Press, Cambridge) or Poster's own move from mode of production to mode of information in Foucault, Marxism, and History Mode of Production vs. Mode of Information (1984: Polity Press, Cambridge).

centralized). Usually, these writers follow the determinist convention of making a particular technological innovation the lynchpin on which social transformation occurs. They also share many of the technological autonomy writers' linguistic conventions (including the assertion of the inability to alter the direction that technological development takes) as well as a belief that there is something distinctive about microelectronics--its pervasiveness, its impact on language--that makes it distinct from all previous paradigmatic technologies. For other slave model writers such as Baudrillard, this acceptance of the autonomy of technology as a new phenomenon is even more clear. The slave model is problematic not only because it leaves little room for a response other than quietude or resignation. The slave model posits an unrealistic and unhelpful lack of agency; unlike the master model, which focuses on the moral and technological will of humanity and its power to exert complete control, the slave model denies our ability to act. In rejecting the language of use and control that was such an important feature of the master model, the slave model substitutes a position in which society is controlled by the very products of its praxis.

Heilbroner has written:

> technological determinism is thus peculiarly a problem of a certain historical epoch--specifically that of high capitalism and low socialism--in which the forces of technical change have been unleashed,

> but when the agencies for the control or guidance of technology are still rudimentary.[7]

While it is hardly clear that our problem is one of waiting for politics to 'catch up', one of the most interesting aspects of technological determinism as a theory is what it indicates about a dominant way of understanding social life from within the heart of the technological society. Woodward describes these theories as "myths" which are used to interpret our own history.[8] Leed describes the conceptions of determinism of communications media as "summarizing symbols" which are used to make sense of the concepts of control and autonomy.[9]

Marshall McLuhan: Salvation Through Enslavement

It is into this general constellation of ideas and questions about where the current proliferation and commodification of media are 'leading us' that the work of

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[7]See Heilbroner , "Do Machines Make History?" in Hickman, ed., Philosophy, Technology, p. 248.

[8]Kathleen Woodward, ed., The Myths of Information: Technology and Post-Industrial Culture (1980: Coda Press Inc., Madison), pp. xiv-xvii.

[9]Eric Leed, "Voice and Print: Master Symbols in the History of Communication," in Woodward, ed., Myths of Information, p. 49.

Marshall McLuhan fits. McLuhan's work offers a particularly clear example of how the slave model effectively challenges the 'neutral instrument' assumptions of the master model, by showing how radically our technologies change us. By exploring these challenges to the assumptions of the master model, and accepting some of the new ways of understanding the relation between society and technology that it implies, this chapter can pave the way to a richer notion of autonomous technology to be discussed in chapter three.

Even though the intention of this chapter is not to present a systematic treatment of McLuhan's thought, his controversial style and content make a discussion of his premises difficult.[10] He writes in what he describes as a "mosaic" form,[11] darting over a broad spectrum of issues, returning time and again to the same images, the same themes and anecdotes. The reader's irritation with this practice would no doubt be interpreted by McLuhan as a symptom of our entrapment in a bygone technological era. Stylistically, he appears to be trying to write from within the new electrical-technological paradigm. McLuhan's hopes for a reintegration of the self and the community may mark him as what Benamou

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[10]Virtually everyone except the most ardent McLuhanites seems to find his writing frustrating. For a particularly acerbic view, see John Fekete, The Critical Twilight Explorations in the Ideology of Anglo American Literary Theory from Eliot to McLuhan (1977: Routledge and Kegan Paul, London).

[11]Marshall McLuhan, The Gutenberg Galaxy The Making of Typographic Man (1962: University of Toronto Press, Toronto) p. 265

calls a conservative "happy technophile"[12] whose work would be assimilated and overtaken in the next two decades by more pessimistic structuralist and post- structuralist 'technocritics', but his concerns with the formation and construction of the self by technology are still relevant.

Although McLuhan's work is bounded by its tendency towards hyperbole and its quirky character, there are echoes of his thought in the works of some communications theorists, as well as the predictions of those who describe the oncoming computer age. The themes and conventions discernable in his work seem particularly relevant at a time when there is so much discussion about the 'impact' of microelectronics and the social transformations generally included in the term postmodernism. In order to understand better some of the characteristics of and problems with the slave model, this chapter will explore five issues: the nature and depth of his determinism, the challenge his work poses to the master model, his theory of technological and social change, the relation of his work to some more recent thinking about our 'postmodern condition', and finally, the reasoning behind this model and the problems with it. McLuhan's work will also be distinguished from other slave model theorists such as Ellul. What unites McLuhan's and more recent determinist positions

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[12]Michel Benamou, "Notes on the Technological Imagination," in Teresa De Lauretis, Andreas Huyssen and Kathleen Woodward, eds., The Technological Imagination (1980: Coda Press, Inc., Madison), p. 68.

is the tendency to abstract technology and technological change from their inherently social and power-bound milieu, and an unsatisfactory account of control.

McLuhan is understood to be a technological determinist, first because he feels that technological change is the ultimately determining factor in explaining how social formations change through history, and second, because the most central aspects of life in the modern age are seen as caused by print as the dominant medium of communication.[13]

Related to this notion of determinism is McLuhan's belief that human beings are in no way the creators or masters of their technologies. For McLuhan, technological change catches humanity totally unaware, remoulding, as it proceeds, not only the social world, but also the mode of reason and perception. Human beings are technologically determined through and through:

> These consequences [of new technology] occur not in our thoughts or opinions, where we are trained to be critical, but in our ordinary sense life, which creates the vortices and matrices of thought and action.[14]

By rejecting the master model's conception of control and direction, McLuhan's work opens up a perspective on the centrality of technologies in social life. McLuhan explores

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[13]His position in The Gutenberg Galaxy is that print engenders a certain mode of operation and rationality (hierarchical and sequential) which then spreads to other facets of life such as industrial production. See also Understanding Media The Extensions of Man (1964: McGraw-Hill, New York), p. 172 and p. 118.

[14]McLuhan, Gutenberg Galaxy, p. 30.

this issue through the meaning he gives to the two phrases "medium is the massage" and "medium is the message." With respect to the first, McLuhan's work questions the disengaged stance of the master model by looking at the extent to which technologies affect the body. Whereas the master model relies on the notion that technology is primarily a tool or neutral instrument which can be used to good or bad ends, McLuhan describes instead how technologies insinuate themselves into our lives and thus effectively resist direction. His thesis is that the range of technological effects in the contemporary period is so extensive, that technologies are now so inclusive, that they become invisible.[15] His goal is to make us aware of how intimately technology affects us and structures our lives.[16] In fact, his primary concern is with how technology shapes the body and the senses, not the social or political realm. This has led Benamou to describe his work as an aesthetic rather than social theory.[17] To this end O'Neill has written that McLuhan's work was important for its understanding that "all technology is bio-technology,"[18] which

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[15]McLuhan, Understanding Media, p. 57.

[16]See Arthur Kroker, Technology and the Canadian Mind Innis/McLuhan/Grant (1984: New World Perspectives, Montreal), p. 55.

[17]Benamou in De Lauretis et al., Technological Imagination, p. 69.

[18]John O'Neill, "Bio-Technology Empire, Communications and Bio-Power," in Canadian Journal of Political and Social Theory, vol. 10 no.1-2 (1986) p. 72.

is to say, all technology inscribes itself on our bodies. McLuhan is indeed most idiosyncratic but most interesting in his discussions of how intimate the effects of technology can be, by focusing on the effect technology has on perception and 'sense ratios'; as older technologies were extensions of the senses, electric technologies are extensions of the nervous system.[19] Because of the pervasive effects of media on reason, perception, and all our forms of life, judgment is affected too. Society cannot, on this reading, simply stand back and adjudicate between competing technologies or technological forms of life since the very perception of reality is technologically determined.[20] The imagery of the technologized body is so pervasive in McLuhan's work, that humanity seemingly becomes part human, part machine.[21] At times we seem to become technological artifacts ("servomechanisms") or servants ("sex organs of technology").[22] This 'working over' by technology is thus the meaning of "the medium is the massage." Kroker discusses this massage in some detail. He writes that because we are, according to McLuhan, the first to live completely within the "mediated environment of the

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[19]McLuhan, Understanding Media, p. 52.

[20]McLuhan does offer the possibility that the artistic figure may be able to gain some critical distance, and that in spite of the seeming inevitability of the changes technology brings, there is a value in awareness.

[21]See Kroker, Technology and the Canadian Mind, p. 71.

[22]The latter phrase points to a nice ironic inversion of one of the master model symbols of control: technology-as-phallus.

technostructure"[23] a rediscovery of humanity must come from within the heart of technology.[24] This, presumably, is part of the reason McLuhan tries so hard to show how fully technologized the social environment has become. McLuhan's model challenges the master model's assumptions about control at the roots, by challenging the idea that human beings exist, perceive, and sense, completely from outside the technological universe they have created, witnessing it instead of living it.

The second challenge McLuhan offers is in his use of the phrase "the medium is the message." A more orthodox conception of communication defines it as simply the emission and reception of information for the purposes of control. This definition is what Carey describes as the "transmission model."[25] As Woodward has pointed out, it is a model that rests on a bourgeois conception of the autonomous individual,[26] that is, a self who is removed from the media of communications and the web of meanings that the mode of communication might be said to create, simply receiving as 'input' the content of the message. McLuhan, in using the phrase "medium is the message," means to suggest that media

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[23]ibid., p. 56.

[24]ibid., p. 64.

[25]James W. Carey, Communication as Culture, (1989: Unwin Hyman, London), p. 15.

[26]Woodward, ed., Myths of Information, p. xviii.

are important for the mode of expression or way of relating that they embody, and not for the particular message or content of what they transmit:

> the personal and social consequences of any medium--that is, of any extension of ourselves--result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology.[27]

As such, then, microelectronics are important not for the messages they transmit, but for the way they transmit. Writers such as Fekete have been extremely critical of McLuhan's refusal to recognize the potential for emancipatory content. It may well be that McLuhan is too categorical in his refusal to look at content, but it seems to be a useful corrective to the "it depends how you use it" school.[28]

McLuhan states his theory of technological determinism most clearly in The Gutenberg Galaxy. Although the theory can be applied to all epochs, McLuhan is concerned here to show how the modern self in the West has been constructed. As such, it is a book about "the making of typographic man." McLuhan's definition of media is very broad; as one McLuhanite defines it, a medium can be "any system, formal or informal, which people use to relate to each other or to their social

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[27]McLuhan, Understanding Media, p. 7.

[28]See John Fekete, The Critical Twilight, p. 157. As Baudrillard writes of McLuhan, along with Benjamin he realized that technology was not a productive force (hence amenable to the master model), but a medium, the "form and principle of a whole new generation of meaning." Jean Baudrillard, "Symbolic Exchange and Death," in Poster, ed., Baudrillard, p. 138.

world."[29] He chooses, however, to focus on media of communication as the central technology.[30] Baldly stated, McLuhan holds that certain 'defining' technologies cause the social practices of an age, as opposed to 'going along with' those practices or being one of them. Although his central concern has been with the body and the individual, he also discusses, here more than elsewhere, the impact of technology on the social world. In doing so, he draws on Innis' work.[31] Because of the central role accorded to communication, he divides Western history into three major periods: oral, print, and the incoming electric/electronic culture. There are certain inherent characteristics in these media that structure these changes. In this way, today's 'backward' oral societies and our own pre-print era--their mode of reason, social organization-- were caused by the primacy of oral communication.[32] What is left unarticulated in McLuhan's work

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[29]Edward Lias, Future Mind (1982: Little, Brown and Co., Boston), p. 4.

[30]Carey points out that neither Innis nor McLuhan makes clear why communication is so central. See James Carey in Raymond Rosenthal, ed., McLuhan: Pro and Con (1968: Funk and Wagnalls, New York), p. 272. Although it is less clear that this is true for Innis, in McLuhan's case, the notion of the centrality of communication can be linked simply to the rise of new communications technologies emerging at the time of his major writing.

[31]Carey in Rosenthal, ed., McLuhan: Pro and Con, p. 281.

[32]cf. McLuhan in The Medium is the Massage: "All media work us over completely. They are so persuasive in their personal, political, economic, aesthetic, psychological, moral, ethical, and social consequences that they leave no part of us untouched..." p. 12.

is the connection between the effects on the body that he documents and the effects on the social body. There is little discussion of how bio-technology, to use O'Neill's phrase, is filtered through the social world.

With the advent of print and subsequently industrial technology, society comes to be fully modern: individuated, fragmented, sequential. Print and industrial technology separate individuals in space (through the notion of privacy), in thought (through point of view), and in work (through specialization).[33] Because print is such a visual medium, for McLuhan, the visual becomes central to all our institutions and ways of life.[34]

By contrast, the new society to be created by electric media imposes a longed-for reconciliation: a new community or retribalization. This theme of reconciliation recalls Bacon's notion that 'progress' would in fact be a kind of return to our status before the Fall. For McLuhan, it will not be a simple rolling back to a bygone age or state of grace, but a reasoned return, and hence a progression.[35] Unlike other progressivist theories of technology which see it as a resource, this reconciliation does not come about as a result of a move by a subject of history; rather it seems to take place without any human agency at all. The

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[33]McLuhan, Understanding Media, p. 107.

[34]McLuhan, Understanding Media, p. 324.

[35]ibid., p. 155.

postindustrial era will be one of touch, simultaneity, and icons, and it will, it appears, emerge naturally out of the dynamics of technology.

This belief in technological determinism gives the defining technologies the status of what Leed calls "summarizing symbols."[36] That is, they are myths that are used to interpret the course of Western history and the changing character of the social world. For Leed, technology is like a metaphor for understanding questions such as individual autonomy and control. Technology has achieved this defining status in virtue of its central role in the control of nature and in social regulation.[37] Leed's understanding of the power of these symbols is particularly instructive in trying to understand McLuhan's work, as he charts out the "myth of communication." On Leed's reading of the myth "defining elements have been introduced into our culture" which lead to gains or losses with each acquisition.[38] Hence, print technology implies, or in McLuhan's strong sense, causes individualization and alienation, the autonomous self and anomie. Electronic technology is greeted with optimism or pessimism because it offers the prospect of reunification or

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[36]Leed, in Woodward, ed., Myths of Information, p. 49.

[37]ibid., pg. 41. For another view of the significance of technology-as-metaphor, see D.O. Edge, "The Technological Metaphor." in D.O. Edge and J.N. Wolfe, eds. Meaning and Control Essays in Social Aspects of Science and Technology (1973: Tavistock Publications Ltd., London).

[38]ibid., p. 43.

the loss of the "critical distance necessary for judgment."[39] Presumably, with this move, theoretical categories like 'alienation' also collapse. Technology becomes an interpretive tool with which to understand the self and the boundaries between the self and the social. The collapse, or decentring of the notion of the autonomous subject and the simultaneous developments in media may lend this model a certain persuasive appeal.

McLuhan's position differs from that of the master model with respect to the underlying picture of the disengaged subject. His position in The Gutenberg Galaxy is that citizens of Western industrialized countries are undergoing a shift in identity from the atomized, bourgeois self (the private man of letters) to a retribalized, reintegrated self. Recall, however that this belief in the autonomous self required a transmission view of communication (which was itself linked to the master model of technology). McLuhan is suggesting that even the experience of being outside of technology, able to reflect on it and control it, is an experience itself created/determined by the dominant medium of communication.

In spite of the critical eye he casts on our ideal of the literate, removed, individual, McLuhan's concern remains

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[39]ibid., p. 44. This could be compared to Baudrillard's notion of the collapse of the social that arrives with the proliferation of the mass media; see "The Masses. The Implosion of the Social in the Media," in Poster, ed., Baudrillard.

largely with the effects of technology on the individual, on the body, and on perception. As Carey points out, his original contribution was in this area, not in the area of social change and technology.[40] McLuhan's focus on the body and the individual is replicated in his focus on the individual as the locus of freedom. To the extent that the actor or agent figures in McLuhan's work, the figure is that of the artist, the solitary figure aware of the nature of perception.[41] While Innis' work on monopolies of power/knowledge allowed him to explore how the bias of communication structures power relations, McLuhan's focus offers no such opportunities. The individual appears surrounded by a technological environment, undistinguished by a clear theory of how media of communication are played out in social and power relations.[42]

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[40]Carey, in Rosenthal, ed., McLuhan: Pro and Con, p. 281. Unlike McLuhan, Innis studies the effects of media on cultural and social organization. He looks at how the bias inherent in certain media favours certain power blocs, and how these in turn could create a monopoly of knowledge which would define the older form of knowledge and the old technology as illegitimate; Innis' political project is to encourage marginalized and regional 'voices' in an attempt to combat this monopoly. (cf. McLuhan's happy faith in the incoming era as one which will be 'all centre and no margins').

[41]See Kroker, Technology and the Canadian Mind, p. 66 on McLuhan's focus on individual freedom. See also his discussion of the artist as model, p. 58.

[42]It should be noted that McLuhan does discuss the effects of print on social organization (that is, that it leads to hierarchy) in The Gutenberg Galaxy, but there is no real discussion of how technologies are power bound.

This artist/actor who emerges as the focus of agency, seems in fact to undercut McLuhan's general position. In spite of the effacement of the subject, the human agent, in McLuhan's proto-structuralist theory, the solitary figure of the artist periodically emerges. The presence of this figure seems to lend an air of contingency to what had before seemed a wholly determined process; the transition to the "global village" is not as automatic as it might have at first appeared. Fruitful use of the electric technology requires an awareness of the technological sensorium, an awareness at the level of perception. It is not clear, however, what this simple awareness is meant to accomplish. It is this same individualist perspective that allows him to be optimistic about the possibilities of a new community in a world with no public space, instead of looking at the difficulties it might pose for any kind of 'retribalization'.[43]

McLuhanism and Postmodernism: McLuhan and Baudrillard

Although McLuhan's work was written before the burst of interdisciplinary activity concerning modernism and postmodernism, it strikes a chord with some of these

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[43]This limitation in McLuhan's work leads him to suggest for example that the new media will lead to a diologue among "centers and among equals." (Understanding Media, p. 273). For another look at technology and bio-power, see John O'Neill, Five Bodies The Human Shape of Modern Society (1985: Cornell University Press, Ithaca), pp. 151-3.

theorists, particularly as much of their work concerns communications theory. It is no coincidence that McLuhan's work is recognized by semiologist Jean Baudrillard.[44] Postmodern theorists are far less likely to be technological optimists than McLuhan, and more likely to concern themselves with contingency and indeterminacy; still, there is an interesting convergence in their views of the 'postmodern condition'.

Baudrillard's work is typical of a recurring theme in writing on postmodernism in its perspective on technological autonomy. According to Baudrillard, the contemporary period is characterized by the infinite play of signs and total mediation in a technoogical world. The 'human' is essentially read out of the technological society, which seems to work and regenerate completely independent of the will of individuals or classes. This theme is also present in Ellul's work.

In the McLuhanesque world, the postmodern condition, a state of both heightened anxiety and numbness[45] and a collapse or implosion of the former legitimating categories of the self, science, rationality and aesthetics, could be understood as the effect of being on the cusp of a new technological paradigm. The condition of numbness or shock so often

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[44]For a look at some of the links between Baudrillard and McLuhan, see Kroker, Technology and the Canadian Mind, pp. 62-3.

[45]See McLuhan, Understanding Media, p. 154. For a description of postmodern society, and a sample of postmodern writing on the subject, see the preface to Arthur Kroker and David Cook, The Postmodern Scene (1987: New World Perspectives, Montreal).

commented upon by postmodern critics is, for McLuhan, a biological response to an intense sensory experience. What is distinctive about the current period is the extension of the nervous system. In this way, human beings are said to find themselves residents of a complete "technological sensorium."[46] The postmodern moment, Kroker writes, occurs when "technique is no longer an object which we can hold in front of ourselves as a site of contemplation, but when technique is us."[47]

McLuhan would have interpreted the current crises of legitimation and scepticism as the effect of the period of transition from one technology to another, and hence from one rationality to another. In his discussions of the shock of moving from one era to another, McLuhan touches on some of the same themes as Baudrillard, although from a somewhat different perspective.[48] One of these is the notion that contemporary

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[46]"...because the central nervous system has been exteriorized, we become processed through the technological simulacrum." Kroker, Technology and the Canadian Mind, p. 57.

[47]Kroker and Cook, The Postmodern Scene, p. 249. McLuhan, of course, would suggest that there was never a period when we could hold technology apart from ourselves; this is implied in McLuhan's treatment of the myth of Narcissus: we, like Narcissus, are unable to see that which we love and hold outside of ourselves, is in fact an extension of ourselves. See Understanding Media The Extensions of Man (1964: McGraw-Hill, New York), pp. 41-2.

[48]Baudrillard believes he has moved beyond what he sees as the fundamental dichotomy in the modern discourse on technology, that of optimism and pessimism. It seems that Baudrillard would place my master and slave discourses in his 'optimism' camp, with technological optimists being slave model thinkers like McLuhan and what he terms dialectical optimists being my master model Marxists. See "The Masses," in Poster, ed., Baudrillard.

society is characterized by pseudoevents or appears as a simulacrum.[49] This is the realm of the "hyper real."[50] For Baudrillard, this experience of unreality is unprecedented, but McLuhan holds that this sense of pseudoevents is recurring, marking only the transition between dominant media.[51]

McLuhan and Baudrillard both see the proliferation of the new media as implying the reign of the sign. McLuhan would agree with Baudrillard that this is the era of the sign and the unrelenting exchange of the sign. For McLuhan, the coming of the information age signals the replacement of the consumer age by the icon age[52] during which the boundaries between culture and technology, art and commerce, and work and leisure are blurred.[53] He anticipates a general implosion in all realms as distinctions between formerly discrete areas, such as art and business, collapse. The sequential world, with its distinctions between the public and the private, also

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[49]Compare McLuhan, Understanding Media, p. 199 with Baudrillard's discussion of media in "Simulacra and Simulations," in Poster, ed., Baudrillard.

[50]Baudrillard, "Symbolic Exchange and Death," in Poster, ed., Baudrillard, p. 146.

[51]McLuhan, Understanding Media, p. 199.

[52]ibid., p. 167.

[53]ibid., pp. 346-7.

collapses. All becomes immediacy[54] in a process similar to what Baudrillard describes as obscenity:

> Obscenity begins precisely where there is no more spectacle, no more scene, when all becomes transparence and immediate visibility, when everything is exposed to the harsh and inexorable light of information and communication.[55]

So in McLuhan's work, there are a number of features that resemble the 'symptoms' of postmodernity. McLuhan sees these symptoms as the result of a recurring shift between paradigmatic technologies. Humanity is destined not to understand what is happening to it and experience only continued numbness as long as it fails to understand the deep impacts of technology, that is, as long as it continues to adhere to the master model.

Totalizing Technique: Ellul and Baudrillard

Although McLuhan and Baudrillard share certain features in their analyses of the contemporary situation, Baudrillard

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[54]Or 'overall implosion': McLuhan, Understanding Media, p. 243.

[55]Jean Baudrillard, "The Ecstasy of Communication," in Hal Foster, ed., The Anti-Aesthetic: Essays of Postmodern Culture (1983: Bay Press, Port Townsend), p. 130. Baudrillard retains a certain criticality here that is entirely missing from McLuhan's work. However, by the time Baudrillard writes "The Masses," he has come to posit passivity as a viable and legitimate political strategy.

differs from McLuhan in his avoidance of McLuhan's reification. McLuhan's work, typical of much technological determinism, tends to understand technology as imposed on society from the outside, carrying with it certain inherent features which cause society to change in a particular direction. As such, it has difficulty accounting for the process of technological change. Technology thus appears as abstracted from the social world. For Baudrillard, the 'obscenity' of the reign of the sign is an inherently social transformation. In this sense, and in his more critical perspective, Baudrillard is closer to Ellul.[56] For Ellul and Baudrillard, as for McLuhan, there is no real meaning that can be given to the concept of direction of technology.[57] Technology, however, does not appear as an abstraction which imposes itself from outside; the problem with the slave model is thus not exclusively one of abstraction.[58]

It is useful to compare Ellul to McLuhan briefly if only because both are often termed technological determinists.

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[56]See Jacques Ellul, The Technological Society, John Wilkinson, trans. (1964: Knopf, New York).

[57]This is most clearly evident in Ellul's and Baudrillard's discussions on the media of mass communication, and the public opinion poll.

[58]Hence Finlay's division into abstracted/embodied does not cover all problematic ways of writing about technology.

Ellul's concern is not even with technology as such, but rather with the technological society. This interest is reflected in Ellul's use of the term 'technique'. He is not referring (primarily) to technological artifacts, but rather to a mode of being or activity characterized by rationalization, systematization and efficiency;[59] In this sense, Ellul's criticism of the technological society is similar to Horkheimer's and Adorno's critique in Dialectic of Enlightenment: that the supposedly 'enlightened' society is in fact completely dominated by instrumental reason. Benello comments, however, that Ellul's analysis avoids the articulation of the connection between instrumental reason and social domination that can be found in the work of the Frankfurt School, and in later writers such as Braverman.[60]

The difference between Ellul's work and McLuhan's (in addition to the optimism/pessimism split), can best be understood by examining Ellul's account of the origins of the technological society. First, Ellul does not maintain that technology has always been determinant of society. Technological determinism is a feature of modernity. Second, the coming into being of what might be described as a

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[59]Darrell J. Fasching, The Thought of Jacques Ellul: A Systematic Exposition. He comments that it is not so much technology but "the technological society and the illusion of freedom it fosters" that are criticized. p. 13 and p. 16.

[60]C. George Benello, "Technology and Power: Technique as a Mode of Understanding Modernity," in Jacques Ellul: Interpretive Essays, Clifford G. Christians and Jay M. Van Hook, eds. (1981: University of Illinois Press, Chicago), p. 94.

technological ethos is neither the result of a consciously directed project of the state or a particular class (so it avoids the master model's assumptions about control), nor as the result of the imposition of a particular paradigmatic technology. It is the result of a combination of factors emerging at the same time early in the modern period. From an initial point at which localized special interests built up procedures and techniques, efficiency comes to mould all aspects of the social in its image, such that formerly discrete areas such as art or religion become consumed by technique.[61] Thus, instrumentalist procedures, procedures of efficiency, are first manifest in (to use a Foucauldian term) various micropractices, then colonize all social practices until society as a whole becomes directed by efficiency; Ellul understands technique as essentially a mode of activity which can then be identified with all elements of the social.

As interesting as this account is, particularly because it avoids reifying technology, Ellul's characterization still relies on a notion of complete enslavement. Certainly, the fact that this enslavement is pessimistic is not a sufficient reason to reject it. The notion of technique as encompassing all society, however, is neither very helpful at the level of theory, nor accurate at the level of experience.

Ellul's characterization lies open to the charge that it is too totalizing, that it simply paints too broad a picture

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[61]Langdon Winner, Autonomous Technology, pp. 124-7.

of the character of contemporary societies. This picture is not helpful for drawing distinctions between societies, for example.

Benello has pointed out that within Ellul's scheme, there is no way to distinguish between the value that should be put on different technologies; those that comply with soft versus hard energy paths, for example.[62] Ellul's response would presumably be that whatever the 'one best means' is, will be the technology that obtains. Benello's point, however, is that technologies are designed for reasons that have nothing to do with efficiency.[63]

McLuhanism and Post-Industrialism

In spite of the highly particular nature of McLuhan's work, his writings have implications that surface in much of the writing about the coming computer age, or microelectronic revolution.[64] This work is determinist in its belief that technologies, which appear in these texts as though they were imposed on society from beyond, determine new social formations. They also tend to suggest that the scope of new

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[62]Benello, in Christians and Van Hook, Jacques Ellul, p. 104.

[63]cf. Winner, "Do Artifacts Have Politics?" in The Whale and the Reactor. Furcher, the existence of criteria besides efficiency in design suggests that technique does not colonize all social practices.

[64] Theodore Roszak, The Cult of Information (1986: Pantheon Books, New York) gives a good account and criticism of the ideology of the 'information age'.

technologies is unlike anything previous. McLuhan's work and the determinist writing on microelectronics have much in common. While the slave model provides a useful corrective to some of the limitations of the master model, its determinism provides an inadequate way of understanding the relation between humans and the technologies they create, or the way these same technologies form part of their way of life. Both McLuhan and writers on the 'microelectronic revolution' posit a central technological artifact as imposing changes on society without exploring the social forces and transformations that go into the formation of these technologies.

The kind of writing that fits into this genre can include both optimistic and pessimistic futurology, although most of the more accessible work is optimistic. The common feature of these works is their assumption that certain inherent characteristics of computers will lead to predictable effects. Clearly, any technique or artifact embodies certain values and hence certain politics simply in virtue of being designed and realized in society. The problem arises in seeing technology as determinant of, instead of part of society. This tendency is what Finlay has termed a-contextuality:

> (m)ost discourses on technology are forced to be deterministic or even ahistorical because they can

> not cope with the contextual relationship of technology to society in history.[65]

The front line of this kind of work is represented by writers like Bell, Naisbitt, and Toffler, but as the use of computers over a range of activities becomes more common, works in a similar vein spring up as well.[66] As several writers have pointed out, this kind of prediction is not new, but was a feature of the Industrial Revolution as well.[67] Current futurology is differentiated by the belief that communication is more fundamental than production, therefore information technology will have a more powerful role in shaping society than industrial technology:

> The present explosion of information technology and of microelectronics is much more closely related to the functioning of society as a whole than was the Industrial Revolution...(m)icro-electronics affects the very essence of social cohesion, i.e. communication.[68]

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[65] Marike Finlay, Powermatics. A Discursive Critique of New Communications Technology. p. 51. The features of an a-contextual position for Finlay include: the use of generalized subjects like 'society'(p. 52) which hides the treatment of technology as a subject and humanity as the object (pp. 89-90). This kind of a-contextuality is a large part of what Finlay's criticism of the language of abstraction is based on.

[66] See, for example, Herbert Simon, Nora and Minc, and Barrie Sherman.

[67] Carey and Quirk, "The History of the Future," in Carey, Communication.

[68] Klaus Lenk, "Information Technology and Society." in Microelectronics and Society: For Better or Worse. A Report to the Club of Rome, Gunter Friedrichs and Adam Schaff, eds. (1982: Pergamon Press, Oxford), p. 274. This kind of writing tends to obscure the problems in the field of production and work relations that accompany the new technologies.

Common predictions include the belief that computers will lead to a changed conception of privacy, an end to class differences, the end to a society based on conflict and the rise of 'synergistic' models,[69] as well as the supremacy of formalized, systematized, decision-making processes.[70]

In keeping with the seeming inevitability of these transformations, there is normally little analysis of the potential impact of different sectors of society in shaping the direction of the information age. Finlay notes that unless the public is placed in a consuming role, it is generally portrayed as passive.[71] The transformation of society may result from the dynamic of some impersonal force or inherent characteristic of the technology:

> (the) impact on personal privacy became a public issue twenty years too late, not because anyone in particular was negligent, but because Media Principle One was operating.[72]

One example of the flaws of this kind of prediction is the discussion about artificial intelligence. In spite of the intractability of the problem of producing common sense in

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[69] Simon Nora and Alain Minc, The Computerization of Society (1980: MIT Press, Cambridge, Mass.), p. 127. See also Yoneji Masuda, "Computopia," in The Information Technology Revolution, Tom Forester, ed., (1985: MIT Press, Cambridge Mass) on "voluntary local communities," p. 623.

[70] Lias, Future Mind, pp. 184-5.

[71] Finlay, Powermatics, p. 90.

[72] Lias, Future Mind, p. 16, where Media Principle One is that "new media are accepted in each culture with little forethought or planning." ibid., p.13.

computer systems, many futurologists have faith that computers will take over all or most public decision-making functions. The consequence of this kind of writing is that 'intelligence' and decision-making come to be identified with that which artificial intelligence workers have (tried to) reproduce.[73] Commenting on the general, inevitable tendency towards a systems approach to problem solving, Lias reduces decision making to a choice between "analysis and fact...(or) political ego and pronouncement"[74] as though the only choice were between complete systematization and caprice.

One interesting aspect of this genre is its tendency to revert occasionally to its opposite. For example, at the same time that Bell asserts that the major determinant of policy is the infrastructure created by computers, and that this infrastructure causes far-reaching social changes, 'society' is confronted with major policy decisions.[75] Similarly, after describing what "will" happen as a result of microelectronics,

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[73]On the pro side in the A.I. debate, see Marvin Minsky's influential "A Framework for Representing Knowledge," in Ronald Brachman and Hector Levesque, eds., Readings in Knowledge Representation (1985: Morgan Kaufman, Los Altos) for a discussion of how some computer scientists have tried to solve the problem of the context necessary for intelligent behaviour. On the con side, see Hubert and Stuart Dreyfus, Mind Over Machine The Power of Human Intuition and Expertise in the Era of the Computer (1986: The Free Press, New York). A good review of current debates is found in Daedalus vol 117, no. 1, Winter 1988, special issue on A.I.

[74] Lias, Future Mind, p. 185.

[75] Daniel Bell, "The Social Framework of the Information Society," in Michael Dertouzos and Joel Moss, eds. The Computer Age: A Twenty Year View, (1979: MIT Press, Cambridge, Mass.), pp. 193-4.

Sherman then writes, "so much depends on the uses to which computers are put."[76] Finlay describes this as the choice/inevitability double bind,[77] but the tendency is perhaps better described by Carey and Quirk. They write that in this kind of futurology, the future 'speaks' to society in three ways: as exhortation, as prophesy, and as ritual of participation."[78] Although these writers are essentially prophetizing, they repeat the need for choices, without seriously examining what those choices are, or what coalitions of forces could contribute to making them.[79]

In general, then, the slave model relinquishes the mastery of technology that was so much a feature of the master model. Yet the slave discourse presents two alternative views of control, one for technological optimism and one for pessimism. In both cases, the notion of a simple rational control has been jettisoned. In both cases, too, technological development is apparently following some kind

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[76] Sherman, The New Revolution, p. 390.

[77] Finlay, Powermatics, p. 66. See also Frank Webster and Kevin Robins, Information Technology: A Luddite Analysis (1986: Ablex Publishing Corp., Norwood, New Jersey), p. 55.

[78] Carey and Quirk, "History of the Future," in Communication, pp. 198-9.

[79] An exception would be the work of some theorists of long wave boom and bust cycles in the capitalist economy. Although they see political and social structures as in large measure determined by the dominant technology, they also explore the potential for social movements to influence those structures. See for example, Carlota Perez, "Structural Change and the Assimilation of New Technologies in the Economic and Social Systems," in Futures, vol. 15, no. 5,(Oct. 1983).

of independent growth pattern, whether an escalating linear movement into enslavement (the Ellul thesis), or a progress towards reunification or social peace (the McLuhan thesis). Beyond this, however, there are significant differences. The difference between determinists and autonomists on this question turns on the autonomous technology position that humanity has somehow surrendered control. For determinists, society never had this kind of control.

For technological optimists, even though society does not control technology (in the Baconian sense), technology ultimately provides humanity with control over nature and the social world. At the least, the future will see an end to the previous lack of control and an end to the 'broken promise' of technology, that technology would bring about social peace and an end to scarcity. As Carey and Quirk have pointed out, the promise of change to be brought about by certain defining technologies pushes this 'technological promise' into an ever-receding future.[80] So, for optimists, while technology is not in society's control, it gives it control. This is why Leed describes technology as a metaphor; it plays out the pattern of past and future control: of the self, the social world, and the natural world. As a metaphor for self-control (body

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[80]Carey and Quirk, "History of the Future" in Carey, Communication, p. 179.

as machine, mind as computer), it represents internalized self-control.[81]

The idea of control, for technological optimists, relates to Tully's discussion of the two conceptions of progress which characterize modernity. On this reading, progress is seen as either "reform and gradual improvement" (like the Baconian view) or as "unintended and dialectical" (the McLuhan thesis).[82] For the first view, an effort is demanded by humanity, either as researchers of knowledge, or as subjects to be habituated to new techniques for the (supposed) benefit of all. It relies, too, on a faith in the theorists' abilities to construct accurate theories for control of the natural and social world. McLuhan certainly has no faith in this kind of control, which relies on society's ability to distance itself from its technologies, yet for him, progress occurs anyway (thus putting him in the "unintended and dialectical" position).[83]

In the case of technological pessimists such as Ellul, there is no control. Technology has come to control human beings by subjecting virtually all their acts to its

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[81]Leed, "Voice and Print," in Woodward, ed., Myths of Information, p. 42.

[82]James Tully, "Progress and Scepticism 1789-1989," pp. 6-16.

[83]McLuhan's peculiar biological conception of the effects of technology suggests that the body's response to one form of technology generates the conditions or symptoms that lead to the next technology.

rationality. Society is not, as is the case with McLuhan, directed by a technology; rather, society has become technique. Technology has become the new organizing principle into which all other categories collapse.

Part of what needs to be understood in the master/slave division are these two conceptions of control which require either an untenable view of the ability to step outside of the technological world in order to control and direct it, or a surrendering of any claim to effective political action because technology appears as an imposition from outside the social world. A fruitful theory of technology will have to go a certain way towards recognizing indeterminacy and contingency, to surrender this need for complete control, without surrendering a claim to act. There are valuable lessons to be learned from the slave model and the autonomous technology theme, which do not require its abstracted perspective and its language of reification. In looking beyond the theme of enslavement in society's relation to technology, two strands must be distinguished: technology as a desocialized determinant of society (McLuhan), and technology as totalizing, as the essence of modern Western society (Ellul).

CHAPTER THREE: CRITICAL PERSPECTIVES

In the survey and discussion of the dominant ways of writing about the relationship between technology and society, difficulties emerged with the dominant discourses on technology. The division was that between mastery and enslavement, each of which presented a different conception of control. There were, however, further distinctions; within the master model, there was the tendency (in technology assessment) to speak in terms of values being determined by technology. Within the slave model, there was a tendency (in the computer revolution literature) to move from understanding technological change as inevitable to suggesting that 'difficult choices' had to be made. Neither model seemed to offer much promise in terms of emancipatory political action. The master model tended to assume that the direction of technological uses was sufficient, whereas the slave model suggested that nothing effective could be done.

The dichotomy between mastery and enslavement was mitigated somewhat by a tendency the two views share to abstract technology from the social milieu. In Bacon's work, for example, the assumption was that technology was separate from the ethico-political realm and could be directed according to the social will. The problem with this model was that it failed to take account of the fact that paradigmatic

technologies, or a society in which a great many activities are technologically mediated cannot be kept separate from the identity of the subject. In the context of the slave model, the difficulty was rather different. Instead of writing about technology as neutral (hence constraining itself to the language of use), technology, or a technology was seen to have an essence, to be inherently good or bad, democratizing or not, independent of its instantiation in society. This position posed problems for an adequate theory of technological change and tended to understand technology as imposing itself on society, instead of being fully a part of society, or instead of technology and society being part of a whole. The problems with these models are twofold. First, they deny a meaningful and realistic notion of control: either technology is completely neutral and separate from us, or it is wholly out of our power to affect its development; second, they offer only minimal potential for exploring how technologies change and how they embody certain politics and priorities. If technology is nothing but inert force, as the master model suggests, questions of technological change and politics go on entirely outside the technological realm. All questions could be addressed in the context of economic priorities, environmental management, canvassing opinions and so forth. In the case of the slave model, most clearly manifest by McLuhan, there is little potential to explore the coming into being of paradigmatic technologies. These

abstracted or reified models of technology and society have been criticized by Finlay and others; there were, however, two more challenging, if less influential possibilities presented in the first two chapters: what were described as TA Model Two and the Ellul thesis.

The difficulty with Model Two was that even though it accepted a fundamental interaction between technology and society's or individuals' values, it was constrained to interpret this interaction as an oscillation between mastery and enslavement, in which society controls and directs technology according to 'conscious social choices', then technology determines human values. The Ellul model did not abstract technology. It posited that in the course of Western history, technique had moved from being an element of a number of decentralized practices to effectively colonizing all social practices in contemporary technological society. This position, however, was too totalizing in its assertion that technique comprises all social practices.

An adequate theory of technology and society, then, would have to respond to these challenges. It would, therefore, have to meet the following requirements. A satisfactory model should give an account of how political activity about technological questions might be carried on, hence it should avoid the extremes of control posited by the master and slave models. In order to do this it should avoid reifying technology. Technology must be seen as a social relation, and

avoid the language of determining and determined. In this way, too, the way power is embodied in technological relations, as in all social relations, can be studied. The tendency to focus on a neutral technology subject to a power-driven class or group, or a technology with an inherent 'agenda' imposing itself on an independently existing social formation can be avoided.

At the same time, however, a theory of technology and society should avoid totalization, in spite of the temptation to see technology as the new organizing principle, or to take the technological society as the problem or issue to be addressed. Besides being politically bankrupt (once the criterion of efficiency or technocratic rationality is seen to have consumed even the potential for resistance), such an approach is not subtle enough to capture the interaction between technological and non-technological practices. It is necessary, then, to look for a model which understands technology as a social practice without totalizing that practice.

In order to work towards a model which incorporates these criteria, the work of several writers who address the same general kind of division discussed in the first two chapters will be used: in particular, Jennifer Daryl Slack, Raymond Williams, and Marike Finlay. The chapter will examine their accounts of the dominant strands in modern technological discourse, what insights they bring to bear on the nature of

these discourses, and their attempted resolutions of the limitations these discourses pose.[1] Each author's work contains fruitful avenues for further work, as well as aspects which seem misguided. This discussion will be supplemented with insights afforded by several other authors, some of whom touch only tangentially on the specific concerns addressed here, but all of whom have insights into the problem of acting in the technological society.

A valuable starting point would be to clarify what is meant by the notion of technology-as-practice. First, if technology is a practice, it is wrong to speak of technology determining society, or society determining the uses of technology. Similarly, technology does not change independently from society, which is itself a world of social practices.

A practice is a social activity or relation; it is a set of regularized ways of doing or being which changes over time. Foucault writes that various social practices are not exclusively governed by ideologies or institutions "but possess up to a point their own specific regularities, logic, strategies, self-evidence, and 'reason'."[2]

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[1] These three are certainly not the only writers to divide up the discourses in a fashion more or less compatible with that presented here; one might also include Winner, Castoriadis, Carey.

[2] "Questions of Method: An Interview with Michel Foucault," in After Philosophy End or Transformation? Kenneth Baynes, James Bohman, and Thomas McCarthy, eds., (1987: MIT Press, Cambridge, Mass.), p. 103.

This view of practices has implications for the subject; any social activity--technology for example--is not controlled by a subject who can step outside of it. The impossibility of removing oneself from the practices of the technological society may seem to warn of potential problems for political action. The question becomes: how is it possible to gain some certainty about our situation if humans are, as some might put it, "trapped" within their situation, and can expect no great turning point in history, (like the Microelectronic Age) which will lead to a reconciliation.

The concept of technology as a practice allows for a more fruitful view of the power relations in technological relations. In the master model, technology is seen as being value neutral; if it is properly used, it is liberating for all human beings. In the slave model, the social, power-implicated aspects of technology were left completely unarticulated. An adequate understanding of technology-as-practice must examine both the central position and relative autonomy of technological practice, and do so without reverting to the slave model.

Jennifer Daryl Slack: A Structuralist Account

Slack's conception of the problem is a good starting point; her concern is to identify the most appropriate type

of intervention in technological affairs.[3] She identifies three principal types of responses: Luddism, alternative technology, and technology assessment. She maintains that all three, however, are flawed by an unsatisfactory conception of causality, or relation between technology and society. In order to criticize these dominant ways of understanding the relationship, she uses Althusser's criticism of mechanistic and expressive causality, and attempts to construct a structuralist model of the relationship between communications technology and society. She is a critic of mechanistic causality ("that causes and effects are discrete and isolated objects, events, or conditions that exercise effectivity externally").[4] This view implies that both cause and effect are distinct from their environment. The implication of this for a theory of technology is that a technology emerges as an "autonomous phenomenon"[5] which then has an effect on society from which it is otherwise disengaged. This is certainly the view that has emerged as dominant in much of the literature on the computer revolution that was explored in chapter two, and expresses the trap of abstraction discussed above.

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[3] Jennifer Daryl Slack, Communication Technologies and Society: Conceptions of Causality and the Politics of Technological Intervention (1984: Ablex Publishing Corp., Norwood, New Jersey). Slack is referred to with approval by Finlay in Powermatics.

[4] ibid., p. 53.

[5] ibid., p. 53.

Mechanistic causality can be subdivided into two types: simple, which corresponds roughly to the slave model, and symptomatic, corresponding to the master model. The model of simple causality, represented philosophically by McLuhanism, and politically by some Luddites and a strain of the alternative technology movement (according to Slack), suggests that there is a bias inherent in technologies and that because of this, the technology will alter social relations in some way. A technology is seen as emerging outside of society, then commanding its effects on society. For Slack, this conception is particularly flawed in its inability to suggest a way of intervening.[6] In the case of symptomatic causality, which Slack sees as an advance on simple causality, technologies enter into the system, society, without any inherent characteristics. Once the technology enters into the system, it becomes an effective force within it.[7] This model clearly conforms to the tool-use model discussed in chapter one, and Slack locates it in most technology assessment work and a good deal of the literature on alternative technology. The model falsely views technology as originating outside the social system, hence it is compelled to overlook the way in

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[6] See Slack, Communication Technologies chapter five, for an account of mechanistic causality. On the quietism simple causality engenders, ibid., p. 57.

[7] ibid., p. 59.

which certain intentions may be inherent in the very design of a technology.[8]

Although Slack takes these versions seriously, her real concern, like Althusser's, is expressive causality. She sees it as more sophisticated than the other two models, but she also believes it to be deeply flawed. An expressive position suggests that the parts are expressions of the essence of the whole,[9] and an expressive causality would suggest, with respect to technology, that it should be linked as both cause and effect "to the society within which they emerge and exercise effectivity."[10] Technologies only emerge (as cause and effect) in the context of the social totality: "(t)echnologies, then, will embody and express the contradictions inherent in the unfolding of commodity relations throughout the capitalist social formation."[11] Slack uses Raymond Williams as her example of an expressivist view of technologies and society.

For Williams, communications technology is one social practice among many which is expressive of late capitalist

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[8] ibid., p. 62. It should be said that although this kind of argument still has many adherents, it has lost considerable credibility as a result of studies such as Harry Braverman's Labor and Monopoly Capital The Degradation of Work (1974: Monthly Review Press, New York).

[9] Slack, Communication Technologies, p. 64.

[10] ibid., p. 64.

[11] ibid., p. 71.

social relations.[12] Slack has one central objection to this position, that "(b)y positing the social structure as a totality within which everything can be defined as the unfolding of an essence, everything can be reduced to that essence."[13] This view, according to Slack, cannot account for a technology which embodies aspects that do not adhere to the essence of the totality. Although, as Slack points out, Williams sees society as characterized by various social formations competing for dominance, he views even the incorporation of elements of other social formations as going on "in terms of the totality."[14] It is true that Williams often reduces technologies of communication to expressions of capitalist social relations, but he is not simplistic:

> We have to think of determination not as a single force, or as a single abstraction of forces, but as a process in which real determining factors...set limits and exert pressures, but neither wholly control nor wholly predict the outcome of a complex activity within or at these limits, and under or against these pressures.[15]

Vig describes this so-called expressivist position as "social determinist/contextual" and notes that although it can help explain the orientation of particular technologies, it has

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[12]Other writers with similar positions might be Robert Young or Stanley Aronowitz.

[13]Slack, Communication Technologies, p. 77.

[14]ibid., pp. 74-5.

[15]Raymond Williams, Television Technology and Cultural Form (1975: Schocken Books, New York), p. 130.

trouble accounting for the distinctive character of technology as a modern phenomenon. Slack also notes the difficulty writers in this vein have in accounting for change from one totality to the next.[16]

The potentially conflicting and contradictory character of technologies is what Slack hopes to capture. She is also critical however of the problems the expressivist model poses for intervention in technological problems. She writes that totality tends to suggest inevitability, that the only way to alter technological practice would be to alter the essence of the totality.[17] Because social actors are part of the totality, she finds it difficult to see where the impetus to change comes from without relying on a "Deus ex machina."[18] It must be said, however, that any theory that does not posit a disengaged subject, and any theory of technology that does not simply see it as a tool, will have to respond to the problem of not having an Archimedean point from which to regard and direct technology.

Although Slack is surely right that positions such as Williams' tend to totalize, her proposed resolution to the problems she finds with other notions of causality is

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[16]Norman J. Vig, "Technology, Philosophy and the State: an Overview," in Michael E. Kraft and Norman J. Vig, eds., Technology and Politics (1988: Duke University Press, Durham) p. 16. Also, Slack, Communication Technologies, p. 67.

[17]Slack, Communication Technologies, p. 78.

[18]ibid., p. 80.

problematic. Her intention is to rely on an Althusserian conception of structural causality.

According to this Althusserian position[19] society is a kind of whole, but amongst the different levels of society (political, ideological, economic) there may be conflict, i.e. these levels can be said to be semi-autonomous. The whole is, however, determined "in the last instance" by the economic level. The significance of this view for a theory of technology is that in addition to the primary contradiction between forces and relations of production, there may be secondary contradictions. In terms of intervening in technological developments, the attempt to act at the "site of historically specific dominant and effective secondary contradictions might be more effective than attempts to confront the largely primary contradiction directly."[20] According to Slack, structural causality, unlike expressive causality, posits that "(t)here are no autonomous, atomistic causes or effects external to [the whole]."[21] Unlike expressive causality, however, the whole is not reducible to

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[19] This overview comes from Slack's summary, in Communication Technologies, pp. 81-92. For good overviews of Althusser, see also, Fredric Jameson, The Political Unconscious Narrative as a Socially Symbolic Act (1981: Cornell University Press, Ithaca), pp. 24-37; Martin Jay, Marxism and Totality The Adventures of a Concept from Lukacs to Habermas (1984: University of California Press, Berkeley), chapter 13; and Susan James, The Content of Social Explanation (1984: Cambridge University Press, Cambridge).

[20] Slack, Communication Technologies, p. 88.

[21] ibid., p. 88.

a single essence.[22] Slack maintains that the notion of semi-autonomous levels coming together in particular historical configurations will overcome the essentializing tendency in expressive causality and the inevitability of a technology's essence for as long as the totality remains the same. It should be noted here that there is still an inevitability about this structural position, merely that contradictions are 'overdetermined'.

Although she had been critical of mechanistic causality primarily for the way in which it abstracted technology, in its very origins, from the 'system' or social world, Slack is firm in defining technology as an object (machine or structure)[23] rather than as a "way of life" or "human activity," because she feels this implies totalization.[24] It is not clear why viewing technology as a human activity necessarily implies totality. The issue of how central to a given social formation its technological "way of life" is, may be decided separately. She writes that she does not want to include social organization in her definition of technology because her concern is with the relationship <u>between</u> technology and society.[25] For her, technology must be seen

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[22]ibid., p. 89.

[23]ibid., p. 89.

[24]ibid., p. 89.

[25]ibid., p. 7.

as one of the "semi-autonomous elements" that, within a given mode of production, structure the whole.[26]

There are two objections that could be made to this definition. The first is that an adequate definition of technology that accounts for the central position of technology in human affairs should include what the technology assessment workers describe as 'social technologies' or modes of organization. If only artifacts are included in a definition of technology, even rational-productive procedures such as Taylorist labour practices are excluded. This distinction would seem to be an artificial separation. The second objection might be that part of the reason for rejecting the models in chapters one and two is that they offered inadequate accounts of control of technologies. A structuralist account effaces the potential for action. Indeed, it is strange that she finds a structuralist account promising, since her expressed concern is with looking for successful ways of intervening.

The implication of Slack's view of causality is that any study of a technology should look not to the nature of that technology (for example, will computers make social life centralized or decentralized), but rather to its historically specific instantiation. Slack seems to be somewhat ambivalent on this point, however. She writes

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[26]ibid., p. 89.

> (a)ssuming the same physical object exists in a different historically constituted configuration, that same physical object might be a quite different historical object.[27]

What Slack is suggesting here is that a technology transferred to another social formation would have a different effect. Certainly, it would have a different meaning for the members of the society, but this is likely not a level that Slack would be concerned to focus on.

Slack's account of the nature of modern approaches contains interesting elements. The schema of theories of causality seems to be a useful one, particularly for addressing the question of technological intervention. It is not clear, however, how a structuralist account can give a more appropriate indication of how to intervene in technological issues, which is her explicit intent. A large part of her critique of the expressivist position is grounded in a belief that it does not leave enough room for action. A structuralist account which sees social actors as supports for social practices and does not look at the meaning technological practices have for social actors, does not seem to leave much room for the kind of intervention she is looking for.

A further question that might be asked relates to the scientistic tendency of an Althusserian perspective, and whether it is appropriate in particular to a critical study

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[27]ibid., p. 90.

of technology, that is, to a questioning of the scientific/technological ordering of life. As Dreyfus and Rabinow have written with reference to Foucault's move "beyond structuralism:"

> (w)ith his abandonment of archaeology as a theoretical project, however, Foucault not only distances himself from structuralism but situates the structuralist project historically within a context of the increased isolating, ordering, systematizing practices characteristic of what he calls disciplinary technology.[28]

Raymond Williams: An Expressivist Account

In spite of these objections, there are advantages to a criticism of expressivist positions such as that of Williams. Williams has a generally similar view of the dominant discourses of technological change and causality. In order to examine the problem of abstracting technology from context, Williams looks at the moment of invention. According to one dominant view, he writes, technology follows an independent process of development; the actual discovery of a technology is, so to say, accidental in the sense that there is no 'political' intention involved. In the case of television, then, if it had never been invented, a series of political and

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[28]Hubert L. Dreyfus and Paul Rabinow, Michel Foucault: Beyond Structuralism and Hermeneutics (1982: University of Chicago Press, Chicago), p. xxvii.

social effects would not have occurred.[29] This position is technological determinism, a view he identifies with, among others, McLuhan. The second strand suggests that a technology is a medium for changes that would otherwise take place. Again, the discovery of the technology is accidental; what is significant is how it is used. This view is referred to as symptomatic, and implies technology is a force or tool.[30] Thus it is a characterization that Slack and Williams share. Both views of cause and effect, Williams writes, require a kind of isolation of technology: "(i)t is either a self-acting force which creates new ways of life, or it is a self-acting force which provides materials for new ways of life."[31] Williams' first step is to try to restore a kind of intentionality to research and development, as opposed to just uses, in order to point to the social character of a technology in its very origins. Restoring intentionality would, for him, overcome the limitations of technological determinism. As Williams notes, it is unsatisfactory to talk about technologies in an abstracted way in terms of 'effects'. He writes of television:

> (t)o say that television is now a factor in socialisation, or that its controllers and communicators are exercising a particular social function, is to say very little until the forms of the society which determine any particular

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[29]Raymond Williams, Television, pp. 12-13.

[30]ibid., p. 13.

[31]ibid., p. 14.

> socialisation and which allocate the functions of control and communication have been precisely specified.[32]

However, looking at the level of intentions, while it may deal with the problem of abstraction of technological determinism, risks slipping into the master model. Williams, like other Marxist critics of technology, would agree that there has been a problem with technophilia in some parts of the left; this problem is symptomatic of the tendency to abstract technology. He is critical of the tendency to objectify technology; in fact, one of his major criticisms of McLuhan is the failure to understand media as practices, rather than as desocialized "physical events in an abstracted sensorium."[33] However, Williams wants to preserve the intentional aspect of these practices; the technologies that exist are the result of choices made by actually existing persons and classes.

With respect to the issue of intentionality, Williams maintains that the technological autonomy view is "a product of the overt and covert marketing of the relevant interests."[34] As such, the modern sense of autonomous technology is an illusion, a manifestation of capitalist ideology which can be unmasked. This perspective is obviously at odds with that of

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[32]ibid., p. 120.

[33]ibid., p. 127.

[34]Raymond Williams, Towards 2000 (1983: Chatto and Windus--The Hogarth Press, London), p. 133.

postmodern critics of technology.[35] While it is certainly true that there is an element of ideological coercion in the 'selling' of the information age, life in the "technological sensorium" can not be accounted for as purely ideological. There is something more of the slave discourse's sense of the self-acting character of contemporary technologies that must be acknowledged here. Williams, however, is surely right to point out the faulty split between research and development and application, and to suggest the consequent need for whole new technologies, as opposed to different applications. Williams' suggestion that new technologies can be explained wholly as an expression of the "dominant capitalist order in its paranational phase"[36] seems to be a simplification. This picture of technological activities or ways of life as expressions of capitalism is too totalizing; it is not subtle enough to capture the senses in which the phenomenon of modern technology is not linked exclusively to capitalism.

Williams' thinking falls into line with other contemporary Marxist 'technocritics', according to whom the new expansion of computers and communications technology represents a deepening of the Fordist and Taylorist practices of twentieth century capitalism, or social Taylorism and neo-

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[35]See for example, Henry S. Kariel, The Desperate Politics of Postmodernism (1989: University of Massachusetts Press, Amherst).

[36]Williams, Towards 2000, p. 143.

Fordism.[37] The need for capital to control knowledge or information for discipline and profit is now extended to a control of information in all areas.[38] Neo-Fordism includes such elements as the privatization and commodification of social life.[39] Webster and Robins refer to this as the restructuring of social relations under (not by) information technology.[40]

The expressivist position and the reconstruction of a philosophy of Luddism (which writers like Robins and Webster are engaged in) are powerful tools for exposing the assumptions and ideologies of the dominant views, and for criticizing the domination of labour in the workplace. This approach poses some problems, however. There is more at work in the very centrality of technology-as-practice than a strict linking to the essence of late capitalism would suggest. If structuralist causality of an Althusserian type offers an

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[37] A prime example of this kind of work is Kevin Robins and Frank Webster, Information Technology: a Luddite Analysis. See also their two articles "Information as Capital: a Critique of Daniel Bell," in Jennifer Daryl Slack and Fred Fejes, eds., The Ideology of the Information Age (1987: Ablex Publishing Corp., Norwood, New Jersey), and "Plan and Control: Towards a Cultural History of the Information Society," in Theory and Society vol. 18, no. 3, May 1989.

[38] Robins and Webster, Information Technology, p. 328.

[39] ibid., pp. 343-7.

[40] ibid., pg. 320. In "Plan and Control" they make a distinction: technological innovations may follow a certain pattern, but modes of domination obey a different time scale. They link information technology to, on one hand, political domination through surveillance and on the other, cultural domination through the management of desire.

inadequate response to these shortcomings, a more novel approach that would be more particular to the study of technology should be considered.

As a first step in fleshing out this view, which would look to a wholly embodied, social view of technology, Finlay's tentative discussions in this area are instructive.

Marike Finlay on Technology as Practice

The basis for Finlay's proposition[41] is, as was mentioned above, that the modern discourse on technology does not divide itself primarily along optimism/pessimism lines.[42] Rather the central division is between those who understand technology as reified, as machine-object and those who see it as always already in a social formation. This approach moves beyond the limitation discussed in the first two chapters. Finlay's particular approach argues that there is an autonomy in these practices, such that they do not have to be either (exclusively) the intentional project of a state or class, nor do they have to be the expression of a single praxis, or essence.[43]

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[41]Marike Finlay, Powermatics; "William Leiss on Technology," and "Technology as Practice."

[42]Finlay, Powermatics, p. 11.

[43]As will be explored below, Finlay sometimes locates the 'essence' in instrumental reason.

In describing technology in general and communications technology in particular, Finlay uses what she takes to be a Foucauldian position, that scientific or technical knowledge is a regularized (discursive or non-discursive) social practice," and that technologies are "social practices of knowledge."[45] Her project focuses not on the status of technological artifacts, or the 'essence' of a technology, but rather on looking for regularities in these social practices of knowledge.

Her technique for analyzing these practices is discourse analysis; that is an analysis that does not focus on the intentions of the social actors within this practice, but rather on the nature of the discourse about technology itself. Discourse analysis is "the study of the way in which an object or idea...is taken up by various institutions and epistemological positions, and of the way in which those institutions and positions treat it."[46] This effort is directed at showing the limitations of the discourse, or calling into question its claims to 'naturalness' or 'truth'.[47]

"Finlay, "William Leiss on Technology," p. 191.

[45]ibid., p. 191.

[46]Finlay, Powermatics, p. 2.

[47]Discursive practices "are embodied in technical processes, in institutions, in patterns for general behavior, in forms for transmission and diffusion, and in pedagogical forms which, at once, impose and maintain them." Michel Foucault, Language, Countermemory, Practice Selected Essays and Interviews, Donald F. Bouchard, ed. (1977: Cornell University Press, Ithaca). p. 200.

One of the unique aspects of Finlay's discursive critique is the dual nature she gives to the object of her critique. Her position is that in the same way as a theorist can analyze discourses about new communications technology, she or he can see the technology itself as a discourse, where discourse can be taken to mean the set of procedures for the formation of serious speech acts.[48] Communications technology, then, is a set of procedures for how to communicate.[49] These procedures include such things as instrumental rationality, and hierarchy.[50] The advantage of this view is that it gets at the distinctive character of communications technology, as distinct from industrial technology. Finlay, however, is somewhat unclear as to whether this 'parallelism' is meant to apply to technology in general as well as communications technology in particular.

Finlay's specific concerns with 'mainstream' or uncritical writing on new communications technology are twofold: first their tendency to abstract technology from the social world, and second, the difference between the content of what is said (that new communications technology will be liberating, democratizing, etc) and the exclusionary practices

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[48]Her use of these terms seems explicitly Foucauldian.

[49]Finlay, Powermatics, p. 18.

[50]ibid., p. 4.

in the process of the discourse.[51] She also points to the way in which questions about technology are structured in such a way as to in fact limit the kinds of discussions that can be pursued.[52] The same tensions are apparent in the technologies themselves; although they may be situated where people can 'get a hold of them', the rules for communication embodied in these technologies may be wholly undemocratic.[53]

Particularly in Powermatics, Finlay's intention is to take a more or less explicitly Foucauldian approach towards the role of communication technology, exploring the features of panopticism she sees both in new communications technology and in discourses on new communications technology. She describes Foucault's position this way: "technology is a set of procedures put into practice by the state."[54] Although this quotation gives a strangely state-centred view of Foucault's intention, it does suggest Foucault's concern with technologies as strategies. Technologies, and the discourse about those technologies are structured from their inception by power relations; not, however, state over individual, or

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[51]ibid., p. 16. It does seem that by pointing out the distinction between the optimistic prediction and the oppressive reality, Finlay is undercutting somewhat her contention that optimism/pessimism is not the primary division.

[52]ibid., chapter one.

[53]ibid., p. 16.

[54]Finlay, Powermatics, p. 17.

capitalist over worker simply.[55] Technologies, as a kind of knowledge, are imbued with power, in the nexus Foucault calls power/knowledge. Technologies can be described as 'disciplinary' insofar as they are oriented from the start to the production of 'docile bodies.' What has emerged as so attractive for communications theorists in Foucault's work (even for Marxists like Robins and Webster) is the image of the panopticon, not only as a disciplinary technology, but as the disciplinary technology: a symbol of the social surveillance and self-monitoring that seems to symbolize modern society in the West, and which has been taken to a new level of 'social panopticism' via new communications technology. Of course, this is a problematic use of Foucault, because it is so totalizing.[56]

A further aspect implicit in discursive critique which Finlay attributes explicitly to Foucault is the decentring of the subject. Finlay writes:

> technology as a set of discursive procedures and practices does indeed have a structure and life process of its own. Social actors are not excluded from the practice of technology, they are merely the places not the sources of that practice.[57]

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[55]ibid., especially chapter three.

[56]Mark Foster's latest book, Critical Theory and Poststructuralism In Search of a Context (1989: Cornell University Press, Ithaca) is largely an attempt to systematize Foucault's work without totalizing it.

[57]Finlay, Powermatics, p. 207.

In other words, this way of thinking about technology-as-practice can approach an understanding of a certain kind of autonomy in technological practice without abstracting technology from its context.

Finlay arrives at a set of rather complex conclusions and proposals. First, she claims to focus on the various effects of power and control in specific technologies. Control of technologies and control of the discourse on those technologies is a power over a kind of knowledge which forms a certain kind of social control.[58] In contradistinction to Williams, although there may be intention in particular 'local' areas, there is no overarching coordinating subject carrying out these relations of technological control. Finlay asks, rhetorically, whether the power which invests these discourses and technologies can be said to lie exclusively with the state, whether their power is simply repressive (as opposed to conducive) whether the power is centralized or not, and whether "(t)o change power relations ...it suffice(s) to change a deep structure of society, for example the economic structure, or must many other aspects of society be changed, and which are they?"[59] Underlying this theoretical concern with many sites of power is a political belief that "the over-insistence on the economic relations of technology and power has led to intervention purely within the economic

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[58]ibid., p. 169.

[59]Finlay, Powermatics, p. 174.

sphere at the expense of intervention aimed at changing the very roots of control-oriented technological rationality."[60]

Finlay has applied what she terms a Foucauldian/Weberian framework.[61] Her essential point is that it is insufficient to alter the relations of production or the uses to which a technology is directed; what needs to be created is a new 'episteme' and a new 'techne.' Her use of the term episteme varies but can be fixed as something like: the set of dominant discourses of knowledge that define the procedures for making true statements; techne can be defined simply as knowledge of how to do or make. Finlay maintains that contemporary social practices of knowledge, of which technology is one, contain regularities including those of exchange, hierarchization, order, exclusivity.[62] These kinds of procedures constitute the dominant episteme, and they apply also to those sciences "known also as technical or instrumental reason,"[63] with techne and episteme being mutually conditioning.[64] Thus it is not sufficient to question the ends to which technology is put, the procedures of technology itself must be questioned.[65] It is by delinking techne and

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[60]ibid., p. 197.

[61]ibid., p. 237.

[62]Finlay, "Technology as Practice," p. 192.

[63]ibid., p. 192.

[64]ibid., p. 201.

[65]ibid., p. 200.

episteme that the theorist ends by asserting "it depends how you use it." It is from this perspective that Finlay argues that a new techne and episteme are needed. Finlay then equates this with the need for a new instrumental rationality and a new rationality more generally. This is a valuable advance, since it focuses attention not only on the context in which a technology is situated, but also the practices of technologies themselves, and moves beyond the 'language of use' described in the first chapter, pointing to the relation between instrumental reason and forms of domination.

In order to explore this relation, Finlay has drawn on Habermas's work on the knowledge interest of interaction, presumably because, as a student of new communications technology, Finlay finds Habermas's interest in communicative rationality most applicable. Habermas's position, however, is similar to the master model's in that the distinction between the interactive and the instrumental realms parallels the master model's distinction between a technology and the use to which it is put, a position Finlay declared herself opposed to.

Habermas's concern, in the works Finlay refers to, is that instrumental rationality has in fact colonized all processes of decision-making, and that an 'interactive' realm not grounded in domination needs to be resuscitated. Habermas's response to Finlay's perceived panopticism in new communications technology would be, it seems, that we must

decide freely and democratically on the uses and limitations of telematics.

Without explicitly acknowledging that she is doing so, Finlay wants to extend the model of interaction into the technological realm itself.[66] This move is necessary because of her assertion that the problem is not (exclusively) that episteme has "been usurped by techne in technocratic society,"[67] and thus that a space for non-instrumental rationality must be opened up (as in Husserl); but also that the procedures of techne and episteme must both change because they are mutually conditioning. In less jargonistic terms: it is insufficient to alter the uses to which a technology is put or the context in which it is positioned; the procedures and practices of technologies themselves must also change.

Thus far, Finlay's position is clear, and helpful in sorting out the interrelation between technological practices and the political, environmental, aesthetic, or (in her case) communicative contexts in which they are situated. Indeed, her need to extend Habermas's 'interaction' is not far from Tribe's criticism in chapter one.[68]

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[66]This is an easy extension for her because she is dealing with technologies of communication.

[67]Finlay, "Technology as Practice," p. 203.

[68]Recall that Tribe's position was that since virtually all our acts are both interactive and instrumental, Habermas's separation of technical from non-technical is inappropriate (although Finlay does not acknowledge the changes she is making to Habermas's work).

Leiss seems to support Finlay's position that procedures of technical knowledge must be democratized so as to make them non-dominating (of external nature or of social groups), in a way that will alter the very design of the technology:

> Will citizens be in a position to evaluate the construction of such exercises--the rules for coding information, the programming models, the selection of variables, the possible hidden externalities?"[69]

In this way, procedures considered by mainstream discourses to be neutral (the rules for coding information are simply the most 'efficient') come to seem political, linked to a variety of forms of domination, open to questioning the power implicit in them.

However, Finlay slips when she distances herself from Leiss:

> would such an interactional practice of the discourse of knowledge and power be qualitatively different from what we have defined technology to be...For Leiss, technology is always self-interest [sic] control; that is the essence of technology for him. However, its function may be emancipatory depending on the socio-politico-economic context. Thus, interaction, for Leiss, is still such domination-oriented scientific knowledge in that he sees it to serve the self-interest of man.[70]

There are two points that need to be better articulated than Finlay has done. First, Leiss would not call this

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[69]Leiss, as quoted in Finlay, "Technology as Practice," pp. 210-11.

[70]ibid., p. 211.

'interaction' domination-oriented. Society can 1) decide democratically how to use the end product; 2) decide using interative principles how to design the technology; 3) decide democratically how to design the technology so that it works interactively (that is, avoids procedures of hierarchy, exclusion, etc). However, Leiss surely cannot be expected to give up on the idea that a technology is instrumental. Although technologies may have expressive elements, they are, it seems, instrumental qua technologies. Neither does Finlay have to posit 'interactional technologies'. New communications technology can be designed in order to avoid panoptic design elements, designed instead to foster the procedures of interaction. Insofar as an artifact of communications technology is a 'social practice of knowledge' or a 'set of rules for how to communicate' why indeed should it not contain democratic procedures. However, this does not mean that the technology is not instrumental. It is designed in order to serve a purpose.

The second point requiring articulation is her notion that self-interested control can be equated with domination. Finlay writes: "(s)imply serving man's interest is not tantamount to instrumental reason which had as its primary tenet domination and as its corollary the service of man's interest."[71] Certainly Leiss, having written Domination of Nature, would agree that the practices of

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[71]ibid., p. 211.

scientific and technical knowledge have been practices of domination (social domination and domination of external nature); this is one reason why techne needs to be criticized and altered as well as episteme. It does not mean, however, that human beings can live without artifacts and ways of organizing which are forms of instrumental reason. It is important to be clear that it is not being suggested that technology is purely instrumental in the sense of being simply a tool; that would be to slip into the master model.

Finlay concludes with problems which she sees arising out of her method, specifically, a problem which she terms 'ontologico-epistemological' in nature.[72] She wonders whether upholding an "interactional normative standard for technology"[73] leads to a need for a ground which is universal or "quasi-universal."[74] This question is problematic for her because of her reliance on and sympathy with a Foucauldian approach to criticizing rationalities on the grounds of their claims to naturalness and universality. Is this ground really necessary? Can Finlay borrow Habermas's notion of interaction without relying on universalism? Tully has suggested that Habermas's Ideal Speech Situation first of all cannot serve as this ground, and second that this need not be a grave difficulty:

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[72]ibid., p. 211.

[73]ibid., p. 211.

[74]ibid., p. 212.

> For once we free ourselves from the convention that we are free and rational only if we can justify the grounds of any uses we follow, we can see that there is a multiplicity of ways of being rationally (and thoughtfully) guided by rules of use, short of self-grounding validation..."[75]

At the least, if Finlay holds to her Foucauldian position, she would have to divest herself of this search for a ground.[76]

Although Finlay's work is directed at new communications technology in particular, she often writes as though her work were generalizable to technology tout court. An adequate theory of technology should be able to account for more than social panopticism, especially since this is not the form of domination associated with all technologies. To summarize, then, there are a number of benefits to Finlay's approach. The notion of comparing procedures of a technology with the way the technology is written about may shed light on implicit forms of social control. Finlay herself suggests that understanding technology as a social practice allows us to see elements of control more clearly and allows the theorist to understand these practices as historically

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[75]James Tully, "Wittgenstein and Political Philosophy. Understanding Practices of Critical Reflection," in Political Theory, vol. 17, no. 2, May 1989, p. 183.

[76]For one thing, while Habermas, in line with the Frankfurt School project, is concerned to look at the point at which instrumental reason came to dominate, Foucault is concerned with looking not at the 'bifurcation' of reason but at a multiplicity of rationalities. See Gerard Raulet, "Structuralism and Post-Structuralism: An Interview with Michel Foucault," in Telos no. 55, Spring 1983, pp. 200-1.

relative."[77] Because this method looks at control within technological practice itself, it emphasizes the need to criticize and rebel against practices of technology themselves and not simply uses of technology.

Michel Foucault: (Mis)appropriating Disciplinary Technology

Finlay's use of Foucault may raise questions about Foucault's somewhat idiosyncratic understanding of technologies. What is most rewarding from an encounter with Foucault for a theory of technology is the new and enriched sense he gives to the notion of autonomous technology,[78] in which technologies are not under the direction of a single coordinating subject. As noted above, what most writers on technology take from Foucault is his notion of disciplinary technologies as exemplified by the panopticon. However, the concept of disciplinary technologies needs to be put in context.

Foucault's later conception of technology seems to be the following. By technologies, Foucault means what are normally thought of as techniques, or strategic practices.

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[77]Finlay, "Technology as Practice," p. 208.

[78]For an interesting insight into Foucault on technologies, see Jana Sawicki, "Heidegger and Foucault: Escaping Technological Nihilism," in Philosophy and Social Criticism, vol. 13, no. 2, (1987).

In Technologies of the Self[79] Foucault elaborates on the division of technologies he made in "The Subject and Power."[80] There are four basic types of technologies, each of which is "a matrix of practical reason:"[81] those of production, sign systems, power, and the last (which is not listed in "The Subject and Power"), of the self. Foucault suggests that each of these is associated with a particular kind of domination, and each "implies certain modes of training and modification of individuals, not only in the obvious sense of acquiring certain skills but also in the sense of acquiring certain attitudes."[82]

Although Foucault makes the point that these technologies do not function separately, but rather interact and overlap, his concern has been to focus on the two latter types of technologies. It is the third of these, technologies of power (biopower), that has been so influential for students of technology, including Finlay, because it speaks so clearly to the technological surveillance which is so much a part of contemporary Western society, containing notions of "Western rationalization,

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[79]Martin, Luther H., Gutman, Huck, and Hutton, Patrick H., Technologies of the Self A Seminar with Michel Foucault (1988: University of Massachussetts Press, Amherst).

[80]in Hubert L. Dreyfus and Paul Rabinow, Michel Foucault: Beyond Structuralism and Hermeneutics (1982: University of Chicago Press, Chicago).

[81]Foucault, Technologies, p. 18.

[82]ibid., p. 18.

Heideggerian technology, and...normalization."[83] Clearly, however, the concept of technologies of power, though it sheds considerable light on a dominant set of practices in our society, cannot be mounted into 'a' theory of technology, nor should it be required to.[84] Because Foucault did not attempt this expanded theory of technology, it does not seem helpful to try to construct one out of scattered references. The are, however, advantages to his schema that are worth noting.

First, he does not write about technology as an object; it is, rather, a number of forms of rationality or "matrices of practical reason." This allows for a clearer perspective on how radically they inform our social world. Second, this model does not posit one description of a technique which is true throughout time and for all technologies. Third, and relatedly, technologies which are directed to different ends (for example, to the production of goods, or of docile bodies), not only employ different strategies, but also imply different relations of domination.[85] This kind of formulation seems to open up possibilities for a subtlety beyond

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[83]Dreyfus and Rabinow, Michel Foucault, p. 254.

[84]Sawicki comments that Foucault escapes nihilism precisely because his is not a totalizing theory of technology. In "Heidegger and Foucault," p. 168.

[85]For example, "one sees the relation between manipulating things and domination in Karl Marx's Capital, where every technique of production requires modification of individual conduct--not only skills but also attitudes." Foucault, Technologies, p. 18. One form of domination which is not explored is domination of nature.

instrumental rationality as a theme. This notion is reflected in Foucault's researches in the area of biopower in which he is studying not the rationalization of society, but different rationalities. Foucault writes that while he acknowledges the significance of Enlightenment and its rationality in the development of our 'political technology', "we have to refer to much more remoter processes if we want to understand how we have been trapped in our own history."[86]

Foucault does seem to suggest, however, in "The Subject and Power," that these technologies may be ordered into systems or blocks.[87] He seems to suggest that an ethic of efficiency overarches this system in the West (since the 18th century):

> an increasingly better invigilated process of adjustment has been sought after--more and more rational and economic--between productive activities, resources of communication, and the play of power relations.[88]

There are large areas of inquiry in terms of the human relationship to nature, which are not captured in the class domination of the workplace, or in Foucault's distinctions. This kind of domination is perhaps best analyzed through the works of critics of Enlightenment rationality.

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[86]Foucault, in Dreyfus and Rabinow, Michel Foucault, p. 210.

[87]ibid., p. 218.

[88]ibid., p. 219.

Conclusion: Learning from Technology as Practice

The intention of chapter three was to examine some of the exc ing and critical work being done on theories of technology, work that has taken on board the kinds of criticisms directed at mainstream perspectives that were discussed in chapters one and two. It is perhaps not surprising that much of this critical work concerns new communications technology, or that it is often interdisciplinary in character. The keen interest surrounding technology and society and the attempt to understand technology as other than a tool or force have been quite recent, and have met with resistance from disciplines such as political science.

This thesis was designed to shed light on how the tendency to understand society's relationship to technology as one of mastery or enslavement structures and limits how to think about controlling technology. If we adopt the master position, we 'buy into' a conception of technologies as tools which are totally distinct from us and over which we can exercise complete disengaged control. If, however, this notion is rejected, do we not fall into a schema in which technology controls us, where technology both moves according to an autonomous, internal dynamic and remoulds society's values, self-perception, even bodies, as it proceeds? The discussion in chapter three was intended to shed light on why

rejecting the former does not have to mean accepting the latter.

In chapter three, a conception of technology-as-practice was suggested. A social practice may be defined as a 'way of doing', a set of more or less regularized procedures. Certain practices may emerge as the dominant ones in particular societies; this does not mean they are not subject to change, or that they will continue as the central practices indefinitely.

What is meant, then, by the notion of technology as a social practice? Technology is thus defined not as a tool, but rather as a regularized way of doing, a set of procedures which obey certain rules. Winner has suggested that the distinction between science and technology is that between a way of knowing and a certain kind of practice.[1] The primary advantage of understanding technology as a social practice, then, is that it opens up the definition of technology beyond the notion of objects (which either control or are controlled), moving beyond the language of use and the language of domination/determination by a technology with a certain essence. If technology is a social practice, interconnected with other social practices, then it may change. Resistances to forms of domination in the practice of technology may take place (unlike in the slave model), but, contrary to the master model, they do not take place

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[1]Winner, Autonomous Technology, p. 63.

exclusively at the level of application or use.

As outlined at the beginning of chapter three, to be considered adequate for the purposes of this paper, developing a notion of technology-as-practice involves: not reifying technology (which technology as practice does not do), offering a way to understand how domination is encoded in practices of technology, suggesting how resistances to that domination might be carried on in a way that does not rely on either of the two extremes of control. Finally, technology-as-practice should not totalize that practice by arriving at a conception of "the technological society." The models discussed in chapter three can now be briefly evaluated with respect to these goals.

Slack's structuralist account of technology as one of the defining elements that shape us, offered an understanding of technology which did not essentialize it. Because the form and position of a technology was determined by its interrelation with other determining elements, technology was to be analyzed in terms of its particular historical constitution. In this way, Slack negotiated a path between a view of technology as a neutral force and technology as imposing its essence on society. There are, however, two related difficulties with Slack's work. First, her insistence on conceiving of technologies as objects seems to limit the exploration of a range of 'social technologies' which are not objects but which obey similar kinds of procedures. Second,

although Slack has expressed concern with intervention in technological matters, her position, in which technology structures human activity rather than being a human activity, does not seem to offer much room for fruitful political action. Society is thus still determined, though not in a simplistic, McLuhanesque way.

With Williams, the same tendency to de-contextualize technology that Slack criticized was set aside. He pointed to types of capitalist domination embodied in particular technologies. It restricted analysis, however, to one form of domination, class domination. Although he pointed out the need to look beyond the level of 'effects' of this or that technology to the types of social forms in which the technology was situated, there was a tendency to reduce all analysis of forms of domination in technology to a conscious project of a class.

In Finlay's analysis, a distinctive approach to analyzing not so much a particular technology, but the rationality of domination encoded or embodied in these technologies was embarked on. It was not totalizing, did not reify technology, and, like Foucault's work, did not require seeing all facets of technology as products of conscious decisions. It seemed, however, that Finlay's model of interaction was not altogether appropriate for analyzing the full character of forms of domination in technologies.

Although it would seem inappropriate to identify a

'Foucauldian theory of technology', certain discussions in Foucault's later work suggested the need to examine different types of technologies and the different (though overlapping) forms of domination which inhere in them.

Taking this notion as a guidepost, it is possible to identify certain theorists and modes of analysis which seem promising, which work within the general critical-theoretical schema outlined in chapter three by focusing on particular areas of technological practice and criticizing definite aspects of domination which form a part of them.

One interesting strand of analysis is found in feminist critiques of technological practices.[2] The object of these kinds of studies--which are often case studies of particular technologies or particular situations they are used in--is to look at the 'gendering' of technology not only in its uses (who uses them and for what ends), but also in the very procedures they obey. Many of these writers come out of the socialist tradition, engaging in a "dual systems theory"[3] approach to studying capitalism, patriarchy, and their interrelation.

Mark Poster, though sensitive to the dangers of trying

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[2]See, for example, Sally Hacker on the influence of militarism and military discipline on technology, engineering education, eroticism, and work in Pleasure, Power, and Technology Some Tales of Gender, Engineering and the Cooperative Workplace (1989: Unwin Hyman Inc., Boston). See also Cynthia Cockburn, Brothers Male Dominance and Technological Change (1983: Pluto Press, London).

[3]Cockburn, Brothers, p. 8.

to totalize Foucault's position, tries to develop a more systematic use of Foucault through his use of the concept of "mode of information," by which he means that microelectronic technology in late twentieth century Western society

> is distinct in that 1) it gives prominance to language and 2) it enacts drastic changes in the structure of language. In what I call the mode of information, everyday life is pervaded by new, electronically mediated language experiences in which the individual is forced to constitute the self and to do so in drastically new ways.[4]

This position seems to be largely correct and a worthy subject for investigation, particularly since Poster neither wants to assimilate the concept of disciplinary technology within a critique of capitalism, nor totalize new linguistic experiences so that the critique of capitalism (or other practices of domination not rooted in language or technologically mediated), are not overlooked.[5]

It may seem ironic to conclude such a general and broad-ranging thesis with a call for case studies and narrowly focused critiques of particular themes of domination in technological practice. It seems necessary, however, to set aside, through critique, discourses grounded in mastery over or enslavement to a technology in order to open a path for

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[4]Mark Poster, Critical Theory and Post-Structuralism In Search of a Context (1989: Cornell University Press, Ithaca), p. 68.

[5]Poster suggests different strategies for analyzing different aspects of the Mode of Information (for example, a Baudrillardian approach for looking at advertising). So too, we should be open to employing different strategies for an analysis of different kinds of power implied by current technological practice.

criticisms of and resistance to forms of domination in the practice of technology.

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