A Reevaluation of Marcuse's Philosophy of Technology

Michael Kidd

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy.

University of Tasmania, July, 2013.

A Reevaluation of Marcuse's Philosophy of Technology

Michael Kidd

Declaration of Originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material which infringes copyright.

This thesis may be made available for loan and limited copying **and communication** in accordance with the Copyright Act 1968.

Abstract

This thesis provides a reevaluation of Herbert Marcuse's philosophy of technology. It argues that rather than offering an abstract utopian or dystopian account of technology, Marcuse's philosophy of technology can be read as a cautionary approach developed by a concrete philosophical utopian. The strategy of this thesis is to reread Marcuse's key texts in order to challenge the view that his philosophy of technology is abstractly utopian. Marcuse is no longer a fashionable figure and there has been little substantive literature devoted to the problem of the utopian character of his philosophy of technology since the works of Douglas Kellner and Andrew Feenberg. This thesis seeks to reposition Marcuse as a concrete philosophical utopian. It then reevaluates his philosophy of technology from this standpoint and suggests that it may have relevance to some contemporary debates.

Marcuse's writings on technology are the primary focus of this thesis, together with a range of major secondary sources. My discussion is accordingly narrow, although its implications are sometimes extensive.

Chapter one introduces the problem to be addressed and locates it in the relevant secondary literature. It explains the strategy and the structure of the thesis as well as the limits of the enquiry. Chapter two reevaluates the influence of Marxian theory on Marcuse's philosophy of technology and shows he appropriated it as a critical-analytical approach to modern society. Chapter three emphasises how Marcuse's critique of the decline of the 'second dimension' of critical reason gives a specific cast to his thought whilst drawing out the implications of his distinction between technics and technology. This chapter also acknowledges the early influence of Marcuse's Heideggerian formation. Chapter four shows that Marcuse's philosophy of technology may have more relevance to contemporary debates about the philosophy of technology than might be expected. It does so by giving a critique of the current emphasis on perpetual economic growth from the perspective of the kind attributed to Marcuse. Chapter five defends Marcuse's concept of nature from a number of prominent contemporary criticisms and suggests that, despite its apparent concerns, it remains relevant to the determination of issues common to philosophers of technology and the environment. Chapter six defends Marcuse’s philosophy of technology from contemporary ‘instrumental’ accounts, and chapter seven undertakes the same task in relation to autonomous accounts of technology.

The thesis concludes that dismissals of Marcuse's philosophy of technology as abstractly utopian and pessimistic are one sided and in some respects precipitate. Moreover, there may be something still to be learnt from his approach to this area of research. His philosophy of technology is arguably more valuable than the existing literature suggests because it has concrete philosophical features that can then be applied to developments since his death. This is not to suggest that Marcuse's claims can be made out or that his theorising is free from serious problems, it is to correct the record in certain limited respects.

Contents

Ὁ τῆς φύσεως πλοῦτος καὶ ὥρισται καὶ εὐπόριστός ἐστιν· ὁ δέ τῶν κενῶν δοξῶν εἰς ἄπειρον ἐκπίπτει.

Nature's wealth is restricted and easily won, whilst that of empty convention runs on to infinity.[1]

1 Epicurus, 'Leading Doctrines', 15, *The Philosophy of Epicurus,* translated by G.K. Strodach, (Evanston, Ill.: Northwestern University Press), p.54.

General Introduction

This thesis will offer a new interpretation of Herbert Marcuse's philosophy of technology. As the treatment of Marcuse's work in the decades since his death have been scant as well as sometimes one-sided, this thesis will argue that Marcuse still has much to offer in regard to the shared grounds of philosophy of technology and philosophy of the environment. It will be the aim to argue that Marcuse offers a cautionary approach to modern technology from which risks facing the human future can be seen to be the result of the edifice of technoscientific production being increasingly motivated and directed toward monetary, rather than strictly technical incentives. As such, problems of crucial, practical exigency – specifically those of an environmental nature – tend to become ever-more contingent upon the a priori convention of profit-motives and economic growth. As it will be the aim to argue, the extent of biospheric destabilisation already unleashed as a consequence of this historically unprecedented arrangement comes at a most inopportune time for civilisation; modern technologically-augmented humanity may be far less stable than is commonly considered, and therefore technology requires radical caution.

History arguably shows the essential ambiguity of technology – since the industrial revolution, technoscientific development had allowed for dramatic rises in living conditions, education, health, life-expectancy and affluence. Yet, Marcuse was intimately aware of its destructive powers and the consequences – both intended and unintended – that could be unleashed with recourse to modern technoscience. However, although he addressed environmental problems late in his career, Marcuse would likely not have predicted the extent to which civilisation under the sway of the "technological mode of production" could come to be endangered by its own success. As a result of technological and industrial proliferation and increased numbers of humans, species diversity has dwindled, crucial resources are being speedily depleted, various forms of pollution have contaminated the waters and atmosphere, rates of salination and desertification grow, and various biospheric cycles are now considered to have been destabilised. Furthermore, technoscientific advance itself has yielded certain novel, historically unprecedented threats; as advancement grows, so too it seems does the capacity for very few to cause great harms.

However, despite this situation, governments, industry representatives, the large majority of

economists and a good deal of the public remains faithful to the cure-all of improvements in efficiency, logistics, distribution and of course, economic growth. This is hardly surprising and betrays an understanding of technology that reflects historical convention: technological and scientific development play an integral role in social development, in extending and augmenting human capacities, in creating opportunity. Yet, as Marcuse continually argued, technoscience is not isolated from the socio-economic mode of production – in this case – capitalism.

> For Marcuse, it is both technological rationality and capitalist relations of production which constitute advanced capitalist societies, and his analysis implies that capitalist imperatives structure technological rationality while technological rationality in turn helps structure advanced capitalism.[1]

If not completely dependent upon an imperative of perpetual growth, virtually all forms of this mode have been accompanied by it, and its modern defenders claim with clockwork regularity that its direction of the means and relations of production provides the solution to virtually all social and now environmental ills. Yet this is based on a misnomer – the material resources technology ultimately relies upon on are finite – but the growth imperative is theoretically infinite. In order to address this contention, this thesis will therefore aim to expand upon Marcuse's argument that it is not technics or technology per se that has led to the current environmental predicament, but the incentives that tend to prevail under capitalism.

Strategy

The major aim of this thesis will therefore be to delineate, expand upon, and defend Marcuse's view of technics and technology, as well as adding emphasis to his call for qualitative change with recourse to both the environmental problems facing the human future, as well as new and novel threats of a wholly technoscientific nature. Although Marcuse himself only began to address such issues at a late stage of his career, it will be argued here that their current prominence adds to the urgency of readdressing his approach in order to provide a critique of the direction of technology under the capitalist mode of production. Unlike many other thinkers concerned with the topic, Marcuse not only recognised the necessity for a philosophy of technology to account for its social, anthropological and agential underpinnings, his approach allowed for its essential ambiguity and its necessary connection to a theory of nature. As it will be the aim to argue, Marcuse's

1 D. Kellner, *Herbert Marcuse and the Crisis of Marxism,* (Berkeley: University of California Press), p. 196.

multidimensional approach resisted taking explicit sides of the various common dichotomies that continue to feature in both academic, journalistic, public and philosophical discussions of technology. Marcuse avoided reducing technology to either inherently good or bad, determining or determined, self-governing or under human control. Whilst Marcuse was specifically concerned with the extent to which technics had come to be deployed as a means of mass social control, for Marcuse, technoscientific advance in itself remained the tool of liberation. Assuming continual development which is itself encouraged under capitalism, he believed the opportunities it opened up were of foremost significance, as within them lay the seeds by which the socio-political status quo could be qualitatively improved.

The following approach will therefore aim to extend Marcuse's critique by drawing specific attention to the environmental implications of the directive incentives of modern technology. It will be argued in general that modern technoscientific production can be distinguished from merely 'technical' modes of production on the basis of its dual purpose; to function 'internally', (i.e. for the hammer to be produced so as to function adequately as a hammer), and for the same hammer to function as a vehicle of profit for its producer. Although it is acknowledged that profit-making and the concept of money are hardly new features of technical mediation, the extent to which they influence modern production today is historically unprecedented, and marks a pronounced shift in the incentives driving production as a whole. Furthermore, the consequences of the differences between the directional incentive of profit and practicality will be critically analysed. As such, it will be argued that as the conventional nature of the former admit of no intrinsic maximums, they are inappropriate as the sole directive incentive of production on the grounds of the preconditional status of a relatively stable biosphere. Given this contention, it will be argued that Marcuse's philosophy of technology can be read as a warning concerning the extent of the influence the imperative of perpetual economic growth plays within technical mediation, by revealing that the practical intentions that formerly animated production are today largely driven by an inexhaustible convention. As such, practical instrumentality comes to be blurred and all the more contingent upon economic value, as what Marcuse referred to as the "end of technological rationality"[2] is transferred to the limited evaluations of the market-mechanism.

This thesis will encompass theoretical and empirical contexts and will be informed throughout by the concrete, practical concern of environmental overshoot. However, it should be acknowledged that within the context of the shared ground of the philosophies of technology and environment, the

2 See H. Marcuse, (1964), *One-Dimensional Man,* (New York: Routledge, 2004), p. 5.

theoretical and practical are hardly causally isolated categories. For example, a widespread belief or collective attitude that considers technoscientific development as inherently ethically and socially positive will obviously tend to foster advance, just as conversely, alternative socio-political, religious, or cultural proclivities may tend to restrict certain types of development, or even development per se.[3] In other words, the direction and shape of technology will be treated as ultimately socially determined and historically specific, but, in line with the Marcusean approach, this is not to rule out technology having an equally important role in shaping and informing social habits, and its role in making the world intelligible. This subject will be specifically dealt with by contrasting Marcuse's 'compatibilist' approach to technology from instrumental and autonomous accounts, which, in varying ways, will be argued to undermine the integral role of human agency and responsibility over the direction of technological development.

Just as Marcuse's approach to technology not only illuminated the ways in which it had ushered in "new forms of control" under modern capitalism,[4] he never ruled out the prospect of human agency effecting liberatory change, and to restore what he took to be technology's primary role in human life: minimising the need for arduous or dangerous labour, opening up opportunity, increasing health, and diminishing suffering. Yet Marcuse argued that such a view of technological development in the advanced industrial societies was no longer reflective of reality; despite his belief that technical and scientific capacities had become sufficiently advanced to bring about authentic qualitative change to civilisation, the rationality of the current "technological mode of production" contained and obscured the potential which, for Marcuse, essentially characterised human life. The critical role of reason which had formerly functioned as a basis to question the given and effect social and political change where possible had been increasingly subsumed into a "one-dimensional" society, mechanically ordered by a technological rationality characterised by quantification and efficiency. As Marcuse believed, above all else this arrangement functioned to maintain and reproduce the psycho-behavioural and technical "status quo".

The major point of critique can be described as follows in relatively simple terms – if confined to a single planetary resource base, sooner or later, it must not be ignored that even a species as innovative as humanity cannot expand in number or in resource acquisition indefinitely. There are relatively few options in this context; either undertake a symbiotic arrangement with the biosphere,

3 Any number of histories of technological development take up this topic. For a recent "New" world-historical approach, see D.R. Headrick, *Technology: A World History,* (Oxford: Oxford University Press, 2009).

4 See Marcuse, *op.cit.* (1964), pp. 3-20.

explore resources off-planet, or face serious existential risks. Far from recognising this seemingly sensible contention, the treatment of nature as not merely a store of resources, but a source of profitable plunder continues and even grows, to a point at which it now come to perceptibly disturb the biosphere. This represents a fundamentally practical concern for civilisation, yet to reiterate, as long as the means of production are directed by the ancillary prerogative of economic growth and responsibility is abdicated to market forces, praxis arguably diminishes. In summary, rather than offering an abstract utopian account of technology's role in creating an authentically liberated society, Marcuse's critical analysis will be interpreted as an incisive critique of advanced industrial society by a concrete philosophical utopian.

Literature Review

The interconnection between economic growth and technological production is well accepted in the economic literature, and the shared grounds between technology and the environment have also been long recognised in ecophilosophy. However, with the salient exceptions of Herbert Marcuse, Lewis Mumford, and Karl Marx, many recent philosophical efforts to engage with technology and its social ramifications have arguably pursued other concerns.[5] Most prominently, these range from technology's ontological status,[6] the nature of its development or "evolution",[7] the extent and role of agency within technical mediation,[8] the social and environmental 'impacts' of specific technical

5 See L. Mumford, (1934), *Technics and Civilization,* (New York: Harcourt, Brace and World, 1963); *The Myth of the Machine,* vol. 1: 'Technics and Human Development', (New York: Harcourt Brace Jovanovich, 1967) and vol. 2: 'The Pentagon of Power', (New York: Harcourt Brace Jovanovich, 1970). For a classic early 'philosophical' approach to technology, see the works of Marx, especially 'The Labour Process and the Valorization Process', vol.1, chapter 7 of *Capital,* (London: Penguin, 1990), pp. 283-291. On definitions of technology in general, see R. Li-Hua, (2009), 'Definitions of Technology', in *A Companion to the Philosophy of Technology,* edited by J.K.B. Olsen, S.A. Pedersen and V.F. Hendricks, (Oxford: Blackwell, 2009), pp. 18-22.

6 Martin Heidegger's, 'The Question Concerning Technology' remains one of the most prominent and influential works in the 'humanities' tradition of the philosophy of technology. See Heidegger, *Basic Writings,* edited by D.F. Krell, (New York: Harper and Rowe, 1977), pp. 287-317. Secondary works on Heidegger's philosophy of technology are far too numerous to list in detail here. For a basic introduction, see D. Ihde, 'Heidegger's Philosophy of Technology', in *Philosophy of Technology: The Technological Condition,* edited by V. Dusek and R.C. Scharff, (Oxford: Blackwell, 2005), pp. 277-292. For a prominent reinterpretation of the Heideggerian ontological approach to technology, see B. Stiegler, *Technics and Time v1: The Fault of Epimetheus,* (Stanford: Stanford University Press, 1994). For an alternative collection of essays on the ontological status of technology, see *The Artificial and the Natural: An Evolving Polarity,* edited by B. Bensaude-Vincent, and W.R. Newman, (Boston MASS: The MIT Press, 2007).

7 On technological evolution see B. Arthur, *The Nature of Technology: What it is and How it Evolves,* (New York: The Free Press, 2009); J.M. Ziman, *Technological Innovation as an Evolutionary Process,* (Cambridge: Cambridge University Press, 2003); G. Basalla*, The Evolution of Technology,* (Cambridge: Cambridge University Press, 1988) and R. Kurzweil, *The Singularity is Near: When Humans Transcend Biology,* (New York: Penguin, 2005). See also the work of B. Barnet, 'Do Technical Artefacts Evolve?' in *Technicity*, edited by A. Bradley and L. Armand, (Prague: Litteraria Pragensia, 2006), pp. 103-114 and 'Engelbart's Theory of Technical Evolution', *Continuum Journal,* vol.20, issue 4, (December, 2006), pp. 509-521.

8 On 'autonomous' and deterministic theories of technology, see L. Winner, *Autonomous Technology: Technics Out of*

systems and artifacts, or on the other hand, the diverse social interests and procedures which inform design processes.[9] The task of critically engaging the influence of economic growth in technical mediation and its resulting environmental implications have of course been taken up by thinkers from diverse backgrounds,[10] but Andrew Feenberg's statement that "economics cannot explain but rather follows the trajectory of technological growth",[11] arguably serves as a general indication of the attitude of much contemporary philosophical discussion of technology in the "humanities" tradition.[12] It will therefore be the chief task of this thesis to question this apparent lacuna, and its implications for the crucial concerns emanating from the modern environmental crisis. In order to do so, Marcuse's critique of consumerism and his concepts of "technological rationality", the "one-dimensional society" and the "technological mode of production" will be drawn upon and defended from a variety of rival contemporary views of technology.[13]

Control as a Theme in Political Thought, (Cambridge, MASS: The MIT Press, 1977); B. Bimber, 'Three Faces of Technological Determinism', and other essays in *Does Technology Drive History? The Dilemma of Technological Determinism,* edited by L. Marx and M.R. Smith, (Boston MAS: The MIT Press), pp. 79-100; R. Heilbroner, (1967) 'Do Machines Make History?' in Scharff and Dusek, (eds.), *op.cit.* (2005), pp.398-404; as well as the 1994 follow-up essay, 'Technological Determinism Revisited', in Smith and Marx, (eds., 1994), pp. 67-78. Works which explicitly conceive technology as autonomous or deterministic include J. Ellul, *The Technological Society,* (New York: Vintage, 1964); Ellul states his case concisely in 'The Technological Order', in *Philosophy and Technology,* edited by K. Mitcham and R. Mackey, (Cambridge, MASS: The MIT Press, 1983), pp. 86-105; M. McLuhan, (1964), *Understanding Media,* (New York: Routledge, 2007), and, as it will be argued here, R. Kurzweil, *The Singularity is Near,* (New York: Penguin, 2005). For a critique of what he refers to as 'substantivist' approaches to technology, (which includes technological determinism), see Feenberg, *Questioning Technology,* (New York: Routledge, 1999). Other critiques of technological determinism include M. Goldhaber, 'Is Technology Autonomous?', in *Controlling Technology: Contemporary Issues*, edited by W.B. Thompson, A. Light, and E. Katz, (New York: Prometheus Books, 1991), pp. 195-203; T.J. Misa, 'Retrieving Sociotechnical Change from Technological Determinism', in Smith and Marx (eds., 1994), pp. 115-141.

9 See for example D. Ihde, 'The Designer Fallacy and Technological Imagination', in *Philosophy and Design: From Engineering to Architecture,* edited by P.E. Vermaas, P. Kroes, A. Light and S.A. Moore, (Amsterdam: Springer, 2008), pp. 51-59. Recent contructivist work in sociology and elsewhere has had a significant influence on other philosophical approaches to technology, especially the work of Feenberg. See for example his *Questioning Technology,* (New York: Routledge, 1999), pp. 78-89. On the social constructivist approach to technology, see W. Bijker and T. Pinch, 'The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other', in *Social Studies of Science,* vol. 14, no. 3, pp. 399-441. For a critique of the social constructivist program, see L. Winner, 'Social Constructivism: Opening the Black Box and Finding it Empty' in Dusek and Scharff, *op.cit.* (2005), pp. 233-242. For a critical response to Winner, see M. Elam, 'Anti Anticonstructivism or Laying the Fears of a Langdon Winner to Rest', in Dusek and Scharff, (eds.), *op.cit.* 2005), pp. 612-616.

10 See for example, B. Commoner, *The Closing Circle,* (New York: Bantam, 1971); *Making Peace with the Planet*, (New York: Pantheon Press, 1990); See also E. J. Mishan, *The Costs of Economic Growth,* (London: Staples, 1967); J. Porrit, *Capitalism: As if the World Matters,* (London: Earthscan Publishers, 2007), and N. Georgescu-Roegen's *The Entropy Law and the Economic Process,* (Lincoln: Iuniverse, 1971); B. McKibben, *The End of Nature,* (London: Penguin-Viking, 1990); *Eaarth: Making Life on a Tough New Planet,* (Melbourne: Black Inc., 2010). For a summary of environmental-economic criticisms of the growth imperative, see P. Hay, *Main Currents in Western Environmental Thought,* (Sydney: UNSW Press, 2005), pp. 204-210.

11 Feenberg, *op.cit.* (1999), p. 79.

12 The distinction between "humanities" or continental and "engineering" or analytic philosophy of technology was first posited by C. Mitcham, *Thinking Through Technology: The Path Between Engineering and Philosophy,* (Chicago: Chicago University Press, 1994). See also M. Franssen, 'Analytic Philosophy of Technology', in Berg Olsen *et al*, *op.cit.* (2009), pp. 184-188.

13 What follows will aim to defend Marcuse's thought from selected aspects of the views of contemporary philosophers of technology such as Andrew Feenberg and Don Ihde, and other accounts from Steven Vogel, Jürgen Habermas,

Since this thesis is by no means intended to offer a 'complete' account of Marcuse's critical-social theory, the influence of thinkers such as Hegel, Freud Lukács, Weber and Heidegger, whom, along with his Frankfurt School colleagues played influential roles in the development of his thought,[14] these sources will only be attended to in passing in order to emphasise the primary influence, that of Marx. [15] Hence, beginning with Marcuse's early essay on the Economic and Philosophical Manuscripts of 1844,[16] the majority of my critical attention will focus on the middle to late period of his career in which the topics of technology and nature come to increasing prominence.[17] The

and Ray Kurzweil.

14 Weber's concept of the 'iron cage' and 'rationality' is critically addressed by Marcuse's 'Industrialization and Capitalism in Max Weber', in *Negations: Essays in Critical Theory,* 2nd ed., edited and translated by J.J. Shapiro, (Boston: Beacon Press), pp. 201-226. For Marcuse's early and influential account of Hegel, see his 1932 work, *Hegel's Ontology and the Theory of Historicity,* (Cambridge, MASS: The MIT Press, 1987). The similarity of the views of Marcuse and Martin Heidegger, especially the latter's approach in 'The Question Concerning Technology' and Marcuse's *One-Dimensional Man* are considerable. On this topic, see chapter 6 of Feenberg, *op.cit.* (2005), pp. 115-133; 'From Essentialism to Constructivism: Philosophy of Technology at the Crossroads,' in *Technology and the Good Life,* edited by E. Higgs, D.Strong, and A. Light, (Chicago: University of Chicago Press, 2000), pp. 294-315. See also I. Thomson, 'From the Question to Technology to the Quest for a Democratic Technology: Heidegger, Marcuse, Feenberg', *Inquiry,* vol.43, issue 2, (Summer, 2000), pp. 225-234. For Marcuse's own thoughts on Heidegger and the influence he played on his thought, see 'Heidegger's Politics: An Interview' with Frederick Olafson', in Abromeit and Wolin, (eds.), *op.cit.* (2005), pp. 165-175. On the philosophical and political legacy of the thought of the Frankfurt School, as well as the influence Theodor Adorno, Max Horkheimer and other critical theorists played on Marcuse's thought, see M. Jay, *The Dialectical Imagination,* (Berkeley: University of California Press, 1996), and R. Wiggershaus, *The Frankfurt School*, (Cambridge: Polity Press, 1995).

15 Arguably, the most comprehensive single account of Marcuse's thought is D. Kellner's *Herbert Marcuse and the Crisis of Marxism,* (Berkeley: University of California Press, 1984). Andrew Feenberg's works, particularly his *Questioning Technology,* (1999) and *Heidegger and Marcuse: The Catastrophe and Redemption of History,* (New York: Routledge, 2005) are also of great importance. Early works on the broader aspects of Marcuse's critical-social theory include M. Schoolman, *The Imaginary Witness: The Critical Theory of Herbert Marcuse,* (New York: The Free Press, 1980), which was subjected to a critical review by Kellner in 'Schoolman on Marcuse', in *New German Critique,* no.26, 'Critical Theory and Modernity', (Spring-Summer, 1982), pp. 185-201. Secondary works and edited volumes discussing Marcuse's thought roughly up to the point of the publication of *One-Dimensional Man* include J. Habermas, (ed.), *Antworten auf Herbert Marcuse,* (Frankfurt: Suhrkamp, 1968); J. Fry, *Marcuse: Dilemma and Liberation,* (New Jersey: Humanities Press, 1974). More recent discussions include J. Bokina and T.J. Lukes, (eds.), *Marcuse: From the New Left to the Next Left,* (Lawrence: University of Kansas Press, 1994); C. Reitz, *Art, Alienation, and the Humanities: A Critical Engagement with Herbert Marcuse,* (Albany: State University of New York Press, 2000); J. Abromeit and W.M. Cobb, (eds.), *Herbert Marcuse: A Critical Reader,* (New York: Routledge, 2004); and C. Fuchs, *Emanzipation! Technik und Politik bei Herbert Marcuse,* (Aachen: Shaker, 2005). Arguably, the most comprehensive guide to works both by and on Marcuse can be found at the 'Herbert Marcuse Homepage' operated by his son, Harold Marcuse, which can be found at: http://www.marcuse.org/herbert/index.html (viewed 10.10.2012).

16 Marcuse, 'New Sources on the Foundation of Historical Materialism', in R. Wolin and M. Abromeit (eds.), *Heideggerian Marxism,* (Lincoln and London: University of Nebraska Press, 2005), pp. 87-121.

17 A sample of Marcuse's work in which technology features as a major concern include the following: (1941), 'Some Social Implications of Modern Technology', and other works in *Technology, War and Fascism: The Collected Papers of Herbert Marcuse,* vol.1, edited by D. Kellner, (New York: Routledge, 1998), pp. 41-65; (1960), 'De l'ontologie à la technologie: les tendences de la société industrielle' ('From Ontology to Technology: Fundamental Tendencies of Industrial Society'), translated by M. Ishay, in *Critical Theory and Society: A Reader,* edited by N. Bronner and D. Kellner, (New York: Routledge, 1989), pp. 119-127; (1961), 'The Problem of Social Change in Technological Society', in *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse,* vol.2, (New York: Routledge, 2001), pp. 37-57; (1964), *One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society,* (New York: Routledge, 2002); (1965), 'The Containment of Social Change in Industrial Society', in Kellner, (ed.), *op.cit.* (2001), pp. 82-93; (1966), 'The Individual in the Great Society', in Kellner *ibid.,* (2001), pp. 64-65; (1967a), 'The End of Utopia', in *Five Lectures: Psychoanalysis, Politics and Utopia,* translated and edited by

early academic reception to Marcuse's broader social philosophy was often hostile.[18] Despite attaining global celebrity status in the 1960s, interest in his thought quickly declined after his death in 1979 only to enjoy something of a resurgence in the 1990s when a number of philosophers revisited his views on nature and technology.[19] Yet before this, at the height of his fame, a variety of critical works emerged which tended to "either grossly simplify his thought, reduce it to an easily digestible commodity, or, on the other hand, abruptly dismiss it in polemics that (were) often politically motivated."[20] It could be said of course that Marcuse's multidimensional approach to technology was somewhat receptive to misinterpretation; on the one hand the strong pessimism of One-Dimensional Man was often taken as a form of technological determinism in which human agents were reduced to the mere effects of deeper technological causes.[21] Marcuse's relentless search for sources of resistance and "qualitative" social change also saw his theory branded as utopian by other critics.[22]

Dichotomies such as these are hardly rare within contemporary philosophical discussions of technology and the environment. Technology, we are told, either plays a determining or liberating role in society;[23] it is considered inherently benevolent by some and malevolent by others;[24] it is said

J.J. Shapiro and S.M. Weber, (Boston: Beacon Press, 1970), pp. 62-81; (1967b), 'Liberation from the Affluent Society', in *Art and Liberation: The Collected Papers of Herbert Marcuse,* vol.4, edited by D. Kellner, (London & New York: Routledge, 2007); (1967c), 'Aggressiveness in Advanced Industrial Society', in Schapiro (ed.), *op.cit.* 1969), pp.248-268; (1970), 'Charles Reich – A Negative View' in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* vol.3, edited by D. Kellner, (London & New York: Routledge), pp. 46-48; and *An Essay on Liberation,* (Boston: Beacon Press, 1969). On the "new technology" see 'Nature and Revolution' in *Counterrevolution and Revolt,* (Boston: Beacon Press, 1972a); and (1979), 'Ecology and the Critique of Modern Society', in *Capitalism, Nature, Socialism,* 3:3, (Copyright © 1992 by Peter Marcuse), pp. 29-48. Works exploring the relevance of Marcuse's thought to contemporary environmental thought include, A. Light, 'Marcuse's Deep-social Ecology and the Future of Utopian Environmentalism', in Abromeit and Cobb (eds.), *op.cit.* (2004), pp. 227-235; A. Feenberg, 'The Liberation of Nature?', in Western Humanities Alliance Special Issue, *Nature, Culture, Technology,* edited by A. Feenberg-Dibon and R. McGinnis, vol. LXIII, no. 3, (Fall 2009), pp. 96-107; and T. Luke, 'Marcuse's Ecological Critique and the American Environmental Movement', in Abromeit and Cobb, (eds.), *ibid.,* (2004), pp. 236-239.

18 Critiques of Marcuse's work by Alasdair MacIntyre, Michel Foucault and Richard Rorty are subjected to strong scrutiny by W.M. Cobb in his 'Diatribes and Distortions: Marcuse's Academic Reception', in Abromeit and Cobb, (eds.), *op.cit.* (2004), pp. 163-187.

19 These works are noted in detail below. On the topic of the rising interest in Marcuse's work, see D. Kellner, 'A Marcuse Renaissance?', in Bokina and Lukes, (eds.), *op.cit.* (1994), pp. 245-267.

20 Kellner, *op.cit.* (1984), p. 378. A sample of the critical works which arguably misinterpreted Marcuse's views for political or other reasons include R. Marks, *The Meaning of Marcuse,* (New York: Ballantyne, 1970); A. MacIntyre, (1970), *Marcuse,* (London: Fontana Modern Masters Series, 1973), H. H. Holz, *Utopie und anarchismus. Zur Kritik der kritischen Theorie Herbert Marcuses,* (Cologne: Pahl-Rugenstein, 1968); and E. Vivas, *Contra Marcuse,* (New York: Delta, 1972).

21 Examples of this tendency include R. Steigerwald, *Herbert Marcuses dritter Weg,* (Cologne: Pahl-Rugenstein, 1969); A. Toffler, *Future Shock,* (London: Pan, 1970), p.291; Schoolman, *op.cit.* (1980), and arguably Winner, *op.cit.* (1977).

22 Marcuse has been regularly mispresented as a "historicist or essentialist, a bleak pessimist or a starry-eyed utopian, an elitist individualist or a blatant irrationalist." Kellner, *op.cit.* (1984), p. 374.

23 See reference 4, above.

24 Arguably the most prominent recent example of technoscientific utopianism is Kurzweil, *op.cit.* (2005). For the other side of the discussion, see for example, B. McKibben, *Enough: Staying Human in an Engineered Age,* (New

to embody 'ethics', 'politics' or 'ideology', or it is considered neutral;[25] and to reiterate, some take it as an autonomous actant in history, whilst others see it as as completely under the control of human agents.[26] Marcuse's approach arguably follows a middle road between such dichotomies, offering not only hope for human responsibility to effect change in the direction of technical development in the future, but also acknowledging its determining features in the present. As such, it offers a considerable philosophical-anthropological foundation and argument for a dramatic reassessment of the modern technological order. Yet, Marcuse's theory of nature – a necessary interlink in any rethinking of the technological project – remains problematic and controversial, partly due for conceptual reasons.[27] Criticisms of Marcuse's 'romanticism'; his supposed advocation of a "fraternal relation" to nature; and the coherence of his concepts of a "new science" and "new technology" from his Frankfurt School colleague and friend, Jürgen Habermas, have given rise to a number of important works of relevance to contemporary ecological and technological issues.[28] It will be argued in this thesis that the major positions that have emerged from this debate tend to overlook significant aspects of Marcuse's approach to technology. It will also be argued that Feenberg's

York: Owl Books, 2004) and B. Joy, 'Why the Future Doesn't Need Us', in *Wired,* issue 8, no.4 (April, 2000). For examples of the neo-ludditism characteristic of certain representitives of the 'anarcho-primitivist' movement, see D. Jensen, *Endgame vol.1: The Problem of Civilization,* (New York: Seven Stories Press, 2006); M. Zerzan, *Running on Emptiness: The Pathology of Civilization,* (Port Townsend, WA: Feral House, 2002); and as editor, *Against Civilization: Readings and Reflections,* (Port Towsend, WA: Feral House, 2005).

25 For a novel discussion of the 'ethics' of technological 'actants' such as automatic doors, see B. Latour, ‘A Door Must be either Open or Shut: A Little Philosophy of Techniques’*,* in Feenberg and Hannay, (eds.), *op.cit.* (1995), pp. 272-281. See also L. Winner, 'Do Artifacts have Politics?', in *The Whale and the Reactor,* (Chicago: Chicago University Press, 1986), pp.19-39. See also Feenberg, 'Can Technology Incorporate Values? Marcuse’s Answer to the Question of the Age' transcript of a paper given at the conference on *The Legacy of Herbert Marcuse*, University of California, Berkeley, (November 7, 1998); Feenberg, *op.cit.* (1999), pp. 101-129; and Ihde, *op.cit.* (2008).

26 See Aristotle, *The Nichomachean Ethics,* book 6, iv, (London: Penguin Classics, 1976), p. 208.

27 Marcuse's discussions of nature (which includes both human, female, and wild or 'first' nature), include Marcuse, *op.cit.* (1941). His critique of the instinct theory and depth psychology of Freud receive their clearest expression in his 1955 work, *Eros and Civilization: a Philosophical Enquiry into Freud,* (Boston: Beacon Press, 1970). Other texts in which Marcuse lays the groundwork for a novel – if sometimes confusing – concept of first nature include Marcuse, *op.cit.* (1964; 1969b; 1972a; and 1979). The role of art and aesthetics would play in the liberation of society are arguably laid down in both his first and final major works. See Marcuse, (1922), 'The German Artist Novel: Introduction', translated by C. Reitz, in *Art and Liberation: The Collected Papers of Herbert Marcuse,* vol.4, edited by D. Kellner, (New York: Routledge, 2007), pp. 71-80; and *The Aesthetic Dimension,* (Boston: Beacon Press, 1978). On problems emanating from Marcuse's view of nature, see the subsequent note.

28 This discussion arose from Jürgen Habermas's criticisms of Marcuse's concepts of the "new science" and "new technology". See Habermas, 'Technology and Science as Ideology', in *Toward a Rational Society,* (Boston: Beacon Press, 1970), pp. 81-122. Further work emanating from this debate includes S. Gandesha, 'Marcuse, Habermas, and the Critique of Technology', in Abromeit and Cobb, (eds.), *op.cit.* (2004), pp. 188-208; Feenberg, 'Marcuse or Habermas: Two Critiques of Technology' in *Inquiry*, vol.39:1 (Elmont, NY: 1996), pp. 45-70. The debate is retraced in Feenberg, *op.cit.* (1999), pp.154-180; see also S. Vogel, 'New Science, New Nature: The Habermas-Marcuse Debate Revisited', in *Technology and the Politics of Knowledge,* edited by A. Feenberg and A. Hannay, (Indiana: Indiana University Press, 1995), pp. 23-42; as well as Vogel's extended treatment of the debate in *Against Nature: The Concept of Nature in Critical Theory,* (Albany: SUNY Press, 1996), pp. 101-143. See also R.B. Pippin, 'On the Notion of Technology as Ideology', in Feenberg and Hannay, *op.cit.* (1995), pp. 43-61; (1992), D. Kellner, 'Marcuse, Liberation and Radical Ecology', in *Capitalism, Nature, Socialism,* vol.3, no.3, (September), pp. 43-46; and C. Fred Alford, *Science and the Revenge of Nature: Marcuse and Habermas,* (Gainesville: University of Florida Press, 1985). Feenberg answers his critics in 'Constructivism and Technology Critique: Replies to Critics', in *Inquiry,* Issue 1., (Summer, 2000), pp. 16-29.

appropriation of Marcusean philosophy of technology does not take the economic incentives motivating technological deployment with sufficient seriousness, especially the environmental implications of the "growth fetish".[29]

It is the major contention of this thesis that the primary importance of Marcuse's approach lies in the distinction he placed between technics and technology, and that this distinction can be illuminated by emphasising the particular economic imperative which arguably plays the most significant role in motivating and guiding the political, corporate, economic and technological 'status quo'; the utopian aim of perpetual growth.[30] It is just this factor of Marcuse's critical theory which has been largely unaccounted for or underexplored on the part of both his critics as well as his chief expositers; yet in hesitating to countenance this crucial and defining aspect of modern technological production, the primary incentive driving and guiding its advance is left unaccounted for, or in certain and prominent accounts of technological mediation, almost completely ignored.[31] Without taking the ensemble nature of technics, economics and the environment into consideration as Marcuse attempted to do, any radical critical approach to either domain in isolation appears doomed to failure. Hence, as the current configuration of technology appears as a danger to the environment, it appears as a danger to the future of human flourishing; a betrayal of the "end of technological rationality", or in other words, the essential role of technics in securing and expanding human capacities, rather than threatening their long-term continuation.[32]

29 This term is owed to C. Hamilton, *Growth Fetish,* (Sydney: Allen and Unwin, 2003).

30 Marcuse inherits the distinction from Mumford, *op.cit.* (1934). Marcuse appears to be quoting the 1936 edition in 'Some Social Implications of Modern technology'. See Kellner, (ed.), *op.cit.* (1998), p. 41.

31 'Autonomous' theories of technology undermine human agency, but 'instrumental' theories arguably overstate its efficacy in technical mediation. Hence, an analogy between modern metaphysical accounts of the problem of free will or determinism can be applied to the question of technological determinism, in which Marcuse's theory offers a "compatibilist" middle road. accounting for both certain elements of determinism without relinquishing the possibility of a change in the overall direction of technoscientific development brought about by human agency.

32 On the "end of technological rationality", see Marcuse, *op.cit.* (1964), p. 5.

Chapter 1

Utopia and the Problem of Method

> Marcuse is a utopian thinker. He conceives of a redeemed technological rationality in a liberated society, much as Plato, at the end of the *Gorgias,* imagines a reformed rhetoric that would serve good ends.[1]

Part one of this thesis will emphasise the importance technology played in his vision of qualitative social change. The discussion will begin with a brief introduction to Marcuse's thought and methodology, before moving to delineate his approach to technology with specific reference to its philosophical-anthropological foundations in concepts derived from the philosophical-anthropological thought of the young Karl Marx. Subsequently, Marcuse's philosophy of technology will be described in detail in order to establish the relevance of his critique to the current direction of technological development and proliferation under modern capitalism.

Throughout his career, Marcuse's thought was driven by a conviction and belief in the possibility of radical social change which he considered necessary to overcome the iniquities of the capitalist mode of production. Marcuse's concept of qualitative social change forms the central base from which his philosophy of technology and critique of capitalist society emerge,[2] and the concept of utopia was "at the core of his ideas",[3] yet his use of this latter concept was neither in its traditional definition as a semi-mythical ideal, nor did it play a purely theoretical or regulative role in his thought.[4] Indeed, from an analysis of his work it becomes evident that he believed in its concrete

1 A. Feenberg, *Heidegger and Marcuse: The Catastrophe and Redemption of History,* (New York: Routledge, 2002), p. 88.
2 See H. Marcuse, 'Ecology and the Critique of Modern Society' in *Capitalism, Nature, Socialism,* 3:3 (1979), p. 30.
3 A.Y. Davis, 'Marcuse's Legacies', in in *Herbert Marcuse: A Critical Reader,* edited by J. Abromeit & W.M. Cobb, (New York: Routledge, 2004), p. 45.
4 See for example, S, Bundschuh, 'The Theoretical Place of Utopia: Some Remarks on Marcuse's Dual Anthropology', in Abromheit and Cobb, (eds.), *ibid.* (2004), pp. 152-162.

possibility, given the advanced stage of technoscientific and intellectual capacities already reached in the mid to late twentieth century.[5]

> All the material and intellectual forces which could be put to work for the realization of a free society are at hand. That they are not used for that purpose is to be attributed to the total mobilization of existing society against its own potential for liberation. But this situation in no way makes the idea of radical transformation itself a utopia.[6]

Marcuse's vision of a qualitatively different society emerged as a result of the advance and proliferation of technoscientific capacities, and remained a prominent fixture of his thought from its beginning to its end. For Marcuse, the nature of such a society did not merely denote a life richer in material advantages, money, or 'certainty' regarding the future, but one "...which is as much as possible free from toil, dependence, and ugliness", lived "in accordance with the essence or nature of man".[7] For Marcuse, the 'essence' or 'nature' of individual humans and their society consisted in the capacity to pursue their potential. Technology was therefore of the utmost importance to his concept of social change, as in its most basic definition it plays the major formative, material role in diversifying and extending human capacities.[8] As Marcuse summarised the thesis of his 1966 'Political Preface' to *Eros and Civilization:*

> ...the title expressed an optimistic, euphemistic, even positive thought, namely, that the achievements of advanced industrial society would enable man to reverse the direction of progress, to break the fatal union of productivity and destruction, liberty and repression – in other words, to learn the gay science (*gaya sciencia*) of how to use the social wealth for shaping man's world in accordance with his Life Instincts, in the concerted struggle against the purveyors of Death.[9]

The basic problem was that rather than being turned toward the goal of increasing human capacities, at the height of its advancement in the modern period, Marcuse contended that technology had instead come under the sway of quite different incentives. In short, technology no longer could be

5 Marcuse, (1964), *One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society,* (New York: Routledge, 2002), p. 5.
6 Marcuse, (1967a), 'The End of Utopia', translated by J.J. Shapiro and S. M. Weber, in *Five Lectures: Psychoanalysis, Politics and Utopia,* (Boston: Beacon Press, 1967), p. 64.
7 Marcuse, *op.cit.* (1964), p.130.
8 See for example, N. Bostrom, 'A History of Transhumanist Thought', in *The Journal of Evolution and Technology,* v.14, (April, 2005), p. 1.
9 Marcuse, (1966) 'Political Preface' to *Eros and Civilization,* (Boston: Beacon Press, 1955), p. 11.

said to truly function in the collective interest of humanity, but in the interest of sustaining the capitalist mode of production. Some examples: increased automation could potentially entail less need for arduous, mindless or repetetive labour and therefore open the scope for increased free time; instead of superior technical 'know how' leading to permanence and endurance of design and functionality, the affluent world had pioneered techniques such as "built-in-obsolescence", and had come to be saturated in a multitude of surplus products – many of which differ in brand name or packaging alone – could not be said to augment human capacities, but merely produce waste and surplus. Marcuse characterised the affluent society as comprising:

> ...an abundant industrial and technical capacity which is to a great extent spent in the production and distribution of luxury goods, gadgets, waste, planned obsolescence, military or semimilitary equipment – in short, in what economists and sociologists used to call "unproductive" goods and services; a rising standard of living, which also extends to underprivileged parts of the population; a high degree of concentration of economic and political power, combined with a high degree of organization and government intervention in the economy; scientific and pseudoscientific investigation, control, and manipulation of private and group behavior, both at work and at leisure (including the behavior of the psyche, the soul, the unconscious, and the subconscious), for commercial and political purposes.[10]

In general, Marcuse uses the terms 'advanced industrial society' and 'affluent society' interchangeably. What he had in mind were liberal democracies – specifically the United States – under the economic conditions of consumer-capitalism of the mid-to-late twentieth century.[11] Under this arrangement, Marcuse believed that possibilities for change were either left in abeyance, rendered irrelevant to a population gaining in affluence and material wealth, or summarily dismissed as utopian, all seemingly in the overwhelming interest of the preservation of the status quo. Today, specifically due to the state of the environment, the stakes of this debate have arguably risen considerably. In short, Marcuse went beyond the work of Karl Marx by contending that capitalism had largely contained the sorts of 'contradictions' which Marx saw as leading to its eventual dissolution. Although the successes of capitalism in the advanced industrial nations saw to rises in affluence and 'disposable income' along with an ever-more diffuse array of new gadgets, commodities and products to purchase with it, for Marcuse, these appeared to be mere distractions

10 Marcuse, 'Aggressiveness in Advanced Industrial Society', in *Negations: Essays in Critical Theory,* (Boston: Beacon Press, 1967), p. 248.

11 See Marcuse, (1967b), 'Liberation from the Affluent Society', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* vol.3., edited by D. Kellner, (New York: Routledge, 2005), p. 77. Marcuse left Germany in 1933, arrived in the United States in 1934 and was granted citizenship in 1940.

from what he considered were the more worthwhile and meaningful goals of authentic satisfaction and fulfillment which would emerge from a qualitative revaluation of values and a "great" or "absolute refusal" of the "false", as opposed to "true" needs often promoted by consumer capitalism.[12] In over three decades since his death, and despite increasing evidence that growth for the sake of growth poses significant threats to the natural environment, such change has not emerged. Indeed, despite various tremors and shocks such as the 1970s oil crisis and the more recent, much reported 'uncertainty' which continues to plague the modern market system, capitalism *per se* appears as secure and unquestioned as it ever did. Nonetheless, rather than relinquishing the possibility for the sort of liberatory change called for by Marcuse, it will be argued in this thesis that change is no longer a theoretical or philosophical option for the supposed betterment of society, but a *practical* necessity if civilisation is to continue to flourish into either the short or long term future. Added to the various antinomies that Marcuse described as inherent to the current arrangement, technology as a whole can no longer be defined as merely the primary means by which humans secure themselves against nature's dictates, but has emerged as a threat to the relative stability of the biosphere – and therefore ourselves. Restoring an exploited and decimated environment for the welfare of future generations therefore appears to entail a reassessment of the capitalist direction of technology, and what is more, this requires a philosophical approach to the subject which is not merely concerned with the development or nature of technics or its various 'impacts', but one which acknowledges the implications of its commodity status. As it will be the aim to show, this was a defining element of Marcuse's philosophy of technology which contributes to its continual relevance to questions pertaining to the human technological mediation of the environment.

Marcuse tracked the implications of technological development through its major period of advance from the industrial revolution through to the twentieth century, a time in which the reciprocal relation between technology, science and economics became all the more integrated, and eventually "bent to the requirements of capitalism."[13] During the mid-twentieth century onwards, the appeal of Marxism as an approach to history and politics began to diminish in public and political domains and then later in the academy, fuelled chiefly by the poor examples provided by "actually-existing socialism",[14] that "enemy who would have to be invented if he did not exist".[15] As Marcuse believed, actually-existing-socialism provided few practical or ethical alternatives, but instead served to stabilise and enforce the moral righteousness as well as the budgets of capitalist society.

12 See for example, Marcuse, *op.cit.* (1964), p. 7.
13 Marcuse, *Counterrevolution and Revolt,* (Boston: Beacon Press, 1972a), p. 60.
14 See Marcuse, *op.cit.* (1964), p. 193.
15 Marcuse, *An Essay on Liberation,* (Boston: Beacon Press, 1969b), p. 84.

By the mid-twentieth century, capitalism's increasing dominance of technological development had paved the way to a notion of the Good Life in which happiness increasingly came to be defined in terms amenable to the 'technologically rational' values of quantification and efficiency, and the overwhelming quantities of material goods made available in the twentieth century provided obvious lubrication for the dismissal of such calls as Marcuse's "Great Refusal" to utopian speculation.[16] For example, in an early essay which discussed the differences between the dominant positivist philosophy of the time and critical theory, Marcuse commented that the latter derived

> ...its goals from present tendencies of the social process. Therefore it has no fear of the utopia that the new order is denounced as being. When truth cannot be realised in the established social order, it always appears to the latter as mere utopia (…) critical theory preserves obstinacy as a genuine quality of philosophical thought.[17]

Despite his revisionary Marxian approach to such questions, looming environmental problems have now arguably provided reason to ask them once again. Although he paid significant attention to humanity's anthropological status in relation to productive activity, Marcuse himself only began to discuss the status of the environment to any significant extent late in his career.[18] Yet due to the lack of scientific evidence at the time that global biospheric limitations were in danger of being breached, this should not necessarily be seen as a shortcoming. Today, economic growth at the national, international, as well as individual and regional levels cannot continue at present rates into perpetuity; to consider otherwise itself appears highly utopian if all faith is placed in offsetting its environmental impacts with rises in green innovation and efficiency. Hence, this fundamental problem – the overshoot of the planetary resource base – will form the background to this thesis, as it inescapably implicates technology both as cause and potential cure, therefore adding practical necessity to the already significant list of reasons Marcuse already provided to countenance alternatives. The welfare of the biosphere must be understood in terms of its preconditional status as the fundamental ground of economics, politics, human and non-human life in general, yet the current manifestations of capitalist systems – to the extent it they are dependent upon the "growth imperative", appears not merely oblivious, but even antithetical to this foundational contention. For Marcuse, liberatory change was possible and necessary *now*; authentic qualitative change could occur come the establishment of “essentially different forms of human existence, with a new social

16 See Marcuse, *op.cit.* (1964), p. 259.
17 Marcuse, *op.cit.* (1937), p. 143.
18 See Marcuse, *op.cit.* (1969b); 'Nature and Revolution' in Marcuse, *op.cit.* (1972a), pp. 59-78; *The Aesthetic Dimension,* (Boston: Beacon Press, 1978), and Marcuse, *op.cit.* (1979).

division of labour, new modes of control over the productive process, a new morality, etc."[19] As he wrote: "...without an *objectively* justifiable goal of a better, a freer human existence, all liberation must remain meaningless – at best, progress under servitude."[20] Hence, Marcuse long contended that the goal of liberation was a practically feasible prospect despite his otherwise pessimistic description of the current arrangement, one which he characterised in typically strong terms:

> We live and die rationally and productively. We know that destruction is the price of progress as death is the price of life, that renunciation and toil are the prerequisites for gratification and joy, that business must go on, and that the alternatives are utopian. This ideology belongs to the established societal apparatus; it is a requisite for its continuous functioning and part of its rationality.[21]

Despite his clear insistence that the preservation of the established system necessitates any alternatives to itself be considered or *treated* as utopian, the following will contend that even in his most pessimistic writings, Marcuse held out hope for the possibility of *actual* alternatives to the current economic, socio-political status quo and that the possibility of change was not just a "theoretical medium of critique",[22] but, in his own words: "the negative, unwritten, unenforceable right of transcendence which is part of the very existence of man in history".[23] Again, the practical problems resulting from the environmental crisis only serve to underline the necessity for change, for they stand to undermine the potential for civilisation to continue to flourish; Marcuse's explanation for this arguably shows that the traditional ends ascribed to technics are reversed under their current direction, no longer necessarily oriented toward the long-term future, but the short-term present; no longer aimed toward securing life in an indifferent nature, but exploiting both for profits. Of course, Marcuse's vision of qualitative change was distinctly socialist in political orientation, which takes the discussion to the influence Marxian theory played upon his thought, specifically that of the concept of human nature illustrated by the young Marx in the *Economic and Philosophical Manuscripts of 1844,* which Marcuse claimed represented a "crucial event in the history of Marxist studies" and placed the "discussions about the origins and original meaning of historical materialism, and the entire history of 'scientific socialism', on a new footing."[24] Therefore,

19 Marcuse, (1961), 'The Problem of Social Change in the Technological Society', in *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse* vol.2, edited by D. Kellner, (New York: Routledge, 2001), p. 37.
20 Marcuse, *op.cit.* (1967b), p. 76.
21 Marcuse, *op.cit.* (1964), p. 149.
22 Bundschuh, *op.cit.* (2004), p. 157.
23 Marcuse, *op.cit.* (1969b), p. 71.
24 Marcuse, (1932), 'New Sources on the Foundation of Historical Materialism', in Marcuse, *Heideggerian Marxism,* edited by R. Wolin and J. Abromeit, (Lincoln and London: University of Nebraska Press, 2005), p. 86.

the discussion which follows aims to describe the roots of Marcuse's theory of technology in Marx's anthropological theory of human nature which the latter contended was founded in human instrumental, productive activity. Through such activity, the potential of humanity comes to be objectified in material-social reality, giving shape and form to ideas, plans and intentions that – without their objective instantiation, remain inert and ideal. For Marx – as well as for Marcuse – technology appeared as the literal embodiment of human instrumental potential, however, for better or worse, the cost such a stance consists in the reduction of the natural environment or 'first nature'[25] to a mere instrument for human manipulation, and the relegation of labour to preconceived routines.[26] Although this appears characteristic of the views of Marx, Marcuse himself took a quite different approach by offering a philosophical means by which first nature might come to be treated as another subject.[27] Before more can be added to this contention, the philosophical-anthropological foundations of the Marxian theory in which labour plays a central role in constituting the human condition will be described before moving to discuss the concept of the alienation that both Marcuse and Marx concluded were the necessary accompaniment of capitalism. In general, the Marxian theory will be understood in accordance with Marcuse's understanding of the term as a critique and "analysis – political, sociological, and economic – of capitalism".[28]

25 For a discussion of Marx's distinction between "first" and "second nature", see P. Hay, *Main Currents in Western Environmental Thought,* (Sydney: UNSW Press, 2005), pp. 20-21.

26 On Marcuse's view of the "continuity of domination" in the work-world, see Feenberg, *op.cit.* (2002), p. 88.

27 See chapter 2 of Marcuse, *op.cit.* (1972a).

28 Marcuse, (1969c), 'Interview with Dr. Herbert Marcuse by Harold Keen', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse* vol.3, edited by D. Kellner, (New York: Routledge, 2005), p.128. See also F. Jameson, 'The Theory of Marxism: Questions and Answers', *Rethinking Marxism,* vol. 20, no.3, (2008), p. 368.

Chapter 2

The Marxian Foundations of Marcusean Philosophy of Technology

This chapter will articulate the Marxian foundations of Marcuse's philosophy of technology. It will stress that rather that viewing Marx's work as a science of history and or a "materialist" account of inexorable social changes, Marcuse utilised it reflexively as a methodology which remained applicable to the critique of advanced industrial society.

Labour and Nature: Marxian Philosophical Anthropology

Amongst the various figures who played a prominent influence on the wider aspects of Marcuse's thought, in the context of technology and nature, his chief influence arguably remains the work of Marx. It is important to note that Marcuse was hardly an 'orthodox' Marxist thinker, nor a 'communist', so a few words on his revisionary approach to the Marxian theory will now be provided.

Whilst Marcuse identified himself primarily as a Marxist thinker, he drew on many other influences – from Hegel and Freud, Lukács, Weber and Heidegger – to his Frankfurt School colleagues in forming the wider system of his 'neo-Marxian' social philosophy. Marcuse remained unconvinced by the fashionable dismissals of the validity of many of Marx's central contentions. In a little-known paper, he systematically defended his adherence to what he took as the five key elements of the theory:

1. In capitalism the social relationships among men are governed by exchange value rather than use value of the goods and services they produce, that is to say their position is governed by their marketibility.

2. In this exchange society, the satisfaction of human needs occurs only as a by-product of

profitable production.

3. In the progress of capitalism, a twofold contradiction develops: between (a) the growing productivity of labour and the ever growing social wealth on the one side, and their repressive and destructive use on the other; and (b) between the social character of the means of production (no longer individual but collective instruments of labour) and their private ownership and control.

4. Capitalism can solve this contradiction only temporarily through increasing waste, luxury and destruction of productive forces. The competitive drive for armament production profit leads to a vast concentration of economic power, aggressive expansion abroad, conflicts with other imperialist powers and finally to a recurrent cycle of war and depression.

5. This cycle can be broken only if the labouring classes, who bear the brunt of exploitation, seize the productive apparatus and bring it under the collective control of the producers themselves. I submit that all these propositions with the exception of the last one seem to be corroborated by the factual development. The last proposition refers to the advanced industrial countries where the transition to socialism was to take place, and precisely in these countries, the labouring classes are in no sense a revolutionary potential.[1]

Despite Marcuse's contention that the most "fundamental notions" of Marx's analysis had been "validated", he was hardly so blinkered as to ignore history's pendulum, which had swung heavily against the purported *scientific* validity of the view by the early to mid-twentieth century. It was this ultimate concern with practical socio-historical reality that led him to revise certain aspects of Marx's view: for example, the degradation and brutality of the majority of communist states by the latter half of the twentieth century appeared to invalidate Marxism as an approach to revolutionary politics, and the amelioration of the affluent working classes of the liberal democratic, capitalist societies had appeared to sharply diminish the fervor for revolutionary action. Hence, Marcuse recognised no single “class” or group as the gravediggers of capitalism, and – to his credit – rejected perhaps the most fatal mistake of actually-existing-socialism, the “seizure of power” or "dictatorship of the proletariat" brought on by a particular revolutionary group, almost all past attempts at which had resulted in mass-slaughter, starvation, terror, or combinations thereof.[2]

1 Marcuse, (1967d), 'The Obsolescence of Marxism?' in *Marx and the Western World,* edited by N. Lobkowicz, (Notre Dame: Notre Dame Press, 1967), pp.409-410. (Emphasis added).

2 See for example Douglas Kellner's introduction to the second edition of *One-Dimensional Man,* p. xxv.

Therefore, despite holding out hope for a "world-historical" revolution, Marcuse himself admitted that, in the absence of a revolutionary class consciousness, "...strategy is no longer guided by this notion."[3] This crisis prompted some Marxist thinkers toward increasingly militant, dogmatic, or extraneous reactions, with some leaning toward textural orthodoxy, and others toward the so-called "cleavage thesis" supposedly constituted by the "epistemological break" separating the thought of Marx into two distinct periods, the philosophical discussions of his youth, and the more scientifically inclined political-economic works such as *Capital* later in his career.[4] Contrary to such views, Marcuse's approach to Marxism may be called 'instrumental'. He apprehended it as a methodological approach to history, a set of conceptual tools which could continue to be utilised in the critique of capitalism. For Marcuse then, Marxism was neither an economic, nor predictive, nor

> ... a scientific theory, a system of truth whose significance lies alone in its correctness as a knowledge, but a theory of social activity and historical action. Marxism is the theory of proletarian revolution and the revolutionary critique of bourgeois society.[5]

Marcuse's work can therefore be understood as an "extremely critical, speculative and idiosyncratic version of Marxism" which attempts to "restore its liberating promises and hopes" as well as to "preserve its emancipatory possibilities in the face of its failure as a theory of revolutionary politics."[6] Having briefly articulated Marcuse's approach to the Marxian theory in general, the discussion now turns to a more specific theme, that of the philosophical-anthropological view of the 'young' Marx as presented in the *Economical and Philosophical Manuscripts of 1844,*[7] and the continuing influence they played over the duration of Marcuse's thought on technology and nature. The technological implications of the Marxian influence will be made evident shortly, but the consequences of this influence for Marcuse's theory of nature will be dealt with later on.

As it should be noted, in the works of his maturity, Marx tended to drop such ontological terms as 'essence' (*Wesen*) from his discussions in favor of a more 'scientific' or materialistic tone, yet Marcuse's view of the *Manuscripts of 1844* (a work which he was amongst the first to publish a

3 Marcuse, *An Essay on Liberation,* (Boston: Beacon Press, 1969b), p. 79.
4 L. Althusser, (1965), *For Marx,* translated by Ben Brewster, (London: Allen Lane, 1969). See also Kellner,*op.cit.* (1984), p. 79.
5 Marcuse, quoted in D. Kellner, *Herbert Marcuse and the Crisis of Marxism,* (Berkeley: University of California Press, 1984), p. 39.
6 Kellner, *ibid.* (1984), pp. 4-5.
7 Marx, *Economic and Philosophical Manuscripts of 1844,* in E. Fromm, (1961), *Marx's Concept of Man,* (New York: Continuum, 2004), pp. 78-150.

lengthy review),[8] appeared to confirm his suspicion that the presence of such concepts remained in Marx's later works by implication.[9] In the *1844 Manuscripts,* Marx provided a philosophical-anthropological approach to human nature by arguing for the centrality of productive activity (specifically *labour*). As Marcuse's Frankfurt School colleague, Erich Fromm wrote, "Marx did not believe, as do many contemporary sociologists and psychologists, that there is no such thing as a nature of man; that man at birth is like a blank sheet of paper, on which the culture writes its text."[10] Broadly put, Marcuse shared with Marx the idea that the concept of 'human nature' was neither an abstraction, nor a conceptual or social construct, deployed as a justification or legitimisation of power and authority.[11] Nor for either thinker was the concept of human nature confined to purely "scholarly" or theoretical interest, but was a topic of the utmost practical importance.[12] Marx's philosophical-anthropological description of human nature in the *1844 Manuscripts* illustrates an agent cognisant of its productive capacities which play the primary role in building its world, but this is not to reduce the human to *Homo fabre,* whose activities are thereby compounded into either purely instrumental or economic activities. Nor on Marx's account can human nature be viewed as existing apart from that of the material environment it is confronted with – on the contrary – as an early devotee of Charles Darwin's *Origin of Species,*[13] he was well aware of the role environmental exigencies had played in the development of humanity, as well as the significance of labour in coping and adapting to them. Hence, for Marx, it is through the imposition of the pre-existing exigencies of first nature that humanity is spurred to realise its fundamental means of objective expression, with this constituted in what begins as an intermediary medium the human places between herself and the indifferent dictates of a generally hostile environment. Much later in human history this 'buffer' or "technological membrane"[14] will come to encompass the globe almost in its entirety, appearing to place the starkness of *first* nature at a distance from increasingly many

8 Marcuse, (1932) 'New Sources on the Foundation of Historical Materialism', in *Heideggerian Marxism,* edited by J. Abromeit and R. Wolin, (Lincoln: University of Nebraska Press, 2005), pp. 87-121.

9 Marcuse, *op.cit.* (1932), p.95. See also E. Fromm, (1961), *Marx's Concept of Man,* (New York: Continuum, 2004), pp. 41-42.

10 Fromm, *op.cit.* (2004), p. 23.

11 As it will be seen, this aspect of Marx's view – largely uncritically adopted by Marcuse – opens up various problems. See for example, S. Vogel, *Against Nature: The Concept of Nature in Critical Theory,* (Albany: State University of New York Press, 1996).

12 See Marx's 'Theses on Feuerbach' part II, in J. Elster (ed.), *Karl Marx: A Reader,* (Cambridge: University of Cambridge Press, 1986), p. 21.

13 As Frances Wheen writes, "Marx and Darwin were the two most revolutionary and influential thinkers of the nineteenth century; and since they lived only twenty miles apart for much of their adult lives, with several acquaintances in common, the temptation to search for a missing link is hard to resist." Friedrich Engels was also apparently convinced that "Just as Darwin discovered the law of evolution in human nature, so Marx discovered the law of evolution in human history." See F. Wheen, *Karl Marx,* (London: Fourth Estate, 1999), p. 364. For an early discussion of Marx and Darwin, see the 1909 pamphlet by A. Pannekoek, 'Darwinism and Marxism', translated by N. Weiser, (Chicago: Copyright Charles H. Kerr & Co., 1912).

14 The term is owed to A. Leroi-Gourhan, *Milieu et techniques,* (Paris: Albin Michel, 1945).

humans, but for the moment it is sufficient to note that both Marx and Marcuse understood that the origins of technical mediation lay in the expediency and pragmatism characteristic of a distant epoch of human development, not yet conditioned by the convention of exchange value. It therefore appears that the early foundations of Marx's theory of human nature are not merely economic, but technical and anthropological. As Morton Schoolman notes in his description of Marcuse's early reaction to the *1844 Manuscripts*:

> Marx's theory is improperly understood if its basis is thought to be economic. Marx, Marcuse is claiming, did not intend a theory of historical or economic determinism, nor would Marx have approved of any politics rooted in such a theory. Historical materialism is not crude historicism. It is not, in other words, a theory that maintains that history develops according to rigid economic laws that establish socialism as its necessary and inevitable outcome. Marx's theory, in fact, has a philosophical foundation that opposes all such interpretations of materialism.[15]

As Marx later elaborated, with the exception of societies undivided by class, individuals come to be ordered under particular historical forms of social organisation based upon social labour and communicative relations and emerges "within a given framework of specific, historically determined, social relations of production...

> These social relations of production determine in the last analysis all other social relations, including those of social communication. It is social existence which determines social consciousness and not the other way around.[16]

Whilst Marx's inversion of the Hegelian dialectic and the significance of labour as a central category for both thinkers will not be entered into here,[17] what should be noted is that Marx conceived of history as being comprised by a number of different *modes* of production which "characterise the articulation, within a given historical period, of social relations and forces of production."[18] In the Marxian theory, tools, factories, assorted technical artifacts, human and non-

15 M. Schoolman, *The Imaginary Witness: The Critical Theory of Herbert Marcuse,* (New York: The Free Press, 1980), p. 22.
16 E. Mandel, 'Historical Materialism', in J. Eatwell, M. Milgate and P. Newman, (eds.), *Marxian Economics,* (London: 1990), p. 4.
17 Marcuse explores these themes and others in his *Reason and Revolution: An Introduction to the Dialectical thinking of Hegel and Marx,* 2nd ed., (New York, Humanities Press, 1954).
18 D. Macey, *The Penguin Dictionary of Critical Theory,* (London: Penguin, 2000), p. 257.

human labour constitute the 'means of production', with the 'relations of production' defined as the totality of relationships which individuals must *necessarily* enter into in order to maintain and reproduce their ways of life. The concept of the mode of production therefore encompasses both labour-power, the means of production and the social and technical relations of production which are shaped by the particular form the mode may assume, with the 'shape' itself being strongly contingent upon technoscientific advance and proliferation, environmental exigency, and so on. As Schoolman continues, in the historically specific context of modern capitalism, "it is within the context of an analysis of alienated labour and private property in the *1844 Manuscripts* that Marcuse demonstrates that labour *as such* is the central category of Marx's theory."[19] By 'central category' what is meant is that – according to Marx – all productive activity ultimately derives from individual and communal instrumental activity, but that this very activity is shaped and informed by the particular mode of production in place. The mode of production cannot be changed qualitatively, but only quantitatively through piecemeal adjustment from within. Yet, the mode can be rendered obsolete if faced with contradictions arising through the growth and / or advancement of the productive forces it may (or may not) foster and permit. Even today, examples of this tendency are quite evident. As it only seems fair to acknowledge, technoscientific advance (or at least, many forms of it) is widely encouraged under consumer-capitalism, and some indications point toward it being the only force always one-step ahead of the power to direct it. With the rise of accessible, affordable and increasingly powerful arrays of networked computers, digitisation, etc., certain forces have recently emerged that – without banning the internet *per se* – appear to be beyond its means of containment.[20] In the same way, Marx argues, the social relations which typically held under certain forms of feudalism became largely redundant through the onset of industrialisation; "the relationship between lord and vassal, which implies both servility on the part of the vassal and obligations on the part of the lord, thus gives way to social relations based upon the exchange of labour-power for a wage."[21]

Embodied in the productive activities of self-conscious agents, the significance and distinctiveness of human nature is worked out or "objectified" in instrumental practices (i.e. labour).[22] As Marcuse

19 Schoolman, *op.cit.* (1980), p. 22. It should be noted that – human labour and productive capacities appear to be of sufficient importance to Marx (and *ipso facto* Marcuse) to constitute an *ontological* distinction between the instrumental capacities of human and non-human animals. See Marx's comments in 'The Labour-Process or the Production of Use-Values', in *Capital,* (1867), vol.1, part 3, chapter 7, (London: Penguin, 1990), pp. 284.

20 For an overview of implications of the internet for copyright infringement, intellectual property, etc., see J. Clough, *Principles of Cybercrime,* (Cambridge: Cambridge University Press, 2010).

21 Macey, *op.cit.* (2000), p. 183.

22 Marcuse, *op.cit.* (1932b), p. 102. Marcuse is quoting Marx's 'First Manuscript'; *op.cit.* (1932), p. 84.

understood, Marx's concept of human nature was intended to be a *naturalistic, humanistic* one,[23] one in which "the naturalism of man and the humanism of nature" are "brought to fulfillment".[24] To reiterate: for Marx, human history itself is constituted in what begins as a series of generally isolated struggles with first nature, and as technical capacities advance, the possible modes and relations of production alter and widen in scope. Just as this approach cannot be reduced to economic activity in isolation, neither can it be reduced to technological determinism, as in the final analysis, technology ultimately remains the tool of human agents, even if the industrial revolution of Marx's time conferred most of the control and ownership of the means of production to the bourgeois capitalists. Hence, the totality of relations and interactions ultimately emerge from the necessary exertion of human labour power:

> ...labour is, first of all, a process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature. He confronts the materials of nature as a force of nature. He sets in motion the natural forces which belong to his own body, his arms, legs, head and hands, in order to appropriate the materials of nature in a form adapted to his own needs.[25]

Far from nature being a social construct, as Marx and Marcuse appear to contend, humanity initially only imposes its manipulative powers on nature as a result of our own (natural) instinct toward survival. It is not humanity that constitutes nature, but *first* nature that (originally) constitutes humanity; like other species we are compelled to act on it out of expediency. A seemingly basic point that will become crucial both to Marcuse's philosophy of technology as well as the current argument is this *ensemble* understanding of productive activity which Marcuse appropriates from Marx. Although it may appear a trivial point, given its anthropological basis, technical mediation cannot be separated from the actions, whims and intentions of its human creators, despite Marcuse's admission that "at the present stage (humanity) is perhaps more powerless over his own apparatus than he ever was before," but nor can it be understood in isolation from its contingent environmental base.[26] In the context of the young Marx's early approach to technics, productive capacities are not just *linked* to human nature, they constitute its objective embodiment, and are founded out of the basic necessity for survival. For Marx and Marcuse as much as for Marshall McLuhan, technical artifacts are not simply instruments, but *augmentations* or extensions of human

23 Marcuse, *ibid.* (1932b), p. 97.
24 Marx, cited in P. Hay, *Main Currents in Western Environmental Thought,* (Sydney: UNSW Press, 2005), p. 264.
25 Marx, (1867), *Capital* vol.1, part 3, chapter 7:1. (London: Penguin Classics, 1990), p. 283.
26 Marcuse, (1964), *One-Dimensional Man,* (New York: Routledge, 2004), p. 240.

physical and cognitive powers, ideas and intentions, in effect, the crystalisation of labour.[27] Yet neither Marx nor Marcuse went so far as McLuhan and others in attributing autonomy to the technical phenomenon, a topic that will be taken up later in this thesis.[28] On the contrary – Marx and Marcuse offered an arguably more nuanced, semi-archaeological approach; technics are not the free-floating, 'hyperreal' entities certain philosophers of a postmodern persuasion have claimed,[29] rather, their 'meaning' can be apprehended from knowledge of their functional workings; as Daniel Dennett wrote, "a wagon with spoked wheels carries not only grain or freight from place to place; it carries the brilliant idea of a wagon with spoked wheels from mind to mind."[30] Contrary to some accounts of technics that will be critically discussed later in this thesis, much can be told about the intentions, capacities, and even psychological, cultural or religious inclinations of a society through their instantiation in technical artifacts. As such, just as the archaeologist "reads" from ancient remains in order to gain a semblance of an understanding of the culture that produced it, for Marx and Marcuse, the means of production and the intentions and determinants which shaped their production are similarly legible. As Marx wrote in the *1844 Manuscripts* "It can be seen that the history of *industry* and industry as it *objectively* exists is an *open* book of the *human faculties,* and a human *psychology* which can be sensuously apprehended".[31] In *Capital,* he adds: "...relics of bygone instruments of labour possess the same importance for the investigation of extinct economic forms of society, as do fossil bones for the determination of extinct species of animals.[32]

For Marx and Marcuse then, technical capacities are not merely one amongst other human faculties that may discern them from non-human animals, but are fundamentally constitutive of what it means to be human. They are integral not just in production, but in making the world intelligible and therefore manipulable in manifold fashions. Marx inherited from Hegel the view that labour is "the act of man's self-creation";[33] hence, labour is the *essential* human activity, as through its

27 For McLuhan's views, see his 1964 work, *Understanding Media: The Extensions of Man,* (London: Routledge, 2007).

28 For discussions of 'autonomous technology and technological determinism, see R. Heilbroner, (1967) 'Do Machines Make History?' in *Philosophy of Technology: The Technological Condition,* edited by R.C. Scharff & V. Dusek (Oxford: Blackwell, 2007), pp. 398-404; L. Winner (1977), *Autonomous Technology: Technics Out of Control as a Theme in Political Thought,* (Cambridge, MASS: The MIT Press). For a critique of Marx as a technological determinist, see B. Bimber, 'Three Faces of Technological Determinism' and the other essays collected in *Does Technology Drive History? The Dilemma of Technological Determinism,* edited by M.R. Smith and L. Marx (Boston: The MIT Press, 1994), pp. 79-100. Chapter seven of this thesis will undertake a critique of autonomous theories of technology

29 See J. Baudrillard, 'Simulacra and Simulation' in *Selected Writings*, edited by M. Poster, (Stanford: Stanford University Press, 1988), pp. 166-184.

30 D.C. Dennett, *Darwins's Dangerous Idea: Evolution and the Meanings of Life,* (London: Penguin,1995), p. 348.

31 Marx, *op.cit.* (1932), p. 109.

32 Marx, *op.cit.* (1867), part 3, chapter 7:1, p. 286.

33 Quoted in Fromm, *op.cit.* (2004), p. 32.

engagement, the "Promethean drive"[34] of humanity is made manifest in the operations of the means of production. "Man" (i.e., human agents, persons), thereby reveals itself as a "*species being* (…) a being that has the "species" (his own and that of the rest of being) as its object".[35] As a species being, humans have the ability "... to relate to the 'general' aspect of objects and to the possibilities contained therein. Specifically human *freedom* has its roots in man's ability to relate to his *own* species; the self-realization and 'self-creation' of man."[36] Technology is therefore not simply cast as a determinant of human life, but in its essence is a liberating force, a creator of opportunity and a means of freeing humanity from toil and hardship. Through engaging in technical mediation, the individual species being

> ...is not limited to the particular, actual state of the being and his immediate relationship to it, but he can take the being as it is in its essence beyond its immediate, particular state. He can recognize and grasp the *possibilities* contained in every being. He can exploit, alter, mold, treat, and take further ("produce") any being according to its "inherent standard".[37]

As Marcuse regularly reminds us, at the earliest stage of human development and the latest, it remains a truth that technics appears ideally aimed toward the betterment of life and human flourishing. However, late in the history of the development of its productive potential, the end of the "prehistory" of humanity;[38] a world no longer defined by necessary labour becomes conceivable, specifically due to increases and advances in technological automation, a point of particular importance to Marcuse. At this point, humanity seemingly cannot help but realise its essential activity and goals, which it does by making the world and others available to itself as *object*; "by using his 'essential powers' to produce an 'external,' 'material,' objective world".[39] Once again, this view broadly dovetails with the high value Marcuse placed in human potential. In the intentional, planned instrumental manipulation of the environment, humanity does not just 'make its way' through the world, but makes this activity itself into its essential project, conducting its work amid and within the natural environment in ways which both imitate the capacities of many non-human animals, but also exceed them to the extent that an exposed, naked and comparably fragile primate now utterly dominates the planet in its entirety. As a result, human beings appear to resist

34 This term is owed to A. Wood, who uses it in his discussion of Marx's philosophy in *The Oxford Companion to Philosophy,* edited by T. Honderich, (Oxford: Oxford University Press, 1995), p. 524.
35 See Abromeit's 'Glossary' in Abromeit and Wolin, *op.cit.* (2005), p. 186.
36 Marcuse, *op.cit.* (1932), p. 96.
37 Marcuse, *ibid.* (1932).
38 See Marcuse, *op.cit.* (1964), p. 45. Marcuse is referring to Marx's comment in 'Preface to a contribution to the Critique of Political Economy', (1859), translated by T.P. Bottomore, included in Fromm (2004), p. 169.
39 Marcuse, *op.cit.* (1932), p. 94

fitting themselves into specific environmental niches, instead they engage in what John Livingston referred to as "self-domestication":[40] they adapt the niches in accordance with their own standards and intentions rather than the other way around; humans do not simply 'see' or 'witness' the object or other "in-itself" as a closed prospect, but in the context of immediate practicality, they do not care, nor need to. For example, the human sees in a fallen stick the potential for assisted walking or for delving into crevices one may not wish to place a hand or finger in, or in terms of its potential as a weapon, or its aesthetic value. To be sure, the Chimpanzee may envision something similar, but, through their comparative propensity for cognitive abstraction, only modern *H. sapiens* have assigned their technical artifacts monetary or exchange value. The development of human technics can therefore be conducted under the incentive of a symbolic convention rather than immediate instrumental necessity. It is precisely this evolutionarily 'novel' capacity that has now extended to order technology on a truly global scope, and will be of the utmost importance in this thesis.

Although exploring the topic in detail is beyond the scope of the current thesis, it should be acknowledged that Marx's approach (and subsequently, Marcuse's) carries with it the strong implication of human-exceptionalism. Of course, in Marx's time, anthropocentric views were hardly uncommon, nor necessarily insensible, but a strong resistance to such views is very common in modern ecophilosophy, despite the arguments of various critics.[41] Although he later discussed the differences between human and non-human labour and technical capacities (i.e., their apparently instrumental manipulation of external nature),[42] for example, by arguing that "the animal is one with its life activity. It does not distinguish the activity from itself. It is *its activity.* But man makes his life activity itself an object of his will and consciousness...", that Marx's well-documented anthropocentrism does not necessarily entail that the human technical mediation of the environment

40 See J. Livingston, *Rogue Primate: An Exploration of Human Domestication,* (Ontario: Key Porter Books, 1994).

41 Discussions of 'ecocentrism' and anthropocentrism form a significant part of various schools of modern environmental philosophy, especially Deep Ecology and more radical approaches such as anarcho-primitivism. Whilst a complete list of this debate is beyond the current scope, a historical overview of the debate is offered by G. Sessions, (1991), 'Ecocentrism and the Anthropocentric Detour', in *Deep Ecology for the 21st Century,* (London: Shambhala, 1995), pp. 156-183. Some prominent critiques of anthropocentrism arguably include A. Leopold V. Plumwood, *Feminism and the Mastery of Nature,* (London: Routledge, 1993); D. Foreman, *Confessions of an Eco-Warrior,* (New York: Crown, 1993), and R. and V. Routley, (1980), 'Human Chauvinism and Environmental Ethics', in *Environmental Philosophy,* edited by D.S. Mannison, M McRobbie and R. Routley, (Canberra: ANU Research School of Social Sciences, 1980), pp. 96-189. On the other side of the debate, see for example Livingston, *op.cit.* (1994); 'The Fallacy of Wildlife Conservation', (Toronto: McClelland & Stewart, 1981); and more recent 'Gaian' approaches such as J. Lovelock, *The Revenge of Gaia: Why the Earth is Fighting Back – and How We Can Still Save Humanity,* (Santa Barbara: Allen Lane, 2006); and *The Vanishing Face of Gaia: A Final Warning,* (London: Allen Lane, 2009).

42 Some may object to my use of the term 'instrumental' in the context of bodily and external (i.e. 'technical') behaviours carried out by non-human animals. Nevertheless, the modern scientific approaches – from physiology to ethology – apprehend nature in the language of 'technical' functionality; hearts are 'organs' which 'function' to circulate blood, wings are 'designed' to assist flight, etc. On this topic, see T. Lewens, *Organisms and Artifacts: Design in Nature and Elsewhere,* (London: Routledge, 2005).

is not novel and unprecedented in an evolutionary context.[43] Marcuse elaborates this position in his essay on the *1844 Manuscripts*:

> ...man relates to himself and to the object of his labour; he is not directly one with his labour but can, as it were, confront it and oppose it (through which, as we shall see, human labour is fundamentally distinguished as 'universal' and 'free' production from the 'unmediated' production of, for example, the nest-building animal).[44]

In its productive activities, humanity is not just compelled to produce on the basis of the binding incentives of nature's indifference; "...man cannot simply accept the objective world or merely come to terms with it",[45] but reflects, reacts, and imagines. Within the context of at first glacial, and then in very recent human history, an explosive 'globalised' expansion of technics and human life across geographical and temporal divides; the objectification and instrumentalisation of first nature has greatly increased in its extent, so much so that, in many of the advanced industrial nations, 'second nature' almost completely obscures the first, physically, culturally and intellectually.[46] Yet, before the implications of this contention can be explored in more detail, it is sufficient at this point to note that Marcuse avoids both dogmatic adherence to an interpretation of the the Marxian texts as a sophisticated form of technological or economic determinism. Instead, he chose to utilise them as methodological and conceptual tools; an array of critical methodologies and 'decisive concepts' rather than a "dogma or system of absolute knowledge". As such, Marcuse's utilisation of the anthropological basis of Marxian theory arguably represents a formidable theoretical and practical toolkit by which to investigate the modern technological condition.[47] His willingness to critically reform the Marxian project in response to changing social and historical conditions appears to be strongly influenced by his reading of the *1844 Manuscripts* which, while not attempting to constitute a totalised, 'grand narrative' approach to the human condition, nevertheless remains a multifaceted, versatile, and revisable "synthesis of philosophy, political economy and revolutionary social theory"[48] which could be brought to bear on modern social reality – especially the topics of technology and the environment – given they are sufficiently fluid to invite revision in line with changing circumstances:

43 Marx, *op.cit.* (1932), p. 84.
44 Marcuse, *op.cit.* (1932), p. 94.
45 Marcuse, *ibid.* (1932), p. 96.
46 Evidently, Marx was already of this opinion even in the nineteenth century. See the comments in Hay, *op.cit.*(2005), pp. 21-22. For a more extreme version of this view, see B. McKibben, *The End of Nature,* (London: Penguin-Viking, 1990); and *Eaarth: Making Life on a Tough New Planet,* (Melbourne: Black Inc., 2010).
47 Kellner, *op.cit.* (1984), p. 5.
48 Kellner, *ibid.* (1984), p. 77.

> Because the Marxian concepts are historical, all of the concepts used to describe eighteenth- and nineteenth-century capitalism cannot obviously be used to describe twentieth-century capitalism; consequently, for Marcuse, Marxist theory and practice require constant reconstruction to keep in touch with the changes in the historical situation.[49]

This is not to say that Marx's philosophical-anthropology – and its largely implied theory of nature – are devoid of problems.[50] This particular topic will be dealt with in a later chapter, prior to this, the implication that the construction of the life world – 'second nature' – must be apprehended as a form of objectification, and the primordial form of "alienation". Although there have been, and may yet be alternative modes of production which provide different means and relations of production, according to Marx's philosophical-anthropological account, a certain level of alienation and objectification *per se* are unavoidable conditions of humanity's essential "species nature". Humans can only *but* live out their collective intentions in material, sensuous forms, and this necessarily requires apprehending first nature in instrumental terms. As Hay summarises: "'First' nature was 'prior' nature, unmediated nature, and it was this upon which human labour worked to produce 'second' nature, which can thus be defined as the product of social interaction with first nature."[51] This original form of *estrangement* cannot be overcome or sublated; only a particular historical form of objectification – alienation – can and, according to Marx and Marcuse – *ought* to be overcome.[52] As will be described in more detail below, the source of Marcuse's pessimism regarding the advanced industrial societies can arguably be drawn out by focussing on the particular *incentives* that guide and motivate the means of production. In other words, almost the entirety of Marcuse's career is defined by his continual critique of the mode of production of capitalism and its dominant influence over the means and relations of production which both he and Marx held to be not simply an unjust or unethical arrangement, but a peculiarly *alienating* scheme. It is to this topic that the discussion will now briefly turn, before moving away from Marx to delineate Marcuse's thought on technology in more detail.

49 Kellner, *ibid.* (1984), p. 297.
50 On this topic, see Vogel, *Against Nature: The Concept of Nature in Critical Theory,* (Albany: State University of New York Press, 1996).
51 Hay, *op.cit.* (2005), p. 21.
52 Marcuse, *op.cit.* (1932), p. 97.

Alienation

Having noted Marx's philosophical-anthropological view of the human as a technical, labouring being, the means by which humanity comes to be displaced and "alienated" from their "essential species activity" must be addressed. To begin, the concept of alienation will be delineated in relation to Marcuse's critical-social theory, which will preface a discussion of Marcuse's philosophy of technology in detail. What follows will also aim to preliminarily distinguish Marcusean philosophy of technology from rival views on the basis of its sophisticated grasp of the position of human agency in relation to both technology and first nature.

In his *Phenomenology of Spirit,* Hegel conceived of alienation in terms of the "unhappy consciousness", a stage in the freedom of self-consciousness that emerges subsequent to the master-slave relation.[53] The unhappy consciousness is said to consist in a misunderstood Christian religiosity and a penchant for the ideal, which experiences the human self as empty and worthless, its value contingent upon an other-worldly, supernatural beyond. In characteristic fashion, Marx upended this contention, by attempting to place it in the lived experience of concrete social conditions by arguing that alienation was a direct and necessary result of the capitalist mode of production.[54] It remains possible for the human being's essential position in relation to the prosthetic life-world to undergo a decisive shift in orientation, a shift that leads the prosthesis itself to appear "...as a precondition of (human) being that does *not* belong to his being, that is beyond his control, and that is 'overpowering'".[55] The reciprocal, *naturalistic* material arrangement of human productive capacity and nature is broken, fragmenting into an oppositional configuration, antagonistic to the unfolding of authentic human potential. Once again, this is not to be understood as some sort of simplistic technological determinism by which an enigmatically non-agential, self-governing artifice inexorably draws human agents into its compliance, but a shift representing a deeper *betrayal* of human potential than could be alleviated with piecemeal political reform or redistributions of income alone. The concept of alienation thus denotes for Marx and Marcuse an abandonment – a convenient forgetfulness of the human prospect due to the continued dominance

53 See G.W.F. Hegel, (1807), *The Phenomenology of Spirit,* B: IV, A and B, (Oxford: Oxford University Press, 1977), pp. 111-118.
54 See Marx's 'First Manuscript', in Fromm, (1961), pp. 78-89.
55 Marcuse, *op.cit.* (1932), p. 98.

of profit motives now embodied in the reified conditions of one-dimensional society.[56] Marcuse's position here builds on György Lukács theory of reification, which has been summarised as the process by which "commodity fetishism, the capitalist labour system, the market, bureaucracy and mass media – as well as science and technology – tend to promote conformist modes of thought and behaviour which eradicate individuality and freedom."[57] The subsequent reification describes a peculiar form of objectivity associated with modern capitalism which would (later) inform the Frankfurt School critiques of instrumental reason and technological rationality. In short, humanity's essential, and characteristic productive capacity comes to be turned away from its self-augmentative role to a form of external domination and social control.

In the *1844 Manuscripts,* Jonathan Wolff argues that Marx described the alienation of labour in four forms:

> First, from the product, which as soon as it is created is taken away from its producer. Second, in productive activity (work) which is experienced as a torment. Third, from species-being, for humans produce blindly and not in accordance with their truly human powers. Finally, from other human beings, where the relation of exchange replaces the satisfaction of mutual need.[58]

According to Marx, to make a living, the vast majority of modern workers must submit to goals that do not belong to themselves, but to external, 'alien' sources, in other words, the owners of the means of production. The worker is compelled to participate within this process to earn a sufficient sum of money in order to meet necessary needs of food, warmth, shelter, etc., with the surplus value she creates being acquired by the propertied classes.[59] In a direct sense, the worker is forced to prostitute themselves through selling the only commodities they possess: their labour power and time, and to this extent at least, they become commodities themselves. In contrast to the "immediate producer's enjoyment of production as a confirmation of his or her powers,"[60] the worker sells her labour to avoid destitution, and falls victim to the capitalist's extraction of the maximum surplus

56 The concept of reification articulated by György Lukács continued to be a significant influence on Marcuse's critical social theory, but tracing its influence on his thought is beyond the present scope. Lukács illustrates the theory in his 'Reification and the Consciousness of the Proletariat' in *History and Class Consciousness,* (London: Merlin, 1971). For the influence of Lukács' on Marcuse, see Feenberg, *op.cit.* (2002), chapter four, and Kellner, *op.cit.* (1984), chapter two.

57 Kellner, *ibid.* (1984), p. 40.

58 J. Wolff, 'Karl Marx', in the *Stanford Encyclopaedia of Philosophy,* (2010).

59 See E. Mandel, (1990), *Karl Marx,* chapter 7, in *Marxian Economics,* edited by J. Eatwell, M. Milgate & P. Newman, (London: Norton & Co., 1990), pp. 1-38.

60 Wolff, *op.cit.* (2010).

value permitted within the competitive fray of the "free" determinations of the market. In Marx's time, the worker was kept just on the boundary of providing for themselves, a position from which she barely had any power to extricate herself. However, were she to do so, she could be assured that an immense "industrial reserve army" is available to replace her – as it is not *her* but her *labour* which is valued as capital. Today, as such thinkers as Marcuse and Gorz note, the conditions of most workers (in the advanced industrial societies at least) had significantly altered for the better, but their increased affluence and security, their "social and cultural integration", had served (instrumentally) to obviate any complaints she may have had concerning her status as an "instrument".[61] In having to sell her labour to the controlling interests of the capitalist, the worker is, in turn, alienated from her species-being and from relations with others which increasingly come to be ordered by the demands of an abstract force; instead of working together for the betterment of civilisation as a whole, the local community or municipality, labour (and the rest of the means and relations of production) are absorbed and subsumed by businesses and corporations which themselves compete against each other on the market for profits. The former fundamentally meaningful status of labour is thereby reduced to mere "work" or jobs, a system of "wage slavery" uncritically lauded by all sides of mainstream politics, often divisive in its competitiveness, often characterised by dull repetition, and oftentimes questionable in terms of its actual usefulness aside from generating profits for the property owners / corporate shareholders.[62]

> The slave is sold once and for all; the proletarian must sell himself daily and hourly. The individual slave, property of one master, is assured an existence, however miserable it may be, because of the master's interest. The individual proletarian, property as it were of the entire bourgeois class which buys his labour only when someone has need of it, has no secure existence.[63]

So as to thrive, individual businesses, small or otherwise isolated capitalist enterprises come to trade within the international / global marketplace, all 'unified' in their division as they compete for profits, each driven by the preconditional necessity of turning a profit:[64] "Each individual becomes a

61 See for example Marcuse, *op.cit.* (1964), p. 26; 29, and Marcuse, *Counterrevolution and Revolt,* (Boston: Beacon Press, 1972a), p. 14.

62 See chapter 7 of Marx's 1861-63 draft manuscript: *Theories of Surplus Value*, 'Early Critique of the Bourgeois-Liberal View of the "Freedom" of the Labourer', (Moscow: Progress Publishers, 1923). On "wage slavery", see chapter 3 of André Gorz's *Critique of Economic Reason,* 2nd ed., (London: Verso, 1989), and M. J. Sandel, *Democracy's Discontent: America in Search of a Public Philosophy,* (Harvard: Belknap Press of Harvard University Press, 1998).

63 F. Engels, (1847), 'The Principles of Communism', in *Selected Works,* vol. 1, (Moscow: Progress Publishers, 1969), p. 83.

64 See Marcuse, *op.cit.* (1972a), p. 9.

mere fragment or atom in the coordinated mass of the population which, separated from control of the means of production, creates the global surplus value," and in the twentieth century, the previous gaps between "white" and "blue-collar work" are blurred if not entirely dissolved; "the intelligentsia plays a vital role not only in the process of material production, but also in the ever more scientific manipulation and regimentation of consumption and 'productive' behaviour."[65] As Marx put it, "...because bourgeois political economy does not have human beings and their history in its conceptual scheme, it is in the deepest sense not a "human science", but is a non-human science of an inhuman world of things and commodities."[66] Marx

> ...imagines modern machinery as a giant automaton (…) a soulless mechanism that has no regard for the human relations between society and nature, or for the proportions between body and spirit. Capitalist technology appears here as a personified and artificially reanimated dead body with monstrous powers.[67]

"For Marx" as Fromm noted, "alienation in the process of work, from the product of work and from circumstances, is inseparably connected with alienation from oneself, from one's fellow man and from nature."[68] The human species-essence is not just founded in terms of its individual contribution to production, but in its communal relations with *others,* and its mediation of the natural environment. As nations industrialised, individuals came to work for causes external to themselves, work that continued – despite increases in automation and efficiency that could potentially lessen the need for labour under necessity – that today, produces not only mountains of waste, pollution and pointless surpluses, but is – with characteristic 'rationality' – directed toward the largest (not necessarily the neediest) of appetites, who also happen to be the locus at which the most profits can be made. The requirements of the genuinely needy therefore typically appear to come second to the profits that can be derived from the already wealthy.

> Alienation means, for Marx, that man does *not* experience himself as the acting agent in his grasp of the world, but that the world (nature, others, and he himself) remain alien to him. They stand above and against him as objects, even though they may be objects of his own creation. Alienation is essentially the experiencing of the world and oneself passively,

65 Marcuse, *ibid.* (1972a), p.12. There will be more to say about the workings of this relatively recent aspect of capitalist development below.
66 Marx, (1932), quoted in Kellner, *op.cit.* (1984), p. 80.
67 T. Kemple, *Reading Marx Writing: Melodrama, the Market, and the "Grundrisse",* (Stanford University Press, 1995), p. 27
68 Fromm, *op.cit.* (2004), p. 43.

receptively, as the subject separated from the object.[69]

Marcuse continues the motif of cold, impersonal mechanisation to accentuate the tragic instrumentalisation of the individual, whose fundamental potential is betrayed in lieu of her reproduction into the form of a functional object. Infamously characterising capitalist society as a form of highly efficient totalitarianism, he wrote "(T)he enlarged universe of exploitation is a totality of machines – human, economic, political, military, educational"; the leaders and managers of which are "all operating in the overriding interest of the capital of the nation as a whole – the nation *as* capital, imperialist capital,"[70] not in the interests of human autonomy, but under the misapprehension that a deferred incentive – that of profit-making – will be sufficient to exhaustively cater to all genuine needs. Although this makes for a quantitatively, materially rich society, there remains at the bottom of the social strata "ruthlessly repressed minorities", whereas a comparatively small group enjoy extraordinary benefits:

At the base of the pyramid atomization prevails. It converts the *entire* individual – body and mind – into an instrument, or even part of an instrument: active or passive, productive or receptive, in working time and free time, he serves the system. The technical division of labour divides the human being itself into partial operations and functions, coordinated by the coordinators of the capitalist process. This technostructure of exploitation organizes a vast network of human instruments which produce and sustain a rich society. For unless he belongs to the ruthlessly suppressed minorities, the individual also benefits from this richness.[71]

Characteristically, the established status quo is cast by Marcuse as an "affluent monster" and "obscene":

> ...in producing and indecently exposing a stifling abundance of wares while depriving its victims abroad of the necessities of life; obscene in stuffing itself and its garbage cans while poisoning and burning the scarce foodstuffs in the fields of its aggression; obscene in the words and smiles of its politicians and entertainers; in its prayers, in its ignorance, and in the wisdom of its kept intellectuals (…) Obscene is not the picture of a naked woman who exposes her pubic hair but that of a fully clad general who exposes his medals rewarded in a war of aggression; obscene is not the ritual of the Hippies but the declaration of a high

69 Fromm, *ibid.* (2004), p. 37.
70 Marcuse, *op.cit.* (1972a), p. 13.
71 Marcuse, *ibid.* (1972a), p. 14.

dignitary of the Church that war is necessary for peace.[72]

Secondly, markets and businesses – especially in the affluent nations – came to be subject to manifold stimulatory measures emanating from the state (i.e., the taxpayer) which preserve and replenish the dominant status quo. This hardly represents a shift from 'consumer' to 'state capitalism', but the integration of each aspect into a giant unified system in which the "executives of the modern state" represent merely a "committee for managing the common affairs of the whole bourgeoisie."[73] In short, work for the sake of work equates to and underpins production for the sake of the enlargement of production, a scheme *and* a social ideology that arguably fosters, produces and provides for the increase of more of the same; i.e. the reproduction of the capitalist system itself. The worker's everyday existence and aspirations come to be colonised by what Marcuse would later call "technologically rational" incentives, which entail instrumental values and quantification above all others in the technical domain which then comes to be applied to the social, ironically resulting in an effectively nihilistic, stultifying arrangement, ill-prepared for the potential biospheric consequences which continue to build as a consequence of the capitalist mode of production itself. Marx's description of the human as an alienated *object* of labour; its value limited to the surplus value that may be extracted from its instrumental performances, cancels other means of evaluation and replaces them with capitalist profit incentives of "gain, work, thrift and sobriety"[74] which, in Marx's words, "pervert" those values which defined a recently repressed, suspended second-dimension of social criticism.[75] As he famously commented in *The Communist Manifesto,* bourgeois capitalism

> ...has left no other nexus between man and man than naked self-interest, than callous 'cash payment'. It has drowned the most heavenly ecstasies of religious fervour, of chivalrous enthusiasm, or phillistine sentimentalism, in the icy waters of egotistical calculation.[76]

The emergent "one-dimensional society" comes to be characterised by a technological / economic rationality reaching the peak of its efficiency. For Marcuse then, the alienating features of capitalism, its false appeal to individuals to work hard for themselves when really it is the preservation of the overall system that is crucial, becomes a normative social, political and cultural ideology which is quite literally transmitted and embodied in the machines, techniques and devices

72 Marcuse, *op.cit.* (1969b), p. 8.
73 Marx and Engels, (1848), *The Communist Manifesto,* (London: Pelican Books, 1967), p. 82.
74 Marx, *op.cit.* (1932), p. 116.
75 Fromm, *op.cit.* (2004), p. 43.
76 Marx and Engels, *op.cit.* (1848), p. 82.

of the existing society and in the nature of the work they demand, as well as in the social relations which derive from them. As Andrew Feenberg notes, the innovation of the assembly line is a particularly clear example of this contention

> ...because it achieves traditional management goals, such as deskilling and pacing work, through technical design (…) However, the assembly line appears as technical progress only in a specific social context. It would not be perceived as an advance in an economy based on worker's cooperatives in which labour discipline was more self-imposed than imposed from above. In such a society, a *different technological rationality* would dictate different ways of increasing productivity.[77]

Feenberg's point follows Marcuse insofar as alienation appears to be literally 'encoded' or incorporated into machinery, commodities, and the social production of certain interests and attitudes in 'consumers' themselves. Whilst it is not the case for Marcuse that this arrangement is beyond redemption or immune to qualitative changes, it is through a "new" form of technological rationality (or more specifically, the reorientation of the direction of technical development away from the artificial preservation [i.e., growth] of the capitalist system to the authentic "end" of technological rationality), that will suffice for the task. It is not so much a 'new science' that Marcuse is concerned to instigate,[78] (as this would presumably arise *post* the advent of qualitative change), but a new directive impetus of technical production, a radical revision of the prevailing technological rationality. In any case, the shape of the means, instruments and techniques is considered contingent upon the nature of the prevailing *mode* of production; "technological rationality is not merely a belief, an ideology, but is effectively incorporated into the structure of machines. Machine design mirrors back the social factors operative in the prevailing rationality."[79]

Unfortunately, further forms of alienation can also be countenanced, firstly, the dangerous prospect that it may be operative in a temporal sense. For societies under the opinion that whatever resources exist in close proximity to them are rightfully their 'property', 'birth right' or 'inheritance', this appears to restrict their value to the current generation residing in that locality, province, state or

77 Feenberg, 'Subversive Rationalization', in *Technology and the Politics of Knowledge,* (Indiana: Indiana University Press, 1995), p.11. (Emphasis added). In illustrating his position, Marcuse quotes Daniel Bell's *Automation and Major Technological Change: Impact on Union Size, Structure, and Function,* (Industrial Union Dept. AFL-CIO, Washington, 1958).

78 On this topic, see S. Vogel, 'Marcuse and the New Science', in *Herbert Marcuse: A Critical Reader,* edited by J. Abromeit and W.M. Cobb, (New York: Routledge, 2004), pp. 240-245.

79 Feenberg, *op.cit.* (1995), p. 11.

nation. Hence, as generations yet to be born, (who, at least conceivably – barring calamity – may come to vastly outnumber all the people who have ever lived),[80] will themselves suffer due to the past and contemporary carelessness and propensity toward short-term plunder, a prioritisation of the immediate as well as the local.[81] In other words, a prevailing concern to continue with "business as usual" legitimates perpetual production growth as a matter of mainstream economic and government policy, and as such, the long-term interests of the human species (which must be understood as contingent upon relative biospheric stability), appear to be regularly undermined or ignored altogether in the name of economic growth. Not only this, the strong evolutionary and often culturally-endorsed impulses toward the locality, the family, the proximal and immediate, etc. which were honed in the "environment of evolutionary adaptedness" (EEA) come to be exploited by the so-called "compliance industries"; the mechanisms of advertising, public relations and marketing, which function to engineer desires, to get the consumer to identify with commodities, thus encouraging and legitimating ever-escalating levels of consumption.[82] Hence, as Marcuse's multidimensional approach arguably reveals, the social, individual and work-related consequences of alienation are directly linked to the exploitation and plunder of the natural environment.

> It was not until organic community relations (...) dissoved into market relationships that the planet itself was reduced to a resource for exploitation. This centuries-long tendency finds its most exacerbating development in modern capitalism. Owing to its inherently competitive nature, bourgeois society not only pits humans against each other, it also pits the mass of humanity against the natural world. Just as men are converted into commodities, so every aspect of nature is converted into a commodity, a resource to be manufactured and merchandised wantonly (...) The plundering of the human spirit by the market place is paralleled by the plundering of the Earth by capital.[83]

Yet despite this arrangement, the optimism of both Marcuse (and Marx) allowed both to envisage a very different ordering, and this can be understood in reference to yet another form of alienation, that which concerns the appropriate place of technology in human society, or what Marcuse called

---

80 Some critiques of this contention include J. Leslie, *The End of the World: The Science and Ethics of Human Extinction,* (London: Routledge, 1996); M. Rees, *Our Final Century?* (London: Vintage, 2004), J. Gray, *Straw Dogs: Thoughts on Humans and Other Animals,* (London: Granta, 2002), and Lovelock, *op.cit.* (2009).

81 The tendency toward immediate, short-term plunder as opposed to securing the future of civilisation is illustrated in detail by J. Collier, *The Plundered Planet,* (London: Allen and Unwin, 2010).

82 On the environment of evolutionary adaptedness, see S.J.C. Gaulin and D.H. McBurney, *Evolutionary Psychology,* 2nd ed., (London: Prentice Hall, 2003), pp. 25-56. The term "compliance industries" is owed to S. Ewen's *PR! A Social History of Spin,* (New York: Basic Books, 1996).

83 M. Bookchin, *Post-Scarcity Anarchism,* (Oakland: AK Press, 2004), p. 24-25.

"the 'end' of technological rationality".[84] Rather than exploiting and 'violating' nature as one would feel freer to do if it were continually taught to be little more than inert, "value-free matter":

> A free society may well have a very different *a priori* and a very different object; the development of the scientific concepts may be grounded in an experience of nature as a totality of life to be protected and 'cultivated'; and technology would apply this science to the reconstruction of the environment of life.[85]

Marcuse is arguably reiterating the point alluded to previously; that technology had long been the chief means by which opportunity and freedom could not just be extended to assist individuals in their labours, but that the opportunities it afforded were akin to a natural right in virtue of the pursuit of transcendence that Marcuse – not to mention various existentialist thinkers – contended characterized human life.[86] Yet, under the current socio-economic status quo, the development of technics came to be applied to the reproduction of the given – not a means of challenging or questioning it – hence, even this most basic understanding of the appropriate place of technics arguably comes to be subject to the alien motive of arresting certain forms of development that may be considered deleterious to the reproduction of the status quo.

Before leaving Marx and moving to discuss the basis of Marcuse's thought in more detail, the ways in which his critical-social theory departs from the Marxian theory should be mentioned briefly. Three major interrelated distinctions are arguably of most import here: 1. the theory of capitalist crisis, 2. the decreasing affluence of the working class, and 3. the consequent tendency toward radical "class consciousness". Putting it simply, Marx contended that capitalism would eventually stagnate on the basis of overproduction.[87] This would have the effect of further immiserating workers as wages consequently fell below the value of labour power, reducing the worker's capacity to provide for themselves as the rate of extraction of surplus value rises. Following historical circumstance, Marcuse contrasted Marx's so-called 'immiseration thesis' with a theory of expansion, or "counterrevolution", in which capitalism moves to *contain* such tendencies through the increased integration of the worker (not to mention her consumption habits) into the service of the

84 See Marcuse, *op.cit.* (1964), p. 5. There will be more to be said on this topic in the discussion of Marcuse's concept of technological rationality in chapter 3.
85 Marcuse, *op.cit.* (1972a), p. 61.
86 See for example J.P. Sartre, (1943), *Being and Nothingness,* part 2, chapter 3, (London: Routledge, 1998).
87 Marx illustrates this contention in chapters 2 and 13 of *Capital,* vol.3, (New York: New International Publishers, 1967).

reproduction of the system itself, both physically and mentally.[88] Where Marx had considered that as real wages reduced, the increasing impoverishment of the worker would lead to a proportional growth in radicalisation, Marcuse instead emphasised quite the opposite by contending that increasing levels of affluence amongst workers had come to have an ameliorating, placatory effect, suppressing revolutionary fervour and rendering it largely irrelevant. What is more, the disasters that emerged from a number of communist experiments served to ramify this point in the minds of the majority of the public and the ruling authorities. Hence, in what he referred to as the "one-dimensional society", the *actual* impoverishment described by Marx is transformed into *relative* impoverishment, and the ideology of an imperative toward perpetual economic growth comes is activated and integrated within virtually every social strata.

Thus far, a sketch of the Marxian background to Marcuse's theory of technology and social critique provides a view of production that situates it ideally as the natural, essential condition of human life. This consists in the instrumental appropriation and objectification of nature by human beings, who in turn make themselves and their society. The more successful and advanced human technical capacities become, the more first nature appears to shrink from the built, 'artificial' world which increasingly comes to dominate the everyday lived experience of individuals. The role of technology – for so long at the service of humanity – came to appear to Marx and Marcuse as an alienating, even monstrous force, a force by which the owners of the means of production could augment their powers of control, and to which modern individuals were compelled to submit, rather than utilise in accord with their liberty and species-nature. As it has been shown, it is too simplistic to attribute these events to autonomous technology, the 'logic of domination', or to civilisation itself. Rather, what Marcuse believed was at fault was the specific *direction* of technical advance and proliferation under capitalism. Although the resultant forms of alienation that Marx and Marcuse contended were the necessary consequence of this system arguably continue to persist, a further, more pressing form of alienation – that between human agents and the natural environment – now arguably entail the most considerable indictment of modern consumer-capitalism. As it will be the aim to argue throughout the current thesis, in light of this evolutionarily novel situation, Marcuse's vision of qualitative change now appears as an increasing practical necessity rather than a naïve hope. Yet capitalism appears thoroughly instantiated in its domination of the means of production both currently, and into the future. Therefore, the discussion now moves to describe Marcuse's analysis and critique of the ideology of advanced industrial civilisation in more detail.

88 See Marcuse, *op.cit.* (1972a).

Chapter 3

One and Two-Dimensional Thought

This chapter will discuss the historical underpinnings of Marcuse's 'multidimensional' critique of advanced industrial society and the decline of the 'second dimension' of critical reason so as to provide the background from which his thought on modern technology is derived. The crucial distinction Marcuse placed between technics and technology will be specifically addressed, as well as his thoughts on the proper and appropriate end of technological rationality.

From Liberation to Control

Like his Frankfurt School Colleagues, Marcuse was concerned with the prevalence of instrumental reason in modern advanced industrial societies (i.e. the affluent, consumer-capitalist / state-capitalist societies), that he believed had come to play a dominant and deleterious influence on the life-world.[1] Marcuse claimed that the world of "man and nature" had come to be "organized as things and instrumentalities",[2] and that the liberties enjoyed by a privileged few had become subject to erosion and replaced by a "hedonic treadmill" of ever-escalating consumerism.[3] Marcuse's critical-social theory and philosophy of technology grew from a concern for the plight of the individual in the context of the "one-dimensional society"; an oppressive constellation comprising the governments, corporations, the population at large, economics and technology, in which the potential of both first and human nature – as well as critical reason itself – became subject to

1 See M. Horkheimer, (1941), 'The End of Reason' in *The Essential Frankfurt School Reader,* edited by A. Arato, and E. Gebhardt, (New York: Urizen, 1978), pp. 26-48. See also Horkheimer and T.W. Adorno, (1944), *Dialectic of Enlightenment,* (London & New York: Verso, 1997).

2 Marcuse, (1964), *One-Dimensional Man,* (London: Routledge, 2002), p. 62.

3 The theory of "hedonic adaptation" was originated by P. Brickman and D.T. Campbell in their 1971 essay, 'Hedonic Relativism and Planning the Good Society', in *Adaptation Level Theory: A Symposium,* edited by M.H. Apley, (New York: Academic Press, 1971), pp. 287-302. It was later refined and referred to as the "hedonic treadmill" by the psychologist, Michael Eysenck in such works as *Happiness: Facts and Myths,* (Hove: Psychology Press LTD, 1990).

increasing rationalisation and alienation due to an efficiently administered “mechanics of conformity”.[4] According to Marcuse, this ordering was the necessary feature of the current productive / economic edifice, which assisted in diminishing and rendering irrelevant various forms of thought, protest and criticism considered antithetical to its cardinal values of efficiency and self-reproduction. It will be the task of what follows to delineate these contentions in more detail.

As Marcuse noted, "several influences had conspired to bring about the social impotence of critical thought:

> The foremost among them is the growth of the industrial apparatus and of its all-embracing control over all spheres of life (…) The ever-growing strength of the apparatus, however, is not the only influence responsible. The social impotence of critical thought has been further facilitated by the fact that important strata of the opposition have long been incorporated into the apparatus itself – without losing the title of opposition.[5]

Marcuse is not just referring to the union movement or the academy, but is concerned to describe the situation in a broader philosophical-anthropological context.[6] As business, government, the media, culture industries and the public mind itself fell deeper into conformance with largely economically and technologically rational incentives, a society had emerged that was arguably psychologically, philosophically and politically ill-prepared and ill-equipped to countenance even piecemeal alterations to the business of day-to-day life, let alone to give adequate consideration to the various consequences of its productive excesses.

Marcuse's negative critique makes use of bipolar language and is often intentionally ironic. On the one hand, he speaks generally of the “rational irrationality”[7] of the established capitalist status quo and its Orwellian tendency to associate itself with freedom and liberty amid the “waste and restriction of productivity; the need for aggressive expansion; the constant threat of war; intensified exploitation; dehumanization.”[8] On the other, Marcuse unsettles the conformist silence of religion,

4 D. Kellner, 'Introduction' to *Technology, War, and Fascism: The Collected Papers of Herbert Marcuse,* vol.1, (New York: Routledge, 1998), p. 5.
5 Marcuse, (1941), 'Some Social Implications of Modern Technology' in *Technology, War and Fascism: The Collected Papers of Herbert Marcuse,* vol.1., edited by D. Kellner, (New York: Routledge, 1998), pp. 41-65.
6 See for example Marcuse, (1975), 'The Failure of the New Left?' in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* vol.3, edited by D. Kellner, (London and New York: Routledge, 2005), pp. 181-191.
7 This term arises again and again in Marcuse, *op.cit.* (1964).
8 Marcuse, *ibid.* (1964), p. 257.

referring to it as “blasphemous”;[9] whilst simultaneously not winning any friends in the business, government or corporate realms by critically commenting on their obsession to display a tailored, “plastic cleanliness”; appearing professional on the surface, whilst being engaged in “dirty deals” underneath.[10] Today's superficial emphasis on the brand, the image, and the obsession with surface physical appearence (whilst strenuously denying the opposite) arguably continues the tendency to conceal the general "dirtiness" and facile nature of modern consumerism.[11] In regard to technoscience; as has already been noted, Marcuse saw in it both the major means for qualitative change, but also the means by which such change was suspended and cancelled. On this basis, it seems little wonder that late in his career, he was taken on as something of a political 'guru' of sections of the radical student movements of the 1960s and early 70s, which are now remembered by the somewhat ironic slogan of “flower power.”

Marcuse's multi-dimensional approach to modern technoscientific civilisation therefore represents a form of thought that refused to uncritically accept the rational, sensible nature of "*what is*". This characteristic willingness to examine the other sides of conventionally prescribed wisdoms is perhaps most evident in Marcuse's unrelentingly visceral criticism of modern capitalist society and its power to contain alternatives to itself and indulge in violence, misery, and deception, whilst promoting the very opposite. He characterised the nature of capitalist society as one:

1. which compels the vast majority of the population to "earn" their living in stupid, inhuman, and unnecessary jobs;
2. which conducts its booming business on the back of ghettos, slums, and internal and external colonialism;
3. which is infested with violence and repression while demanding obedience and compliance from the victims of violence and repression;
4. which, in order to sustain the profitable productivity on which its hierarchy depends, utilizes its vast resources for waste, destruction, and an ever more methodical creation of conformist needs and satisfactions.[12]

9 Marcuse, *An Essay on Liberation,* (Boston: Beacon Press, 1969b), p. 62.
10 Marcuse, *ibid.* (1969b), p. 28.
11 Marcuse, *ibid.* (1969b), p. 36.
12 Marcuse, *ibid.* (1969b), p. 62.

Yet, Marcuse's pessimistic assessment was balanced by a sense of optimism which emerged as a result of the consequences of these very prospects, an optimism which only grew in his later period.[13] For example, he contended that the superior sophistication of the means of control and containment in under capitalism give away or imply the capacity to move toward alternative arrangements of society:

> The level of productivity which Marx projected for the construction of a socialist society has long since been attained in the technically most advanced capitalist countries, and precisely this achievement (the "consumer society") serves to sustain capitalist productive relations, to ensure popular support, and to discredit the rationale of socialism.[14]

Marcuse's multidimensional approach explored certain aporiae of modern capitalism; on the one hand, the status quo widely encouraged immense levels of technoscientific advance and proliferation which theoretically imply the productive capacity to build a freer society, to ease suffering and hopelessness, and to enrich community, social relations, and allow for the long-term flourishing of first nature as well as its denizens (humanity included). On the other hand, Marcuse believed these enormous powers were instead diverted into the containment of exactly such prospects, stalling their practical application, and rendering them to theory. Rather than the Marxian vision of the gap between theory and practice being closed through pursuing the positive ends and implications technoscientific development opened up for the human future,[15] modern society, Marcuse lamented, remained mired in a "repressive continuum"; a situation in which the prospects for change and liberation were and are available, but are instead directed into increasingly sophisticated, deceptively benign forms of social control and exploitation so that economic growth may continue. For Marcuse, the consequence is "a mutilated, crippled and frustrated human existence"; an existence "that is violently defending its own servitude."[16]

Although the beginnings of this critique and his concern with technics go back at least as far as his

13 Marcuse's optimism increases markedly after the publication of *One-Dimensional Man.* See for example, Marcuse, *ibid.* (1969b); *Counterrevolution and Revolt,* (Boston: Beacon Press, 1972a); and *The Aesthetic Dimension,* (Boston: Beacon Press, 1978).

14 Marcuse, *op.cit.* (1972a), p. 3.

15 Andrew Feenberg notes that Marcuse referred to the closure of this gap as "the noblest desideratum of philosophizing". See his *Heidegger and Marcuse: The Catastrophe and Redemption of History,* (New York: Routledge, 2005), p. 89

16 Marcuse, (1967), 'Liberation from the Affluent Society', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* edited by D. Kellner, (New York: Routledge, 2005), p. 80.

1938 essay 'On Hedonism' and receive their most famous expression in *One-Dimensional Man*,[17] Marcuse's concern with twentieth century technological development, as well as early intimations of the theory of one-dimensional society are initially presented in his 1941 essay, 'Some Social Implications of Modern Technology',[18] in which he describes the historical origin and encroachment of "technological rationality" through an analysis that contrasts it with a "second-dimension" of individual or critical rationality.

> Individual rationality (…) was won in the struggle against regnant superstitions, irrationality and domination, and posed the individual in a critical stance against society. Critical rationality was thus a creative principle which was both the source of the individual's liberation and society's advancement.[19]

Marcuse argued that this second dimension of "critical reason" or "rationality" had its apogee in the middle-class revolution of the sixteenth and seventeenth centuries,[20] and from this historical standpoint, he gauged the growth of modern technological rationality in capitalist societies and its resultant "fetish of technique" from the early stages of its modern development into its establishment in twentieth century advanced industrial society.[21] Prior to the eighteenth century, individual rationality was not just a theoretical ideal, but represented an *extra* dimension of society that carried out a practical / critical role in checking received reality and critically engaging with sources of authority to some effect. In this arrangement, "Truth", as Marcuse claimed, was originally "homogenous", but it came to be

> ...split into two different sets of truth values and two different patterns of behavior: the one assimilated to the apparatus, the other antagonistic to it; the one making up the prevailing technological rationality and governing the behavior required by it, the other pertaining to a critical rationality whose values can be fulfilled only if it has itself shaped all personal and social relationships.[22]

In this multi-dimensional ordering of society, rationality and reason were not limited to the received

17 See Marcuse (1938), 'On Hedonism', in *Negations: Essays in Critical Theory,* (Boston: Beacon Press, 1969), pp. 159-200.
18 Marcuse, *op.cit.* (1941).
19 Kellner, *op.cit.* (1998), pp. 4-5.
20 Marcuse, *op.cit.* (1941), pp. 42-43.
21 Note that Marcuse's understanding of technology and *technique* are quite distinct from the use of the terms presented by Jacques Ellul in *The Technological Society,* (New York: Vintage, 1964).
22 Marcuse, *op.cit.* (1941), p. 50.

dictates of authority, but stood as independent, critical forces – albeit with varying levels of practical potency. “In the emerging bourgeois ideology of the eighteenth and nineteenth centuries, the nascent liberal-democratic society was deemed the social arrangement in which the individual could pursue its own self-interest and at the same time contribute to social progress.”[23] As Marcuse noted, this image of critically engaged reason

> ...stood for values which strikingly contradict those holding sway over society today. If we try to assemble in one guiding concept the various religious, political and economic tendencies which shaped the idea of the individual as the subject of certain fundamental standards and values which no external authority was supposed to encroach upon. These standards and values pertained to the forms of life, social as well as personal, which were most adequate to the full development of man's faculties and abilities. By the same token, they were the “truth” of his individual and social existence. The individual, as a rational being, was deemed capable of finding these forms by his own thinking and, once he had acquired freedom of thought, of pursuing the course of action which would actualize them. Society's task was to grant him such freedom and to remove all restrictions upon his rational course of action.[24]

Marcuse goes on to describe how the enlightenment principles of autonomous thought, personal liberty, individual rationality and the courage to follow one's own reason, came to be subject to a general diminution which began to accelerate around the period of the industrial revolution, giving rise to social conditions that had the effect of stifling the critical dimension of various arenas of thought and discourse.[25] Consequently, the self-evident worth of individual autonomy and liberty were sectioned off, mediated and drawn into conformance with that which “...holds good for the functioning of the apparatus and for that alone”.[26] This amounted to a generally positivist, operationalistic approach to science and philosophy, which continues to be strongly represented in the dominant forms of economic theory. The recent prevalence of various strands of subjectivism and relativism in public discourse were also arguably convenient, for if all 'oughts' concerning how society should be governed, how the Good Life should be pursued, what equates to 'genuine' and 'surplus' needs, etc. were rendered to preference under the thin pretensions of politeness and

23 Kellner, *op.cit.* (1998), p. 5.
24 Marcuse, *op.cit.* (1941), p. 42.
25 *Sapere aude* ("dare to know", or more generally, "dare to be wise") is originally attributed to Horace's *Epistularum liber primus* (*First Book of Letters*), section 1.2.40, published in 20 BC. Immanuel Kant uses the phrase as his "motto" of Enlightenment or "man's release from his self-incurred tutelage", in his 1784 essay, 'An Answer to the Question: What is Enlightenment?'. See I. Kant, *Political Writings,* 2nd ed., (Cambridge: Cambridge University Press, 1991), pp. 54-60.
26 Marcuse, *op.cit.* (1941), p. 49.

impartiality, the directors of the means of production would be free to pay lip service to providing for them whilst drowning consumers in endless cycles of rehashed products so as to secure employment and economic growth. In Marcuse's estimation, this pervasive *technological* rationality called for "unconditional compliance and coordination (and) the subordination of thought to pre-given external standards."[27] The rational, autonomous individual, now the subject of increasing psycho-social "adjustments" and administration as well as physical regimentation, made way for the twentieth century achievement of the "one-dimensional individual"; one who was not just defined primarily on the basis of her productive capacities alone, but by her ductility and pliability and her new sense of contentment and acceptance of the prevailing status quo which, Marcuse contended, included her being "unwilling and perhaps even incapable of comprehending what is happening and why it is happening."[28] Thus, the value of the "the human individual whom the exponents of the middle class revolution had made the ultimate unit as well as the end of society" gave way to the values of instrumentality and efficiency.[29] The "higher culture",[30] which, Marcuse admits were enjoyed by only a privileged minority, came to be artificially restricted in the advanced industrial societies.[31] As he noted in *One-Dimensional Man*, this did not necessarily always mean the death or annihilation of cultural values and traditions commonly bemoaned by other figures within the humanities tradition of philosophy of technology,[32] but their productive utilisation (and their willingness to be utilised) by the dominant apparatus:

> Today's novel feature is the flattening out of the antagonism between culture and social reality through the obliteration of the oppositional, alien, and transcendent elements in the higher culture by virtue of which it constituted *another dimension* of reality. This liquidation of *two-dimensional* culture takes place not through the denial and rejection of the "cultural values," but through their wholesale incorporation into the established order, through their reproduction and display on a massive scale.[33]

27 Marcuse, *ibid.* (1941), p. 49-50.
28 Marcuse, *op.cit.* (1964), p. 148.
29 Marcuse, *op.cit.* (1941), p. 42.
30 By "higher culture" Marcuse means the second critical dimension and its conveyance through art and aesthetics. See Marcuse, *op.cit.* (1978).
31 Marcuse, *op.cit.* (1964), p. 60.
32 The distinction between "humanities" and "engineering" philosophy of technology is owed to C. Mitcham, *Thinking Through Technology: The Path Between Engineering and Philosophy.* (Chicago: University of Chicago Press, 1994). For a brief sample of philosophers and other thinkers analyses what might be called the corrosion of culture by modern technology, see Ellul, *op.cit.* (1964); M. Heidegger, (1954), 'The Question Concerning Technology', in *Basic Writings,* edited by D.F. Krell, (New York: Harper and Rowe, 1977), pp. 287-317. See also N. Postman, *Technopoly: The Surrender of Culture to Technology,* (New York: Vintage, 1993), and A. Borgmann, *Technology and the Character of Contemporary Life,* (Chicago: Chicago University Press, 1984).
33 Marcuse, *op.cit.* (1964), p. 60.

The process Marcuse is describing is therefore not a destruction of traditional culture or values, but a process of absorption and integration. Oppositional elements are themselves constructively incorporated into the dominant culture and rationality for its own collective interest. In addition to the diminution of individual critical thought, rather than being used to lessen individual labour time and effort, technoscientific powers became ever-more geared toward attempts to contain and control their own inherent liberatory potentials. More and more, the design of technics and the labours of human agents came to follow distinctly more narrow and unified paths toward profit making, which increasingly represented the major incentive driving and guiding the means of production up until the present day.

The concept of use value hardly escapes this predicament – rather it appears to *define* it.[34] As the production of technological artifacts comes to be ever-more geared toward providing for and securing perpetual economic growth, the formerly manifold instrumental incentives which initially motivated their production and design became subject to the 'alien' presence of the commodity form, until there emerged a point – historically very recently – that exchange value came full-circle in its permeation of production as a whole.[35] This process significantly accelerated in the twentieth century when world gross domestic product (GDP) quintupled, and the total industrial output in the twenty year period between 1953 and 1973 reputedly exceeded the totality of that achieved over the one hundred and fifty year period preceding it.[36] Given other significant tendencies of twentieth century production such as Fordism, Taylorism, disposability, built-in obsolescence, and an explosion of mass-production and automation had emerged without parallel decreases in necessary labour time or the amelioration of income discrepancies, the constant reiterations of “progress”, “development”, “jobs” and more recently, “moving forward” came to sound ever more hollow.

Hence, for Marcuse, a narrowing of the incentives guiding and impelling production from use value to exchange value had occurred, resulting in the *commodification* of the incentives behind technical development and proliferation.

34 On use value and exchange value, see Marx, (1867), *Capital* vol.1, part 1, chapter 1: 'The Commodity', (London: Penguin Classics, 1990), pp. 125-177.

35 See Marx, *ibid.* (1867), chapter 1:4, pp. 163-177. See also Marx, *op.cit.* (1953), p. 165.

36 This was largely due to post World War II expansionism, especially in the United States. See for example, P. Bairoch, 'International industrialization levels from 1750 to 1980' in *The Journal of European Economic History,* vol.11, no's 1 & 2, (Fall, 1982), p.73. The innovation of the shipping crate was also important. See M. Levinson, *The Box: How the Shipping Container Made the World Small and the World Economy Bigger,* (Princeton: Princeton University Press, 2008).

Marcusean Philosophy of Technology

> Although he was certainly influenced by Adorno and even Heidegger, Marcuse was not the romantic technophobe he is often taken for. To be sure, he argues that instrumental reason is historically contingent, but unlike Adorno and Heidegger, he thinks human action can change the epochal structure of technological rationality and the designs which flow from it. A new type of reason would generate new and more benign scientific discoveries and technologies. Marcuse is an eloquent advocate of this ambitious position, but today the notion of a political transformation of science has a vanishingly small audience and discredits his whole approach.[37]

Theories of technology entail various epistemological and conceptual difficulties, not least the problem of defining technology *per se* in anything but broad terms.[38] Understandably, definitions range widely, but for the current discussion, two crucial points regarding Marcuse's definition need to be addressed. Firstly, Marcuse was a believer in the hardly controversial claim that technology was still developing, it is not a "fixed destiny."[39] This contention forms the background both to his philosophical anthropology as well as his philosophy of technology which considered technoscience to contain powers that, were they to be released in line with what he contended were its innate potentials, would be directed to provide for the augmentation of human capacities, to diminish the need for arduous or dangerous manual labour, to counter misery and sickness, and to restore the mutilated environment. Broadly, Marcuse's view implies that technological, natural and human ends ought be considered inseparable; the so-called "end" of technological rationality is not merely aligned with human potential in some arbitrary fashion – it is the concrete means by which this potential may be pursued, embodied and practically realised.[40]

> Utopian possibilities are inherent in the technical and technological forces of advanced capitalism and socialism: the rational utilization of these forces on a global scale would

37 Feenberg, *Questioning Technology,* (London & New York: Routledge, 1999), p. 153.
38 A summary overview of the more common definitions is provided by S.J. Kline, 'What is Technology?' in *Philosophy of Technology: The Technological Condition,* edited by R.C. Scharff and V. Dusek (Oxford, Blackwell, 2005), pp. 210-212. See also the volume edited by J.K.B. Olsen, S.A. Pedersen and V.F. Hendricks, *A Companion to the Philosophy of Technology,* (Oxford: Blackwell, 2009).
39 Feenberg, *op.cit.* (2005), p. 1.
40 See Marcuse, *op.cit.* (1964), p. 239.

terminate poverty and scarcity within a very foreseeable future.[41]

The second point concerns Marcuse's distinction between 'technics' and 'technology' which arguably becomes crucial in understanding his wider critique of advanced industrial society. Marcuse originally attributed the distinction to Lewis Mumford,[42] but it appears to owe more to the Marxian distinctions between mode, means, and relations of production. Although in Marcuse's writings – not least 'Some Social Implications of Modern Technology' and *One-Dimensional Man* – the distinction is not held scrupulously,[43] it will be contended in this thesis that it persists throughout his work in an implicit manner and has specific relevance to questions pertaining to the shared grounds of technology and environment.

For Marcuse, technics, or the "technical apparatus" denotes the totality of instruments, devices and artifacts that are commonly taken in English as 'technology' in general. In other words, the "apparatus of industry, transportation and communication", individual technical artifacts, from tools and machinery to consumer products, engine parts, computers, and the mechanisms and techniques by which they are produced.[44] Marcuse is less concerned to interrogate this element of the equation, as 'technics' (or the means of production) are "but a partial factor" of what he is most interested in: the mode of production which provides the incentive and impetus which underlies their production in the first place.[45] In short, it is once again clear in 'Some Social Implications of Modern Technology' and later works that Marcuse remains concerned with the historically specific shift in the orientation of production from use-value to exchange value.[46] This shift spans almost the entire gamut of the means of production, but also counts for the human relations of production, as in the affluent societies, well after subsistence needs had been met for the majority of the workforce, wage increases served as an incentive to continue to carry out work and to keep levels of consumption growing. For Marcuse, technical artifacts are socially contingent and ethically neutral; they can be used to "promote authoritarianism as well as liberty, scarcity as well as abundance, the extension as well as the abolition of toil".[47] However, understood in Marcusean terms, 'technology' is a *mode* of

41 Marcuse, *op.cit.* (1969b), p. 4.
42 Marcuse, *op.cit.* (1941), p. 41.
43 See for example, J. Ocay, 'Marcuse's Critique of Advanced Industrial Society', *Kritike* vol.4, no.1, (June 2010), pp. 56-57.
44 Marcuse, *op.cit.* (1941), p. 56.
45 Marcuse, *ibid.* (1941), p. 41.
46 Although *One-Dimensional Man* arguably provides the most cohesive and complete description of Marcuse's philosophy of technology, it's subtitle, "Studies in the ideology of advanced industrial society" makes it clear that he is concerned to analyse technology in a wider social and political context.
47 Marcuse, *op.cit.* (1941).

production.[48] Hence, the neutrality of technics ought not blind the investigator to this preconditional, "basic historical factor":

> One may still insist that the machinery of the technological universe is “as such” indifferent toward political ends – it can revolutionize or retard a society. An electronic computer can serve equally a capitalist or socialist administration; a cyclotron can be an equally efficient tool for a war party or a peace party. This neutrality is contested in Marx's controversial statement that the “hand-mill gives you a society with the feudal lord; the steam-mill society with the industrial capitalist.” And this statement is further modified in Marxian theory itself: *the social mode of production, not technics is the basic historical factor.* However, when technics becomes the universal form of material production, it circumscribes an entire culture; it projects a historical totality – a "world".[49]

Marcuse's distinction thereby draws out the role that profit-making has come to play in motivating and guiding production, which in the advanced industrial societies tends to play the major influence in rationalising and legitimating the vast majority of technical forays. A distinction can therefore be made between the *technological* and the development and proliferation of the *technical* and technoscientific realms. Technology is not simply a 'form' or historical stage of technical activity, it is a "new rationality" containing "new standards of individuality"; a historically-specific "social process" operant at the level of ideas, opinion, government policy, and most especially business, and hence is inseparable from the collective choices, motives and decisions of agents. Given these contentions, it is unsurprising that Marcuse claims that he is not specifically interested in the "...influence or effect of technology or particular technical artifacts on human individuals as such, as (...) they are themselves an integral part and factor of technology, not only as the social groups which direct its application and utilisation."[50] Again, as a mode of production, technology incorporates and directs – and is itself directed by – the instrumental rationality appropriate to machinery which comes to dominate the relations of production, i.e.: individual human relations to each other, as well as to first nature.

> Technology, as a mode of production, as the totality of instruments, devices and contrivances which characterise the machine age is thus at the same time a mode of organising and perpetuating (or changing) social relationships, a manifestation of prevalent thought and

48 See Marcuse, *ibid.* (1941), p. 41
49 Marcuse, *op.cit.* (1964), p. 157-158. (Emphasis added).
50 Marcuse, *op.cit.* (1941), p. 41.

behaviour patterns, an instrument of control or domination.[51]

Especially in its modern form, Marcuse contended that the technological mode of production is operant in both the individual and socio-cultural contexts, private and public, local, regional and international. In 'Some Social Implications of Modern Technology', he uses the example of "technocracy" utilised by the Third Reich in his native homeland to emphasise its incredibly broad scope and relevance, far transcending the realms of technics, mechanisation and industry, through the National Socialist's "ingenious manipulation of the power inherent in technology: the intensification of labor, propaganda, the training of youths and workers, the organization of the governmental, industrial and party bureaucracy – all of which constitute the daily implements of terror – follow the lines of greatest technological efficiency."[52] All of which Marcuse characterises as – to summarily paraphrase – *anti-technological,* as once again he viewed technology in its 'essence' as a positive force for humankind, tending toward the decrease of unnecessary toil rather than its artificial increase, to the lessening of terror and suffering, rather than their extension. Although certainly not incapable of brute force, the use of technology within the liberal-democratic, advanced capitalist nations tended toward the what Walt Lippman referred to as the *engineering of consent* rather than its overt, terroristic enforcement.[53] Yet, Marcuse was convinced that a technocratic totalitarianism remained an appropriate label for even these societies. As he wrote at the conclusion of the second edition of his study of Hegelian thought, *Reason and Revolution,* "The defeat of Fascism and National Socialism has not arrested the trend towards totalitarianism. Freedom is on the retreat – in the realm of thought as well as that of society."[54] Indeed, the use or misuse of technology under consumer capitalism was not – as many advocates of the "free-market" continue to maintain – the direct opposite of the violence of such regimes as the Nazis, but related through both arrangement's use of technology as a means of social control. Marcuse did not see Fascism as a definitive break from liberalism, but instead demonstrated "...the continuities between liberalism and fascism and shows how liberalism's unquestioned allegiance to the capitalist economic system prepared the way for the fascist-totalitarian order and with it the abolition of liberalism itself.[55] Marcuse again cites Mumford who was similarly critical of the contention that technological development under capitalism tended toward its natural 'end', noting that it was

51 Marcuse, *ibid.* (1941).
52 Marcuse, *ibid.* (1941).
53 See W. Lippmann, (1922), *Public Opinion,* (New York: FQ Classics, 2007). The terms is now more well-known through its use by Noam Chomsky. See his *Propaganda and Control of the Public Mind,* (Boston: AK Press, 1998).
54 Marcuse, 'Epilogue' in *Reason and Revolution: An Introduction to the Dialectical Thinking of Hegel and Marx,* 2nd ed., (New York, Humanities Press, 1954), pp. 433.
55 Kellner, 'Herbert Marcuse and the Vicissitudes of Critical Theory', in *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse,* vol.2., edited by D. Kellner, (New York: Routledge, 2001), p. 8.

neither the spirit of invention, nor the promise of innovation in increasing humanity's "essential powers" that fostered and motivated technological growth, "...but business, or power over other men. In the course of their development machines have extended these aims and provided a vehicle for their fulfillment".[56] According to Marcuse, the growth of technology in the capitalist nations had therefore come to take on forms quite "different from and even opposed" to those which marked its temporal beginnings, the large duration of its existence, as well as its essential end.[57]

It is hopefully already clear that the difference Marcuse placed between technics and technology only superficially resembles the more famous distinction proposed by Martin Heidegger.[58] Marcuse is not aiming to provide an ontological theory or definition, but aiming to trace its concrete social manifestations in the practical context of everyday lived experience.[59] Although his views of the modern context of this 'lived experience' of technics and technology are undeniably critical, there remains in Marcuse's account the potential prospect of human responsibility coming to play a far more significant role in technical mediation than it currently does, or that was allowed for under the pessimistic sway of such thinkers as Heidegger, Ellul, and to a lesser extent, Mumford.[60] As has already been argued, given the necessary wherewithal, Marcuse's theory allows for technics and technology to be turned away from the profit motives of an already affluent few to the benefit of the non-affluent many and the recovery of first nature; the immense wealth that technoscientific production is the primary means of generating *could* be turned to feed the hungry and assist the sick on a global scale instead of being funneled to elite, affluent populations who live in comparative comfort but continue to bemoan their supposed economic “uncertainty”. Marcusean philosophy of technology is therefore hardly pessimistic in its entirety; as he wrote in response to critics that mistakenly attributed more than a mote of each of these views to his philosophy, “science and technology are the great vehicles of liberation, and it is only their use and restriction in the repressive society which makes them into vehicles of domination.”[61] In emphasising how technics (and, in the modern era, techno*science*) comes to be used, it should be noted that Marcuse is not

56 L. Mumford, cited in Marcuse, *op.cit.* (1941), p. 41.
57 Marcuse, *ibid.* (1941), p. 42.
58 See Heidegger, *op.cit.* (1954).
59 For a thorough discussion of the differences and similarities of Marcuse and Heidegger's views on technology see Feenberg, *op.cit.* (2005). See also I. Thomson, 'From the Question to Technology to the Quest for a Democratic Technology: Heidegger, Marcuse, Feenberg', *Inquiry,* vol.43, issue 2, (Summer, 2000), pp. 225-234.
60 See J. Ellul, (1963), 'The Technological Order', in *Philosophy and Technology,* edited by C. Mitcham and R. Mackey, (Cambridge, MASS: The MIT Press, 1983), pp. 86-105, and Ellul, *op.cit.* (1964).
61 Kellner, *op.cit.* (1984), pp.266-267, citing Marcuse, *op.cit.* (1969b), p.12. (Note that Kellner's initial reference to this quote [p. 21] appears to be incorrect). It should be noted that Marcuse's thoughts on the beneficence of technology are not always consistent. For example, see Marcuse, *op.cit.* (1964), p. 172. Such critics include Alvin Toffler, who mistakenly described Marcuse, Lewis Mumford and Erich Fromm as “anti-technological” in his 1970 bestseller, *Future Shock,* (London: Pan, 1972), p. 291. See also M. Schoolman, *op.cit.* (1980).

only thinking about the 'end user'; the agent who purchases *x* in order to carry out a particular task. Instead, he can be said to be drawing attention to the collective 'function' of the entire edifice of capitalist-driven production, namely: the maintenance and recreation of *itself*. In this process, individuals, artifacts and first nature are drawn into conformance through being provided with monetary incentives in exchange for their participation and compliance as wage labourers – strictly speaking, they are not causally determined to do so, but offered a deal that they can hardly refuse. Marcuse's concern with use is also not a reiteration of the classical Aristotelian distinction between organisms and artifacts, which, as will be argued later, lacks sufficient depth to countenance the role of the individual in advanced industrial societies.[62] Nor, as will also be discussed later is Marcuse offering a version of the 'unintended consequences' thesis, in which the original incentives informing technical designs are displaced by exactly the concern with the end user noted above.[63] Rather, Marcuse made the hardly radical proposition that the incentives of profit making cannot be separated from any discussion of the modern technical phenomenon, a contention mainstream economists would hardly disagree with. Indeed, the large majority of small and large-scale productive endeavours are not able to be accomplished without sufficient capital – either as a future expectation or as an *a priori* prerequisite. It is not necessarily the usefulness or the 'worth' of the technical endeavor that will decide on its ultimate success, but its 'value', or capacity for to make profits.[64] However, it is also important to note that Marcuse is not arguing that technoscientific development nor the increases in affluence it has conferred are the *causes* of the one-dimensional society, but their consequences:

> The oppressive features of technological society are *not* due to excessive materialism and technicism. On the contrary, it seems that the causes of the trouble are rather in the *arrest* of materialism and technological rationality, that is to say, in the restraints imposed on the *materialization* of values. These restraints pertain to a particular period of civilization, to a particular organization of the struggle for existence. Their abolition, that is, the liberation of technology, would involve the entire material and intellectual culture of advanced industrial society.[65]

62 See Aristotle, *Nichomachean Ethics,* Book 6, iv, translated by J.A.K. Thomson, (London: Penguin Classics, 1976), p. 208 (emphasis added).

63 For a highly readable account of this thesis, see E. Tenner, *Why Things Bite Back: Technology and the Revenge of Unintended Consequences,* (New York: Vintage, 1997).

64 As Marx commented after a quotation from John Locke, the "British writers" of the seventeenth century tended to refer to the use value of an artifact as its "worth", and its exchange value as its "value". As Marx notes: "This is quite in accordance with the spirit of a language that likes to use a Teutonic word for the actual thing, and a Romance word for its reflection." See Marx, (1867), *Capital,* vol.1, part 1, chapter 1. note 4, (London: Penguin Classics, 1990), p. 126.

65 Marcuse, (1961), 'The Problem of Social Change in the Technological Society', in Kellner, (ed., 2001), pp. 37-57, p.

"Excessive materialism and technicism" are then not the causes of the affluent society, but the means by which the materialisation of values is artificially suspended. Although stimulated and prompted, and unable to avoid the necessity of a regular income, the individual is not simply the determined effect of "autonomous technology", but is widely encouraged to be a proud contributor to the system. Instead of being brutally enforced as under (say) the dictatorial communist regimes of Stalin and Mao, public consent becomes an 'engineering project' for seemingly ever more intimately acquainted fusions of government departments and corporations, "spin doctors", public relations and marketing firms, whose productive work – whether they are aware of it or not – tends to lubricate the reproduction of the overall arrangement. Marcuse is therefore hardly calling for technical development to be subdued, nor for its advance to be 'artificially' halted or suspended; indeed, it is *just* the latter that is the problem. As it will be ventured later, Marcuse may have been happily surprised to note that various recent technical capacities – especially the global spread of computers and the internet – show almost exactly the sorts of effects he was speaking of. If examples such as the "piracy" (i.e. sharing) of documents, software, video and audio and the radically open dissemination of information through such media as Wikileaks are any indication, a strong case can be made that the level of innovation modern capitalism encourages may grow beyond even its capacity to contain its potential consequences.[66] However, before this contention can be elaborated further, what Marcuse called for was a *redirection* of technology away from the exploitative incentives that prevail in capitalist societies, or in other words, a new mode of production, which he contended could be actualised under a redefined, non-bureaucratised form of socialism.[67] The current destructive capitalist direction of technology – Marcuse thought – was ultimately subject to change by human agents, and it *must* be changed, but this does not entail the simplicity of a return to more simple agrarian practices as many theorists amongst the left counter-culture and certain sections of the environmental movement have called for, and for which they are continually criticised by their opponents.[68] As he wrote:

57.

66 In modern economic theory, such innovations are known as 'disruptive technologies'. Arguably, they were originally noted by Marx and Engels, and taken further by Joseph Schumpeter and his theory of "creative destruction". See Marx and Engels, (1848), *The Communist Manifesto,* (London: Pelican Books, 1967), pp. 85-86. The concept was exapanded on in Marx (1939), *Grundrisse: Foundations of the Critique of Political Economy, (rough draft),* notebook VII, (London: Penguin, 1993), p. 750. See also Marx (1863), *Theories of Surplus Value: 'Volume 1V of Capital',* 2., (London: Lawrence and Wishart, 1969), pp. 495-406. Schumpeter's view is provided in his 1942 work: *Capitalism, Socialism and Democracy,* part II: VII 'The Process of Creative Destruction', (New York: Harper & Row, 1950), pp. 81-86.

67 Marcuse, *op.cit.* (1964), p. 44; and Marcuse, *op.cit.* (1967a), p. 62.

68 For 'deep green' and 'anarcho-primitivist' critiques which hold civilisation *per se* rather than technics or economics to be the major cause of environmental upheaval, see for example, D. Jensen, *Endgame v1: The Problem of Civilization,* (New York: Seven Stories Press, 2006). It should be acknowledged that Jensen disapproves of this term. See also J. Zerzan, *Running on Emptiness: The Pathology of Civilization,* (Port Townsend, WA: Feral House,

> I hope that when I speak of doing away with the horrors of capitalist industrialization it is clear I am not advocating a romantic regression behind technology. On the contrary, I believe that the potential liberating blessings of technology and industrialization will not even begin to be real and visible until capitalist industrialization and capitalist technology have been done away with.[69]

Accepting his distinction between technology and technics, the actual prospects of the sort of reforms Marcuse was calling for can now begin to be drawn into an ecological context. Indeed, Marcuse was adamant that any attempt to understand the modern technological phenomenon – let alone to consider ways in which it might be reformed or directed toward environmental causes – must take into consideration the influence of the prevailing mode of production and the incentives it intersperses through all levels of society. In this context, the oxymoronic "greening" of the means of production appears inadequate to address the problem of the direction of modern technological development; what is instead required is a radical reorientation of its chief incentives, and, *ipso facto*, its apprehension and appropriation of the natural environment. Hence, if it is the case that the fusion of capitalism and technics amounts to a "technological" mode of production, and that this mode of production encourages a manner of dealing with both human and first nature which is predatory, competitive and exploitative, the growth or success of the mode of production itself arguably begins to illuminate its potential limitations. However, it is precisely these limitations which neither the capitalist, nor the technological mode of production appears willing to countenance. Indeed, as it will be argued in the next chapter, growth for the sake of growth – that which the current arrangement makes its chief imperative – appears particularly antithetical to environmental limitations of any sort until it reaches them. Therefore, in Marcuse's view, the changes that appear to be required in terms of our social conduct as well as our treatment of the natural environment appear unlikely to emerge through reform to technics alone, but through what he referred to as *qualitative change*; "change, not only in the basic institutions and relationships of an established society, but also in individual consciousness in such a society".[70] Although this may appear a utopian option, arguably even Marcuse did not – and perhaps could not – have adequately envisioned the extent to which profit motives would come to dominate the direction of social and technological development after his death, and, more pressingly, the extent to which this directive

---

2002); and his edited volume, *Against Civilization: Readings and Reflections,* (Port Townsend, WA: Feral House, 2005).

69 Marcuse, *op.cit.* (1967a), p. 68.

70 See Marcuse, 'Ecology and the Critique of Modern Society', *Capitalism, Nature, Socialism* 3:3, (1979), p. 30.

impetus would lead to a potential practical risk to the continuation of civilisation as a whole.[71] Yet, these same profit motives appear to be the major motivation of the effort that has, thus far criticised, countered and thwarted any substantial, concerted efforts to rectify the situation.

To summarise, Marcuse's separation of technics and technology is founded in the original Marxian divisions of mode, means, and relations of production. The technological society is one in which the powers of technics and the incentives of wealth-generation form a mutually reciprocal union, spanning, stimulating, and interpenetrating each division of productive activity as well as playing a major influential role in the relations of production by suppressing or redirecting criticism, protest and alternatives to the status quo. It is therefore necessary to explain the role of technological rationality in more detail, specifically its influence in shaping the relations of production.

Technological Rationality and the End of Technology

> Modern man, committed to the ideology of the machine, has succeeded in creating a lopsided world which favors certain aspects of the personality that were long suppressed, but which equally suppresses whatever does not fit into its predominantly mechanical mold.[72]

This section of the discussion aims to describe Marcuse's concepts of "technological rationality" and what he viewed as its "end"; an arrangement in which technoscientific capacities would be liberated from the incentives which play the major role in fostering their current, "dominating" instantiation.[73] It will be the aim to show here that each of these concepts arise from the extent to which the technical has become a model for various forms of public and political communication, behaviour and imagination, and to trace its starkly different implications to our mediation of the natural environment.

71 Marcuse's most coherent statements on environmentalism are arguably found in *Counterrevolution and Revolt* (Chapter 2), as well as Marcuse, *ibid.* (1979). See also D. Kellner, 'Marcuse, Liberation, and Radical Ecology' in *Illuminations,* (1982); and the essays on the environment in *Herbert Marcuse: A Critical Reader,* edited by A. Abromeit and W.M. Cobb, (New York: Routledge, 2004). See also S. Vogel, *Against Nature: The Concept of Nature in Critical Theory,* (Albany: State University of New York Press, 1996), and also 'The Question Concerning Nature', in Feenberg, *op.cit.* (2005), pp. 115-134

72 L. Mumford, *The Conduct of Life,* (London: Secker and Warburg, 1952), p. 180.

73 Marcuse, *op.cit.* (1964), p. 5.

As has been described so far, Marcuse's critical-social theory and philosophy of technology are highly bifurcated; on the one hand he was acutely pessimistic about the direction of modern technology in the advanced industrial societies of his age and believed it had taken on a controlling, oppressive aspect.[74] On the other: the requisite technoscientific powers of the one-dimensional society themselves stood as sufficient evidence for Marcuse that the capabilities already existed which could allow for the emergence of "new sensibility" and even a "new science", which he believed would be in accord with the "end" of a liberated technology.[75] Yet, in Marcuse's estimation, a betrayal of this potential had occurred to the extent that the apparatus had defeated its own purpose "...if its purpose is to create a humane existence on the basis of a humanized nature".[76] It was not simply the case that the roles traditionally ascribed as holding between technology and humanity – "man the tool-maker", *Homo fabiens,* etc., – had been reversed, but that the orientation and direction of modern technological rationality had shifted; instead of serving as the chief means by which human potential may be enriched, he believed it had now tended to sacrifice this most appropriate of ends on the altar of capitalist profit-making.

Although Marcuse only mentioned the term a small number of times in his later works, the concept of the end of technological rationality remains of significant import in understanding his critique of one-dimensional society and his view of technology. Compared with much of Marcuse's other thought, the concept is markedly simple: as technics consisted in "the translation of potential into the actual",[77] the end of technological rationality is to improve human life, extend instrumental capacities, and thereby work toward the authentic satisfaction of genuine needs. The manipulation of nature is a necessary part of this, but this process may take on disparate forms, some relatively benign, some utterly malignant – just as technics "may increase the weakness as well as the power of man", it may also be deployed on the environment in a sensitive or an exploitative fashion.[78] Despite undoubted improvements to standards of living in the advanced industrial nations since the onset of the industrial revolution, Marcuse contended that certain crucially important opportunities afforded by advanced technology seemed to recede, whilst others continued to grow well beyond sensible or equitable proportions. Amongst many examples, great discrepancies continued to exist in wealth distribution and today appear to be at least as wide or wider still.[79] In advanced industrial

74 Marcuse's contentions on this score are summarised in the opening chapter of *One-Dimensional Man;* 'The New Forms of Control'.
75 See Marcuse, *op.cit.* (1972a). See also S. Vogel, 'Marcuse and the "New Science"', in Abromheit and Cobb, *op.cit.* (2005), pp. 240-245.
76 Marcuse, *op.cit.* (1964), p. 149.
77 Marcuse, *op.cit.* (1969b), p. 79.
78 Marcuse, *op.cit.* (1964), p. 240.
79 For example, in the United States, easily the wealthiest nation in the world (defining "wealth" as "the value of

nations, increases in free time proportional to increases in technological automation had rarely eventuated, yet innovations in automation which are economically expedient routinely result in job losses. Commodities which inundate the affluent nations which may be produced by cheap, "off-shore" labour often result in surpluses whilst the sections of the populations of the producing countries may not even have access to basic sanitation. As Marcuse argued, were this artificial suspension of technoscientific development to be lifted, the way could be clear for a materialisation of values and needs which would allow the "free play of thought and imagination" to assume "a rational and directing function in the realization of a pacified existence of man and nature", opening up "a universe of qualitatively different relations between man and man, and man and nature".[80] In other words, the end of technological rationality was available but stymied; its potentials for creating a vision of the liberated society were instead directed toward the perpetuation and stabilisation (i.e.: growth) of consumer-capitalist society.

> Advanced industrial society is approaching the stage where continued progress would demand the radical subversion of the prevailing direction and organization of progress. This stage would be reached when material production (including the necessary services) becomes automated to the extent that all vital needs can be satisfied while necessary labor time is reduced to marginal time. From this point on, technical progress would transcend the realm of necessity, where it served as the instrument of domination and exploitation which thereby limited its rationality; technology would become subject to the free play of faculties in the struggle for the pacification of nature and society.[81]

Even before the evolution of *Homo sapiens,* technics served as a means of "transcending the realm of necessity".[82] Anything from building nests and digging burrows to erecting siege-towers required the manipulation of the environment to some end, whether this end happened to be formed in the mind of the constructor previously or not.[83] Again, in the modern period, Marcuse contended that

everything a person or family owns, minus any debts") 1 percent of the population own 42 percent of the nation's overall wealth. Extending further, the top 10 percent of the population are said to own 93 percent of the nation's overall wealth. See E.N. Wolff, 'Recent trends in household wealth in the United States: Rising debt and the middle class squeeze – an update', *Working Paper* No. 589. (Annandale-on-Hudson, New York: The Levy Economics Institute of Bard College, 2010). See also G.W. Domhoff, *The Power Elite and the State: How Policy Is Made in America,* (New York: Aldine de Gruyter, 1990).

80 Marcuse, *op.cit.* (1964), p. 239.

81 Marcuse, *ibid.* (1964), p. 18.

82 For a recent discussion of this contention in a palaeoanthropological context, see T. Taylor, *The Artificial Ape: How Technology Changed the Course of Human Evolution,* (London: Palgrave-Macmillan, 2010). For an 'existential' anthropological discussion, see J. Ortega y Gasset, (1939), 'Thoughts on Technology' in Mitcham and Mackey, *op.cit.* (1983), pp. 290-313.

83 It should be noted that the implication here – that 'technics' is not merely human activity – is not explicitly made by Marcuse, but accepted in this thesis.

technical capacities had developed to a point at which this ultimate end had become practically realisable. As technoscientific capacities developed and proliferated around the Earth, "the reduction of the required physical energy and its replacement by mental energy" opened up the possibility for the

> ...dematerialization of labor. At the same time, an increasingly automated machine system, no longer used as the system of exploitation, would allow that "distantiation" of the laborer from the instruments of production which Marx foresaw at the end of capitalism: the workers would cease to be the "principal agents" of material production, and become its "supervisors and regulators" - the emergence of a free subject within the realm of necessity.[84]

Instead of being directed toward the "pacification of nature and society", Marcuse contended that the dominant rationality of advanced industrial societies had become "technological", and served as a means of legitimation and control over human and non-human nature.

> Today, domination perpetuates and extends itself not only through technology but *as* technology, and the latter provides the great legitimation of the expanding political power, which absorbs all spheres of culture (…) In this universe, technology also provides the great rationalization of the unfreedom of man and demonstrates the "technical" impossibility of being autonomous, of determining one's own life. For this unfreedom appears neither as irrational nor as political, but rather as *submission* to the technical apparatus which enlarges the comforts of life and increases the productivity of labor. Technological rationality thus protects rather than cancels the legitimacy of domination and the instrumentalist horizon of reason open on a rationally totalitarian society.[85]

Once again, far from offering a dystopian or determinist position on technology, Marcuse's use of the term "submission" shows the extent to which he believed that the mass of individual labourers themselves had been seduced and placated by the "false needs" generated by the overall apparatus. As such, his concept of the end of technological rationality showed his respect and admiration for the potential of science and technics as historically generic capacities in virtue of the prospects they held if allowed free expression. However, and arguably most importantly: along with this was the requirement of widespread and fundamental attitudinal change, or the emergence of a "new

84 Marcuse, *op.cit.* (1969b), p. 49.
85 Marcuse, *op.cit.* (1964), p. 162. (Emphasis added).

sensibility":

> ...a different sensitivity as well as consciousness: men who would speak a different language, have different gestures, follow different impulses; who have developed an instinctual barrier against cruelty, brutality, ugliness.[86]

As he optimistically thought, such change would engender a public mind "physically and mentally incapable of creating another Auschwitz."[87] Hence, Marcuse fell short of placing uncritical faith in technoscientific powers alone. Indeed, he noted is resistance to "all technological fetishism" and "ideas of the future omnipotence of technological man, of a "technological Eros".[88] This caveat appears as a cautionary note to those commentators (amongst which Marcuse includes various "Marxist critics of contemporary industrial society"),[89] who would appear to conflate a pacified existence with an increase in the power of technoscience isolated from a new consciousness or sensibility.[90] Just as technology may be reformed under new incentives, Marcuse believed such a new sensibility would lead to a very different approach to the natural environment. As it will be shown in more detail later, unlike a significant proportion of modern environmental theorists, Marcuse did not have a problem with the idea of human "mastery" over nature, but with the technological *domination* of nature in which it is reduced to mere inert matter and resources. Although, as it will be seen, Marcuse's concept of nature was not without its problems, he reminded that there are two forms of *mastery*: "a repressive and a liberating one."[91] In his view therefore, such concepts as mastery or management do not necessitate or imply domination or voracious, rapine inclinations, but are subject to the particular social *mode* of production under sway.

Once again, Marcuse's discussion of the technological is highly reminiscent of the ontological work on the subject carried out by Heidegger some ten years prior to the publication of *One-Dimensional Man*.[92] Indeed, as Feenberg sees it, the most

> ...important vestige of Heidegger's influence is Marcuse's theory of the two dimensions of

86 Marcuse, *op.cit.* (1969b), p. 21.
87 Marcuse, *op.cit.* (1979), p. 38.
88 Marcuse, *op.cit.* (1964), p. 239.
89 Marcuse, *ibid.* (1964), p. 239.
90 As it will be argued in detail later, this criticism extends to various technological determinists as well as more recent advocates of the so-called "technological singularity". See chapter seven of this thesis.
91 Marcuse, *op.cit.* (1964), p. 240.
92 See Heidegger, (1954), 'The Question Concerning Technology' in *Basic Writings,* edited by D.F. Krell, (New York: Harper & Rowe, 1977), pp. 287-317

> society. Although his presentation of this theory in *One-Dimensional Man* does not reference Heidegger, on examination it reveals a remarkable resemblance to the argument of 'The Question Concerning Technology.' In fact Marcuse sketches a sort of 'history of being' that parallels Heidegger's account in his famous essay.[93]

Marcuse's concept of technological rationality also bears more than a passing resemblance to Heidegger's concept of the "essence" of technology, which the latter names *gestell,* (usually translated as 'framework' or 'enframing'), an all-consuming ordering in which human agents and the natural environment are swept up into the "standing reserve", where they are conceived and treated as resources.[94] As other commentators have taken up these comparisons in detail, they will not be attended to at any length here, suffice to say Feenberg's comment that "Marcuse intended his own 'history of being' as a politically charged alternative to Heidegger's" will be accepted over what follows.[95] Contrary to Heidegger however, Marcuse's critique of the 'relation' of human to technics is arguably far clearer than his former teacher and colleague. For Heidegger, technology appears as a monolithic, apparently autonomous force; as "no mere human doing."[96] For Marcuse, technological rationality describes the growing tendency to construe and intentionally produce social relations, (i.e., relations between individuals, political arrangements, legal and social services, education, and economics) in terms of priorities and values normally ascribed to technical artifacts, hence efficiency, operationalism, and instrumentality, the theoretical background of the physical sciences, and the discourses associated with management and production come to be widely imposed on the lifeworld.[97] As Marcuse wrote, "...when technics becomes the universal form of material production, it circumscribes an entire culture; it projects a historical totality – a 'world'".[98] Through tracing the history of technological rationality to the twentieth century, grounded in his already rigorous critique of consumer capitalism, this concept arguably brings the incentives guiding modern production back into sharp focus by emphasising the extent to which the "new forms of control" were put to work to engender both a one-dimensional individual and society.

> Marcuse shows that the concept of rationalization confounds the control of labor by management with control of nature by technology. The search for control in nature is generic, but management arises only against a specific social background, the capitalist wage system.

93 Feenberg, *op.cit.* (2005), p. 86.
94 See J. Malpas, *Heidegger's Topology: Being, Place, World,* (Boston, MASS: The MIT Press, 2006), p. 209.
95 Feenberg, *op.cit.* (2005), p. 86.
96 Heidegger, *op.cit.* (1954), p. 300.
97 See Marcuse, *op.cit.* (1964), chapter seven.
98 Marcuse, *ibid.* (1964), p. 158.

> Workers have no immediate interest in the output of this system, unlike earlier forms of farm and craft labor, since their wage is not essentially linked to the income of the firm. Control of human beings becomes all important in this context.[99]

Thought broadly, technological rationality consists "in a core set of characteristics that runs through a variety of types of action."[100] For Marcuse, it represents the inherently instrumental values and operating principles which are normally deemed appropriate in the design and function of artifacts, values such as efficiency, order, predictability, reliability, etc. This provides for a generally functionalist or instrumental appraisal of artifacts, the designs of which are ideally aligned to the tasks said artifact was produced to perform: the hammer *to* hammer, the container *to* contain, the refrigerator *to* refrigerate, etc. This does not mention the various ways in which technical artifacts may be turned to alternative uses, perhaps unintended (although perhaps also hoped for, but not envisioned) by the original designers.[101] However, as Marcuse, and other members of the Frankfurt School had critically noted, technological rationality had widened and extended to the social realm, permitting the extension of its characteristic values to the social domains of ideology, culture, the family, etc., amounting to a means of ordering and standardising social relationships and individual behaviours. Hence, the 'second dimension' of rational-critical debate which Marcuse believed formerly served as a means of questioning the given was increasingly obscured. As Marcuse writes, "the decisive point" is that technological rationality

> ...dissolves all actions into a sequence of semi-spontaneous reactions to prescribed mechanical norms—is not only perfectly rational but also perfectly reasonable. All protest is senseless, and the individual who would insist on his freedom of action would become a crank. There is no personal escape from the apparatus which has mechanized and standardized the world. It is a rational apparatus, combining utmost expediency with utmost convenience, saving time and energy, removing waste, adapting all means to the end, anticipating consequences, sustaining calculability and security.[102]

This situation was, Marcuse believed, historically specific as – in reference to his tracing of its

99 Feenberg, 'Subversive Rationalisation', in *Technology and the Politics of Knowledge,* edited by A. Feenberg and A. Hannay, (Indiana: Indiana University Press, 1995), p. 11.

100 L.C. Simpson, 'Technological Rationality', in Olsen *et al, op.cit.* (2009), p. 189.

101 In various "open source" projects, from "homebrew" software programs to mods and other sorts of adaptations, the original design of certain technical artifacts invites users to modify the original design and turn it to other constructive uses. Again, in Marcusean terms, such examples appears to show how the 'technical' both precedes – and may exceed – the 'technological'.

102 Marcuse, *op.cit.* (1941), p. 46.

emergence prior to and after the industrial revolution into the twentieth century – technology decreasingly served democratic or liberating roles in society, but had taken on a controlling, regimenting aspect. More precisely today, it is a force directed under the auspices of profit, rather than satisfying immediate and pressing instrumental needs. Thus, for Marcuse, "technology and technological systems are embedded in a variety of social, political and economic contexts – contexts that ultimately shape the concrete form that material technologies and technological processes will assume."[103] One need not go far to note the extent of technological language in managerial discourse, corporate jargon, and government press releases. For a society supposedly overtly resistant to the objectification or reduction of persons to numbers or statistics, the way workers are stimulated into compliance with pregiven "performance targets", "benchmarks" all aimed at generating "positive outcomes", and the tendency for such "weasel words" to infest everyday speech has never been more prevalent. As Heidegger noted critically, the "...talk of human *resources*, about the *supply* of patients for a clinic" is now so ubiquitous and widely accepted as to be barely noticeable.[104] Friends and acquaintances are referred to as "support networks" or "contacts"; hospital deaths become "negative patient outcomes", and obstacles, difficulties, or barriers are reduced to mere "challenges" to which "solutions" must be attained. Hence, this operationalistic tendency appears as a strong indication of the technologically-rational content of language and speech.[105] Merely anecdotal evidence is sufficient to argue that engaging in such banter is not merely accepted but encouraged as a means of personal and professional legitimation under the current ordering of advanced industrial society. Thus, it can be seen that technological rationality describes a mechanical tendency which serves to administer and order human subjects, bringing their performances, ideas and opinions into productive conformity. Subsequently, many of those aspects of the life-world that are not necessarily amenable to such means of evaluation and quantification – or, those which may be highly resistant to them – came to engender a pervasive value-neutrality, resulting in what Marcuse referred to as "a pattern of mind and behavior which justified and absolved even the most destructive and oppressive features of the enterprise."[106] In the public sphere, this pervasive pretense to impartiality regarding normative claims has arguably had the effect of devaluing and effectively sequestering many forms of discourse and critique that can be routinely countered as *merely* subjective, relative, 'ideological' or reflective of only personal tastes or preferences. Informed or educated judgment, if not consigned to the ever more exclusive

103 Simpson, *op.cit.* (2009), p. 189
104 Heidegger, *op.cit.* (1954), p. 299. (Emphasis added).
105 For a large collection of such terms, see the works or D. Watson, specifically, *Watson's Dictionary of Weasel Words: Contemporary Clichés, Cant and Management Jargon,* (Sydney: Knopf, 2004), and *Bendable Learnings: The Wisdom of Modern Management,* (Sydney: Knopf, 2009).
106 Marcuse, *op.cit.* (1964), p. 149.

and narrow domains of 'experts' and 'specialists', comes to be treated as examples of supposedly fossilized and outmoded 'grand-narrative' approaches to philosophical, historical and other topics, a pervasive attitude that, although welcomed in many academic domains, has had its most powerful pronouncements trickle down into the public sphere as if they were (paradoxically of course) gospel truth. In other words, critique of the current arrangement appears to be reduced *a priori* to the slippery slopes of value preference and personal subjectivity.[107]

Marcuse contended that the predominance of technological rationality arises out of the success of the modern sciences, the quantification and prediction of nature, not through a "specific societal application of the sciences", but from values "inherent in pure science even when no practical purposes were intended:

> The quantification of nature, which led to its explication in terms of mathematical structures, separated reality from all inherent ends and, consequently, separated the true from the good, science from ethics (…) The precarious link between Logos and Eros is broken, and scientific rationality emerges as essentially neutral.[108]

Yet, if technological rationality – in its practical application – aims toward quantifiability, exactness, accuracy and realism, how is it that its social / ideological manifestation appears to represent the very opposite? Put simply, as it carries out its functional role in ordering and engendering human performances, speech and behaviours, other important concerns (ethical, existential, ontological) appear to be conveniently passed over. "Conveniently", because it is most opportune that the sort of deeper questions Marcuse was asking are given license to be left in abeyance. In other words, Marcuse was not simply complaining about the spread of 'scientism' into the life-world or claiming "...that the philosophy of contemporary physics denies or even questions the reality of the external world", instead he is emphasising that "in one way or another, (science) suspends judgment on what reality itself may be, or considers the very question meaningless and unanswerable."[109] This supposed 'impartiality' (which, again, is quite appropriate in "strategic-instrumental" domains), now appears to apply to an increasing list of vital human concerns.[110] Under technological rationality;

107 Arguably, this tendency is most prevalent in the so-called 'postmodern' movement, typified by the ongoing debate between Jürgen Habermas and Jacques Derrida. For an overview, see *The Derrida-Habermas Reader,* edited by L. Thomassen, (Chicago: University of Chicago Press, 2006). For a formidable critique of postmodernism from a Marxian perspective, see A. Callinicos, *Against Postmodernism,* (Cambridge: Polity Press, 1990).

108 Marcuse, *op.cit.* (1964), p. 150.

109 See Marcuse, *ibid.* (1964), pp. 154-155.

110 The term 'strategic-instrumental action / rationality' is owed to J. Habermas, *The Theory of Communicative Action, vol.1: Reason and the Rationalization of Society,* (Boston: Beacon Press, 1984).

positivism came to be practically construed as the domain of *objective* fact,[111] whereas other ideas – values, spirituality, notions of 'the Good'; the concept of substance; etc. were "de-realised";[112] not so much 'disproven' as *excised* from discussion and hence rendered "ideal". As a result, it is unsurprising that they were effectively impotent in their power to critically challenge the socio-political or economic status quo. As Marcuse surmised:

> If the Good and the Beautiful, Peace and Justice cannot be derived either from ontological or scientific-rational conditions, they cannot logically claim universal validity and realization. In terms of scientific reason, they remain matters of preference, and no resuscitation of some kind of Aristotelian or Thomistic philosophy can save the situation, for it is *a priori* refuted by scientific reason. The unscientific character of these ideas fatally weakens the opposition to the established reality; the ideas become mere *ideals,* and their concrete, critical content evaporates into the ethical or metaphysical atmosphere.[113]

It is hardly surprising then, under the current arrangement the idea of an alternative society – one which, (say) was no longer so completely ordered under the auspices of economic growth alone – can seem utopian not merely to the majority of the public, but to the majority of "experts". Questioning the mode of production is therefore easily dismissed; consigned to the same predicament as the 'Good', the 'Beautiful', or the status of a universalisable basis of moral conduct. The most immediate, basic questions confronted by such prospects are stalled by such elementary 'critique' as "who's definition of a better society?", "by what or who's standard is it better?", etc., etc., *ad infinitum.* This is arguably not merely mistaking a lack of answers in practise for a lack of answers in principle, but serves to sideline genuine rational-critical debate of the status quo as a whole. To be sure, the appearance, if not the end of rational-critical debate are tolerated within the one-dimensional society in a manner sufficiently evident on the surface to give the *appearance* of being highly democratic, but on ethical and even certain practical subjects, many important debates seldom reach solutions. For a prominent example of this tendency, consider mass-media's treatment of the 'debate' concerning the theory of anthropogenic climate-change. Whilst the media strive to *appear* to carry out their function in providing an avenue of debate and information, in reality they commonly fall victim to the balance fallacy (otherwise known as the fallacy of false balance), which ensures that – despite the large-majority of the weight of scientific evidence being on one

111 Marcuse cites Herbert Dingler, who wrote that physics "does not measure the objective qualities of the external and material world – these are only the results obtained by the accomplishment of such operations." See Marcuse, *op.cit.* (1964), p. 152.
112 Marcuse, *ibid.* (1964), p. 151.
113 Marcuse, *ibid.* (1964).

side of the theory – the detractors, (incorrectly labelled "sceptics"), enjoy equal airtime to promote their views. However, as an indication of the false balance on this topic, a survey of the abstracts of 928 peer-reviewed articles on 'global climate change' published between 1993 and 2003 in respected scientific journals found that exactly *none* disagreed with the contention that human activities are the primary causes of global warming.[114] In another more recent survey of the opinions of geophysicists and meteorologists, 97 percent agreed that "global average temperatures have increased", with 84 percent saying they believe that human activities are the cause, 65 percent agreeing that television news was "not very" or "not at all" reliable as a source of information on global climate change, and similar figures were reported in regard to its coverage by local newspapers.[115] It seems therefore, that there is significant evidence that the politically-correct imperative to present both sides of the story does not always improve the public's grasp of such important problems, but allows them the false assurance that the decision is, ultimately up to them. However, science is not a democracy. In the particular context of anthropogenic climate change, ignorance is potentially perilous, but appears to be a boon for the continuation of 'business as usual'.

Another possible example of this tendency to resist criticism involves the growing discrepancies between income in the affluent nations (let alone when the average earnings of affluent individuals are compared to 'underdeveloped' nations). Consider the salaries of various CEOs compared with their colleagues.[116] Even despite the Global Financial Crisis of 2008-2009, any hope of reforming such drastic discrepancies seems consigned to theory, one again lubricated by a normative sense of impartiality that rules against one's earnings being open to criticism and scrutiny.[117] Rights tend to exceed and displace responsibilities and obligations; as the super-affluent few defend their "freedom" to continue to improve their credit ratings, those who have no hope of perhaps ever even gaining one languish in powerlessness and obscurity. For Marcuse, this stultification of critique was therefore not merely regrettable, but tragic, as outside the means of verifiability employed by the empirical sciences is an entire world, a world

> ...of values, and values separated out from the objective reality become subjective. The only

114 See N. Oreskes, 'Beyond the Ivory Tower: The Scientific Consensus on Climate Change', in *Science,* vol. 306: 5702 (December, 2004), p. 1686. For an overview of global climate change science and politics, see A.E. Dessler and E.A. Parson, *The Science and Politics of Global Climate Change: A Guide to the Debate,* (Cambridge: Cambridge University Press, 2010) and J. Houghton, *Global Warming: The Complete Briefing,* 4th ed., (Cambridge: Cambridge University Press, 2009).

115 See the summary by S.R. Lichter, 'Climate Scientists Agree on Warming, Disagree on Dangers, and Don't Trust the Media's Coverage of Climate Change', *STATS Survey,* (George Mason University, 2008).

116 See Wolff, *op.cit.* (2010), and Domhoff, *op.cit.* (1990).

117 Ironically, the wages of politicians are not afforded the same level of impartiality.

> way to rescue some abstract and harmless validity for them seems to be a metaphysical sanction (divine and natural law). (…) No matter how much they may be recognized, respected, and sanctified, in their own right, they suffer from being non-objective. But precisely their lack of objectivity makes them into factors of social cohesion. Humanitarian, religious, and moral ideas are only "ideal"; they don't disturb unduly the established way of life, and are not invalidated by the fact that they are contradicted by a behavior dictated by the daily necessities of business and politics.[118]

As such, the critique of modernity mirrors the critique of the modern socio-economic, technological status quo; in effectively disregarding direct answers, encouragement of open-ended toleration and an almost paranoid resistance to notions of absolute truth permeates not only everyday political and social discussion, but also elements of academic, socio-political, philosophical critique. All the while, technological rationality operates and expands happily. As has been argued here, Marcuse shows that this arrangement serves a specific (yet not necessarily conscious) function: as a means of redirecting rational-critical debate away from the many concrete issues of practical and ethical exigency which are unwelcome to those who benefit from the reproduction of the capitalist status quo. Politically, technological rationality is therefore at home in both the traditional political right and left which continue to maintain a charade of fundamental disagreement on certain social issues. It can be described as a "charade" for the reason that neither faction, whether Tory or Labor in the United Kingdom, Republican or Democrat in the United States, or Liberal or Labor in Australia, appear willing to disturb the imperative of perpetual economic growth, but keep it operating in an optimal fashion. This serves as an effective filter to those who may hold such questions to be of the utmost import. In accord with the cosmeticist faith – all problems or contradictions are cast as as merely challenges to be solved by increases in efficiency or funding.[119] Indeed, potential interference in this almost religious techno-economic faith may not only count as risks to growth but risk to votes, hence it could only be rational to place one's political reliance in an ethos that could not only offer quantification, calculation, prediction and measurement on the one hand; the victory of Logos over Eros *and* Mythos, but had also proven itself in bringing about vast increases in levels of affluence visible in the advanced industrial nations of the present day. Here was a system that – quite simply, visibly, *worked*; hence, any questioning of its tendencies that do gain

118 Marcuse, *op.cit.* (1964), p. 151.

119 For alternative approaches which lead to very similar conclusions as Marcuse, see N. Postman, *Technopoly: The Surrender of Culture to Technology,* (New York: Vintage, 1993); see L. Winner, 'Techné and Politeia: The Technical Constitution of Society', in *Controlling Technology: Contemporary Issues,* (New York: Prometheus Books, 1991), pp. 291-303. The term 'cosmeticism' is owed to W.R. Catton Jr., *Overshoot: The Ecological Basis of Revolutionary Change,* (Chicago: University of Illinois Press, 1982).

any prominence are easily dismissed as criticisms of "progress". Given this situation, the reasons as to why Marcuse's critique quickly diminished in popularity soon after his death are arguably implicit in his own work: under the current condition of technological rationality, the object of the second dimension of critical reason is suspended and "made into a methodological principle" that guards against such 'utopian' critiques as Marcuse's own. He expands on the implications as follows:

> ...this suspension has a twofold consequence: (a) it strengthens the shift of theoretical emphasis from the metaphysical "what is …?" to the functional "How...?", and (b) it establishes a practical (though by no means absolute) certainty which, in its operations with matter, is with good conscience free from commitment to any substance outside the operational context (…) To the degree to which this conception becomes applicable and effective in reality, the latter is approached as a (hypothetical) system of instrumentalities; the metaphysical "being-as-such" gives way to "being-instrument." Moreover, proved in its effectiveness, this conception works as an *a priori* – it determines experience, it *projects* the direction of the transformation of nature, it organizes the whole.[120]

For philosophers of technology still debating whether technology can be understood as applied science, Marcuse arguably shows that science and technics are increasingly oriented toward exchange value rather than use value.[121] Science and technology come to increasingly rely on each other, but the horizon of neutrality in the scientific domain has now extended into the "essential neutrality of technics."[122] What is deemed reasonable, valuable, interesting or otherwise worthwhile to pursue scientifically comes to be ever-more determined by what can be *derived* from it which may lead to sources of profit. Even experimental research is ultimately contingent on economic rationality; whether it can "deliver the goods" or at least stand a good chance of accidentally revealing some discovery that may.[123] Once cast as an independent search for knowledge which was considered valuable in itself, technological rationality and economic expediency have integrated

120 Marcuse, *op.cit.* (1964), p. 155.

121 The view of technology as applied science was noted early by Francis Bacon, who argued that the purpose of the human sciences is to reveal "Knowledge of Causes, and Secrett Motions of Things; and the Englarging of the bounds of Humane Empire, to the Effecting of all Things possible". The purpose of knowledge was that it formed the means to which this end could be sought, and was to be embodied in technics. See F. Bacon, (1627), 'On the Idols and on the Scientific Study of Nature', excerpt from his *New Atlantis: Or, Voyage to the Land of the Rosicrucians,* in Scharff and Dusek, (eds.), *op.cit.* (2005), p. 31. For a more recent discussion of technology as applied science, see M. Bunge, 'The Philosophical Richness of Technology', in *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association,* 2 (1976), pp. 153-172. On the topic in general, see R.C. Scharff, 'Technology as Applied Science' in Olsen, *et al,* (eds.), *op.cit.* (2009), pp. 160-164.

122 Marcuse, *op.cit.* (1964), p. 158.

123 Marcuse, *ibid.* (1964), p. 46,

much scientific work into the technological mode of production, and consigned many of the hours once spent in the field to filling out grant applications. As Marcuse explained, without reducing the scientific enterprise entirely to the status of a tool of profit-making, he emphasised the extent to which an "instrumentalist *horizon"* in the sense of an *"a priori* 'intuition' or apprehension" had come to preface and pre-define much of the work it carries out.[124] Although science has been focused on here, arguably similar critiques may be leveled in regard to technological rationality's colonisation of education, medicine, social work, the arts and entertainment industries, and even "free time", which becomes "directed leisure".[125] Once again, just as the nature of capitalism is to absorb and sell anything deemed potentially profitable, the nature of technological rationality is to make use of whatever it touches; its essence: "...to compel the qualitative to become the quantitative."[126] Under the guiding direction of the former, the latter comes to be propelled by a singular incentive, amounting to a highly efficient, yet also often highly risky or even destructive pairing of mutual benefit.[127] Even previously non-technological, or even anti-technological domains come to be defined and evaluated primarily on the basis of their instrumental / economic potential, and thus function to sell or reaffirm the status quo. For this to be possible, traditional production must be accompanied by an 'ideological' extra productive aspect: in short, the values driving traditional production must be extended from their *technical* instantiations to the social domain. With the success of capitalism, the global increase of trade, commerce and communication, Marcuse contended that technological rationality had increasingly replaced the role previously held by agents of authority, but instead of being turned to alleviating the "struggle for existence",[128] humanity's augmentative powers were now used to bolster and rigidify the age-old struggle of competition and commerce;

> In the social reality, despite all change, the domination of man by man is still the historical continuum that links pre-technological and technological Reason. However, the society which projects and undertakes the technological transformation of nature alters the base of domination by gradually replacing personal dependence (of the slave on the master, the serf

124 Marcuse, *ibid.* (1964), p. 160.

125 Marcuse, *op.cit.* (1979), p. 35. Despite increases in affluence, rates of work and overtime in many affluent nations continues to grow. See for example, C. Hamilton & R. Denniss, *Affluenza: When too Much is Never Enough,* (Sydney: Allen & Unwin, 2005), p. 5.

126 See J. Wilkinson, 'Translator's Preface' to Ellul, *op.cit.* (1964), p.xvi.

127 On the potential existential risks posed by modern technoscience, see N. Bostrom, 'Existential Risks: Analysing Human Extinction Scenarios and Related Hazards', in *The Journal of Evolution and Technology,* vol.9, no.1, (2002); *Global Catastrophic Risks,* edited by N. Bostrom and M.M. Ćirković, (Oxford: Oxford University Press, 2008); M. Rees, *Our Final Century?* (London: Vintage, 2004); J. Leslie, *The End of the World: The Science and Ethics of Human Extinction,* (London: Routledge, 1996) and R. Posner, *Catastrophe: Risk and Response,* (Oxford: Oxford University Press, 2008).

128 Marcuse, *op.cit.* (1964), p. 148.

> on the lord of the manor, the lord on the donor of the fief, etc.) with dependence on an "objective order of things" (on economic laws, the market, etc.).[129]

Under the "matter-of-factness" conferred by technological rationality,[130] the values of individual reason that had formed the second, critical dimension of society therefore came to be suppressed and redirected toward profitable production, uniformity of interest, and "rationalisation".[131] Those actions, behaviours, attitudes or technological artifacts that are obviously not counter-productive to the prevailing incentives are obviously endorsed and often drawn into it for productive purposes; but often so are those that may appear to be resistant, or even antithetical to the status quo. If not, they arguably tend to be ignored, undermined, rendered obsolete, dismissed as 'utopian', counter-productive or merely preferential. In short, technological rationality productively appropriates whatever can be deemed of use to its somewhat limited scope of evaluation, liquidating

> ...all reference to essence and potentiality. It aims at classification, quantification, and control. It admits no tension between true and false being and makes no distinction between preferences and potentialities. The empirically observed thing is the only reality and truth and falsehood apply only to propositions about it. (…) Modern reason flattens out the difference between the essential potentialities of things and merely subjective desires. It declares its "neutrality" over against the essences which govern the earlier *technai.* Arbitrarily chosen values are placed on the same plane as essences and no ontological or normative privilege attaches to the latter. It is this abstention from essentializing that gives modern reason its peculiar positivist self-understanding as purified of social influences.[132]

As economic growth informs and motivates technical advance and proliferation, the latter tends to unfurl in a manner largely unfettered by social or philosophical critique, and as was noted previously, mainstream politics appears to be of little help due to its own overtly declared adherence to the growth imperative. The final alternative for Marcuse was therefore to appeal to people's attitudes and sensibilities. If change could be affected in this domain, the potential could be opened up for a new kind of society coupled with a new approach to the natural environment. If liberated from its current direction:

---

129 Marcuse, *ibid.* (1964), p. 147.
130 The phrase "matter-of-factness" is once again owed to Lewis Mumford. See his 1934 book, *Technics and Civilization,* (New York: Harcourt, Brace & World, 1963).
131 For his opinions on Weberian social theory and the concept of rationalisation, see Marcuse, *op.cit.* (1969a).
132 Feenberg, *op.cit.* (2005), p. 87.

> ...technical experimentation, science and technology would and could become a play with the hitherto hidden – methodically hidden and blocked – potentialities of men and things, society and nature (…) This means one of the oldest dreams of all radical theory and practice. It means that the creative imagination, and not only the rationality of the performance principle, would become a productive force applied to the transformation of the social and natural universe. It would mean the emergence of a form of reality which is the work and the medium of developing sensibility and sensitivity of man.[133]

To summarise what has been said thus far, it may be helpful to point out what Marcuse was not saying. Firstly, although his critical-social theory was radical by today's standards, labelling him a utopian thinker is arguably an exaggeration. As Andrew Feenberg explains, the radical nature of Marcuse's philosophical approach should not be surprising given he was imagining how modern society may "appear to a backward glance rooted in the wider context of values evolved over past centuries and destined to achieve realisation in future ones."[134] In other words, if a time-traveller from a century ago were to travel to the affluent societies of the early twenty-first century, she would likely be impressed by the average living conditions she witnessed, the diversity of foodstuffs and gadgets, the innovative medical techniques, and so on. By analogy, Marcuse was hoping the same could be said of civilisation a century from today. Of course, much would have to changed: the forces arrayed against qualitative change were and are considerable, the means and relations of production appear as "one-dimensional" as they were when Marcuse was attending to them, and the now almost singular emphasis on perpetual economic growth on the part of governments, corporations, as well as the wider public is arguably stronger than ever.[135] Under the current arrangement, technical and scientific potential is turned toward the incentives of power, control and the profit of these "vested interests", (as Marcuse defined them: "hierarchical private bureaucracies that enforce division"), and away from the democratisation of functions that technological rationality – taken to its logical end – appears to affirm.[136] However, this arrangement is now no longer stultifying for the project of social / individual liberation, rather, the perpetual reproduction of the capitalist status quo now arguably threatens the environmental basis which forms the precondition of social flourishing *per se.* Secondly, Marcuse was neither calling for reductions in material affluence or "work", on the contrary, he was tracing the possibilities for creative work, beyond the "realm of necessity" which advancing techniques such as automation also

133 Marcuse, *op.cit.* (1967b), p. 83.
134 See Feenberg's comment in Marcuse, *op.cit.* (1979), p. 40.
135 See the subsequent chapter.
136 See Marcuse, *op.cit.* (1941a), p. 152.

appear to affirm:

> ...to make the work is necessary, and will remain necessary, but it will be a very different kind of work. What is no longer necessary is that the human organism as a whole is mainly an instrument of toil (I don't say work). The technical term is alienated work. Pleasure is relegated to marginal hours of the day, or of the night. This in my view is a perversion of the human being itself. Nothing in the human being says that it has to be this way. And to the degree to which society succeeds in abolishing scarcity – to the degree to which society actually succeeds in utilizing and distributing the available resources according to the needs of all citizens – that is to say, primarily the abolition of misery, poverty, oppression, whatever it is, to that degree this perversion in human existence can be remedied.[137]

Marcuse's approach hence also rules out simplistic reductions that would pit the individual against 'the system', or free agents against an oppressive, deterministic technological edifice. Rather, Marcuse argued that technics and humanity both come to be subject to a deeper set of incentives that increasing numbers – despite having little choice but to participate within them – also feel quite free and happy to take on for understandable reasons. As a result, for most individuals the grounds of revolutionary class-consciousness are hardly ruled out on the basis of an iron fist, but are ameliorated and pacified, rendered largely irrelevant, and to varying extents, the entire mass of society finds itself labouring to reproduce the necessary conditions of the renewal of capitalism. The individual is not simply placated, numbed "brainwashed" by a cold, calculating system that lies in opposition to her wants and interests – on the contrary – it is the predominant source of her wants and interests. The one-dimensional individual is not merely distracted or somnambulated by her increased capacity to purchase surplus commodities, even though she may be dazzled by the prospect. Rather, the "one-dimensional existence" is one that is manufactured, as well as agreed and consented to – even viscerally defended – by the society at large who tend to view it as the only option.[138] Such a situation requires technological rationality to become operative at the level of the actual goals, attitudes and aspirations of individuals themselves, rather than serving as merely the physical means by which regimentation is enacted. In other words, technological rationality and the technological mode of production denote the production of both artifacts and social attitudes, hence, in any epoch, let alone the modern one, the philosophy of technology must not be isolated to the discussion of technical artifacts alone. One cannot ignore the incentives guiding production without

137 Marcuse, *op.cit.* (1979), p. 30.
138 See Ocay, *op.cit.* (2010), p. 61.

acknowledging both the base-level human interests that guide it, and specifically, the distinctly human monetary incentives which play such formative roles both in their social relations and productive performances. Marcuse's social critique is therefore offering a significantly more diverse basis upon which the role of modern technology in the advanced industrial society can be criticised than many other thinkers who place the source of social problems in such domains as the diminution of the influence of religion, the 'breakdown' of the family, the advent of 'mass-society', urbanisation, the rising influence of the media, or the growth of corporatism. To the extent that these factors exist and are in play, they do not get to the root of the problem. As Marcuse wrote:

> ...an entire dimension of human reality finds itself suppressed: the dimension which permits individuals and classes to develop a theory and a practice of transcendence (*dépassement*) and to envisage the 'determinate negation' of their society. Radical critique and effective opposition (intellectual as well as political) finds itself from now on integrated into the status quo; human existence becomes 'one-dimensional'. Such an integration cannot be explained solely by the emergence of *mass culture,* the *organization man,* or the *Hidden Persuaders,* etc.; these notions belong to a purely ideological interpretation which neglects the analysis of fundamental processes: processes which undermine the base upon which the radical opposition could develop.[139]

If Marcuse's critique is sound, under technological rationality, the one-dimensional society represents the success of an effort to impose the methods of production on the society itself; individuals literally become objects of a colossal “engineering project”. The individual is sufficiently shaped and molded so as to emerge as a receptive and amenable operant / participant in the technical system as a whole where she takes on her role as a consumer / producer. To reiterate: this is not always against her will, but is conducted in such a manner as to cultivate her willingness to exchange her labour for material rewards gained from productive activity and to make her sufficiently gratified by the yearns and desires collective labour itself contrives to generate. Such a one-dimensional existence, a rationality that appears thoroughly focused on the hedonic treadmill of self-gratification, instrumental reason, ethical relativism and hyper materialism, and whose hopes for the future include merely elevated levels of the same, appears to represent a significant obstacle for a turn toward Marcusean qualitative change, let alone the necessary goal of living in accord with the carrying capacity of the Earth.

139 Marcuse, 'De l'ontologie à la technologie: les tendences de la société industrielle' *Arguments,* 4, no. 18 (1960), cited in Kellner, *op.cit.* (1984), p. 239.

In accord with the aforementioned bipolarity or multidimensional nature of his critical-social theory, the veracity of Marcuse's criticism of technological rationality can be seen as inversely proportional to the extent to which it cancelled out the very hopes of the latent prospects it itself projects for the human future. The promise of technology is therefore betrayed and undermined by the domination of economic incentives which are one step removed from praxis. Rather than being turned toward the goals of a "free human realisation" in which humanity could transcend the "hard struggle for life, business and power",[140] releasing "individual energy into a yet uncharted realm of freedom beyond necessity", the promise and potential offered by the end of technological rationality is closed off, with technics being turned to ever more efficient exploitation of the natural environment, and in the social realm, becoming a system of mass psycho-social control. Were the overall direction of production to alter, to be allowed "free expression", the individual

> …would be liberated from the work world's imposing upon him alien needs and alien possibilities. The individual would be free to exert autonomy over a life that would be his own. If the productive apparatus could be organized and directed toward the satisfaction of vital needs, its control might well be centralized; such control would not prevent individual autonomy, but render it possible in actual fact, however, the contrary trend operates: instead of fulfilling the individual's natural requirements for autonomy, the individual is drafted into the service of the system as a constituent.[141]

Whether more individual autonomy rather than less will provide an answer to many of the environmental questions humanity now faces in regard to its technological 'experiment' appears to be an open question, but today, it is one that demands concrete, concerted action before the luxury of the possibility of voluntary action dwindles further. In this context, it is arguably on this point that Marcuse's contentions are at their darkest, as the one-dimensional individual has become so accommodated into believing that capitalism is not just superior to alternative configurations of society, so 'natural' as to be 'second-nature', but that it is the sole contender. Alternatives are greeted not just with ambivalence or disinterest as such, rather, one-dimensional society is scarcely capable of envisioning the need for them. As Marcuse noted, "today, the prevailing type of individual is no longer capable of seizing the fateful moment which constitutes his freedom. He has changed his function; from a unit of resistance and autonomy, he has passed to one of ductility and

140 Marcuse, *op.cit.* (1941), p. 160.
141 Marcuse, *op.cit.* (1964), p. 5.

adjustment".[142] Hence, if Marcuse's impressions of the one-dimensional society are at all accurate, it appears that the likelihood of qualitative change is inversely proportional to efforts placed upon containing just this possibility, and as we have seen, the efforts are considerable; spanning almost all sectors of individual social and work life as well government and the wider community. The uncritical matter of factness afforded to the status quo, (continual growth in population, affluence and consumption), appear firmly set in, but they are occurring at the precise moment at which the exploitative power of the means of production are at their apex, a "tipping point" at which the finitude of the planetary "resource base" has never been clearer, and from which much of the low-hanging fruit has already been located and plucked.[143] Unless the contingency the technological mode of production places on the notion of perpetual growth is earnestly reassessed, sooner or later, a very different sort of socialism than that advocated by Marcuse looms as a potential future for global civilisation. Hence, voluntary adaptive and mitigative action – no matter how difficult – appears far preferable to a world in which first-nature once again assumes the commanding status it had for the vast majority of *H. sapiens'* evolutionary development.

142 Marcuse, *ibid.* (1964), p. 152.

143 See for example, R. Heinberg, *The End of Growth: Adapting to our New Economic Reality,* (Gabriola Island: New Society Publishers, 2011). On the oil crisis, see M. Yeomans, *Oil,* (New York: The Free Press, 2005); R. Heinberg, *The Party's Over: Oil, War, and the Fate of Industrial Society,* 2nd ed., (Forest Row: Claireview Books, 2005); and P. Tertzakian, *A Thousand Barrels a Second: The Coming Oil Break Point and the Challenges Facing an Energy Dependent World,* (New York: McGraw-Hill, 2007).

Chapter 4

Marcuse on the Contradictions of Perpetual Growth

> For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it?[1]

This chapter will suggest that Marcuse's philosophy of technology can be applied to modern environmental and politico-economic concerns. Rather than dismissing his call for qualitative social change as utopian or continuing to emphasise his critique of capitalism, it will be argued that environmental problems emerging from the current direction of technological development under an imperative of perpetual growth instead lends some support for his call for significant "qualitative change".

Marcuse's critique of the current politico-economic status quo was conducted from the vantage point of a hypothetical liberated future society in which technology had been directed to its appropriate ends. These 'ends' consisted in directing technological powers to the construction of an individual liberated from what Marcuse considered were the stultifying effects of the affluent society. As Marcuse contended, the question for social theory asks "how can (these) resources be used for the optimal development and satisfaction of individual needs and faculties with a minimum amount of toil or misery?"[2] Although there is little doubt that he was staunchly critical of capitalism in almost all respects, his critique was not based in a specifically economic context. As a philosopher of concrete praxis, he was concerned with broader *meta*-economic contradictions he believed had arisen in affluent, consumer capitalist nation states as a result of a collective *misdirection* of technological development. In making his case, Marcuse outlined what he took to be a number of contradictions which had arisen not through an excess of materialism, nor through

1 St. Luke, chapter 14, v.28.
2 Marcuse, (1964), 'The Paralysis of Criticism: Society Without Opposition', Introduction to the first edition of *One-Dimensional Man,* (New York: Routledge, 2004), p. xli.

the auspices of a seemingly autonomous Orwellian technological order, but from the 'artificial' suspension and misdirection of technical capacities away from extending and augmenting human powers to a system of regulation and conformity which hindered their expression. Marcuse outlined some of these contradictions as follows:

> The union of growing productivity and growing destruction; the brinkmanship of annihilation; the surrender of thought, hope, and fear to the decisions of the powers that be; the preservation of misery in the face of unprecedented wealth constitute the most impartial indictment – even if they are not the *raison d'être* of this society but only its by product: its sweeping rationality, which propels efficiency and growth, is itself irrational.[3]

For Marcuse, technology had become a means of mass social organisation and control; instead of using the saved labour time made possible through advances in automation with more 'free' time, increasing levels of productivity and efficiency were channelled into the production of surplus products which – for Marcuse – represented "false needs"; false in that they were deceptively marketed, sold, and taken on as necessities. The implications of Marcuse's indictment are considerable: if it is the case that "...the continued acceptance of domination no longer prevailed, that scarcity and the need for toil were only 'artificially' perpetuated – in the interests of preserving the system of domination",[4] the benefits of technical and scientific progress were at best hindered, or at worst canceled. As he wrote: "It has frequently been stressed that scientific discoveries and inventions are shelved as soon as they seem to interfere with the requirements of profitable marketing. The necessity which is the mother of inventions is to a great extent the necessity of maintaining and expanding the apparatus."[5] Marcuse then echoes Thorstein Veblen's claim that in such a monopolistic system, driven by the competitive urge to keep up with innovation or perish, "invention is the mother of necessity."[6] This contention can be strengthened when one considers the establishment's attitude toward recent innovations such as the internet. For example, the greatly increased possibility of sharing and acquiring information have – to say the least – hardly been greeted with enthusiasm by defenders of copyright laws, intellectual property, or traditional exchange relations. Indeed, from the perspective of mainstream legal, political and economic discourse, these new capacities are commonly denounced as thievery, or more specifically "piracy". This is not to argue of course that all technical innovations should automatically be made available

3 Marcuse, *ibid.* (1964), pp. xliii-xliv.
4 Marcuse, 'Political Preface' to *Eros and Civilization,* (Boston: Beacon Press, 1955), p. 11.
5 Marcuse, (1941), 'Some Social Implications of Modern Technology', in D. Kellner (ed.), *Technology, War and Fascism: The Collected Papers of Herbert Marcuse,* (New York: Routledge, 1998). p. 46.
6 Marcuse, *ibid*. (1941).

to the public; however, it arguably bears out Marcuse's contention. Yet despite its radical nature, Marcuse based it chiefly on a relatively conservative understanding of the appropriate role of technology, one that most would likely accept.

For Marcuse, however it may come to be defined, technics is an *augmentative* phenomenon. Conventional and 'common sense' understanding views technical artifacts as opening up the potential of new capacities or to make other tasks easier, more accurate, manageable, productive, etc. They provide extensions or prostheses to human (and indeed, to non-human) sensory and physiological capacities and their advance and innovation adds to this process, accelerating levels of efficiency in pre-existing tasks and revealing further avenues of instrumental potential. In short, the question of human progress in terms of our moral conduct may at least be debateable, however – for better or worse – there can be little doubting the rate of technical and scientific progress in the modern period. As efficiency levels rise and capacities increase related potentials emerge: one the one hand, such advances imply that the requirement of labour under necessity may diminish, freeing up time for workers to be spent pursuing their own interests aside from the differed incentive of earning a wage. Commenting on some passages from Lionel Stoleru, André Gorz wrote:

> Stoleru, by contrast with the majority of political leaders and apologists for the employers, admits that the current technical changes save on working hours *across the whole of society* and not just on the scale of particular enterprises: they allow more and better production using fewer working hours and less capital; they allow not only wage costs to be reduced but also costs in capital per unit produced. Computerization and robotization have, then, an economic rationality, which is characterized precisely by the desire to *economize,* that is, to use the factors of production as efficiently as possible (...) From the point of view of economic rationality, the working time saved across the whole of society, thanks to the increasing efficiency of the means used, constitutes working time made available for the production of additional wealth.[7]

The stakes have risen considerably since Marcuse's time, and it is now no longer only the 'artificial' plight of the worker under the technologically rational, one-dimensional ordering of the politico-economic status quo that is in question, but the entropy defying nature of the global productive system as a whole which looms as a threat. In short, a mode of production that resists acknowledging limitations and seeks only growth – if left unfettered – will eventually reach the

7 A. Gorz, *Critique of Economic Reason,* 2nd ed., (London: Verso, 1989), pp. 2-3.

limits of its resource base. This entails that the question concerning technology is now *existential* rather than only political, economic, or philosophical. In short, the conditions for liberation from necessary labour consist in the extent to which technological innovation and the social ordering had rendered the need for it obsolete, and as was noted previously, Marcuse believed sufficient levels of innovation for such changes had been reached by the mid-twentieth century.[8] In this manner, Marcuse and Gorz were repeating the calls of earlier libertarian socialists such as William Morris who distinguished "useful work" from "useless toil".[9] Bertrand Russell summarised the position in 1935:

> Modern methods of production have given us the possibility of ease and security for all; we have chosen, instead, to have overwork for some and starvation for the others. Hitherto we have continued to be as energetic as we were before there were machines; in this we have been foolish, but there is no reason to go on being foolish for ever.[10]

Arguably by most indications, the path that Russell described as "foolish" continues to be enacted and pursued in earnest today. Yet further compounding the situation is a certain externality that neither Russell nor Marcuse could likely have predicted would appear on the horizon so soon: ecological overshoot. Today, problems such as anthropogenic climate change, decreasing supplies of easily accessible fresh water, as well as a number of less well-known 'exotic' threats emerging from technology itself have – for certain thinkers – rationalised placing it in the category of prominent existential risks.[11] Hence, rather than a set of tools utilised to further human flourishing and security, there appear to be mounting reasons to conclude the overall direction of modern technology and production could pose a significant threat to these very prospects. At the very least, this echoes Marcuse's contention that modern technology – at least in terms of its environmental implications – is a historically unprecedented event. It is also arguably this particular situation which most strongly shows the folly of investigating technics 'in itself', as if it could be detached from the various interests which animate and direct it and the implications – both intended and

8 "Man's liberation from domination and exploitation (...) has failed to materialized although the historical conditions for its realization have been attained". See Marcuse, 'Some Remarks on Aragon: Art and Politics in the Totalitarian Era', in Kellner, *op.cit.* (1998), p. 201.

9 See W. Morris, (1884), *Useful Work versus Useless Toil,* (London: Penguin, 2009).

10 B. Russell, (1935), *In Praise of Idleness,* (London: Routledge, 2006), p. 15.

11 Although academic discussion of existential risks remains somewhat isolated, it is generally concluded by various experts in the field that anthropogenic (i.e. technological) risks are at least equal to – or outweigh – known 'natural' threats. Once again, see N. Bostrom, 'Existential Risks: Analysing Human Extinction Scenarios and Related Hazards', in *The Journal of Evolution and Technology,* vol. 9, no.1, (2002); M. Rees, *Our Final Century?* (London: Vintage, 2004); R. Posner, *Catastrophe: Risk and Response,* (Oxford: Oxford University Press, 2004); and volume edited by Bostrom and M.M. Ćirković, *Global Catastrophic Risks*, (Oxford: Oxford University Press, 2008). See also J. Leslie, *The End of the World: The Science and Ethics of Human Extinction,* (London: Routledge, 1996).

unintended – of its subsequent proliferation.

Even if technical solutions are available which could allow certain persistent problems to be overcome, other factors can hinder or stall action. To take a well-known example often mentioned by Marcuse, if various experts are to be believed, solving the problem of world hunger is *technically* feasible but has not yet eventuated due to a diverse variety of other factors; political, social, economic, etc.[12] Likewise, even if the effects of climate change appear to be locked in, a great deal of work *could* be done – far more than is being conducted at present – to either adapt, prepare or work to minimise its potential effects. Again, neither technical capacities, nor a lack of information is the problem in this context, but a diverse array of competing and often oppositional interests, many of which it must be said are driven by pecuniary interests. For this reason, and despite the enormity of the task, Marcuse resisted the tendency to abstract technology from its complex and diverse interconnections; for him, the question concerning technology cannot be confined to technics itself, for this would require isolating it from both the incentives and implications which are always already active in the artifacts themselves as well as their performance and function.

Although necessarily technically embodied, arguably, the chief incentive of modern technological advance and development is not technical, but economic. Can it be doubted that few technical projects – either large or small-scale – escape the mediation of money and are created for purely technical reasons, which is to say, in and of themselves? Although the majority of Marcuse's work was spent broadly criticising the influence of capitalism on the individual and nation state and only dealt with economic growth in passing, his views of technology remain especially relevant in the current environmental context, where apparently decreasingly few critics and philosophers of technology address the role of profit making in technological mediation. Hence, assessing the primary interests and incentives fuelling and guiding technology in the advanced industrial nations (as well as developing nations) becomes crucial to the philosophy of technology, and it is the central claim of this thesis that Marcuse's work can be read not merely as a critique of capitalism or technology, but of its combination driven by an imperative of perpetual growth. Two related contentions which emerge from this conjecture will be dealt with here:

12 Jon Foley, head of the University of Minnesota's Institute on the Environment claims that solving world hunger is technically feasible, "but not with business as usual." See B. Walsh, 'Feeding the Planet Without Destroying It', *Time,* May 22, 2012. One official from the United Nations Food and Agriculture Organisation (FAO) went further, saying that it is "easily possible", but falls into the trap of contending it will result from technological 'silver bullet solutions' in order to do so. See the editorial in *Nature,* vol. 466, issue 7306, (July, 2010), pp. 531-532.

1. The environmental implications of technology driven by the growth imperative;
2. The philosophical / existential implications of the prioritisation of exchange value at the expense of use-value.

The allocation of profit-making as the central engine guiding and motivating technical mediation ought be regarded with a considerable degree of scepticism borne out of caution in regard to its current and potential environmental implications. As the evidence of the side-effects of industrial pollution, global climate change, ocean acidification, species extinction, etc. become more evident by the day, affording a proportionate level of caution in regard to technological development would appear to be sound, yet the prioritisation of economic growth (coupled with technological expansion) remains firmly fixed in the minds and words of dominant political and economic interests. Indeed, faith in the ideology and practise of perpetual economic growth (henceforth: 'the growth imperative') is evident not only in the realm of trade, business and government, but at the level of individuals and family groups for whom the Good Life remains contingent on increases in discretionary income. Despite the seemingly obvious entropic contradiction evident in the arrangement of a bottomless convention applied to technical mediation in a finite resource environment, "growth has become the recognised political responsibility of governments throughout the capitalist world".[13]

Marcuse's approach echoes Marx's distinction between use value and exchange value, and from this perspective, it can be seen that technics decreasingly proliferate out of the need to satisfy the former rather than the latter. As was noted above, its is naive to consider that technical production is no longer carried out as it long was: by contriving a technical solution to a given problem. Rather, the solution must also be affordable and profitable which transforms the technical artifact into a *commodity*. Indeed, the converse also often occurs; that is, a certain innovations or products will emerge which may have a profitable function assuming a technical problem can be invented which it can address. To be sure, Marcuse was not directly criticising the practise of money-making, however, the his critical-social theory contains an implicit critique of the narrowness of economic

13 R. Heilbroner, (1953), *The Worldly Philosophers,* New Ed, (London: Penguin, 1980). It should be noted that the growth imperative is not necessarily restricted to capitalism. The Australian economist, Clive Hamilton, summarises the modern role of growth in modern politico-economic circles: Nothing more preoccupies the modern political process than economic growth. As never before, it is the touchstone of policy success. Countries rate their progress against others by their income per person, which can rise only through faster growth. High growth is a cause of national pride; low growth attracts accusations of incompetience in the case of rich countries and pity in the case of poor countries. A country that experiences a period of low growth rates goes through an agony of national soul-searching, in which pundits of the left and right expostulate about 'where we went wrong' and whether there is some fault in the national character. See Hamilton, *Growth Fetish,* (Sydney, Allen and Unwin, 2003), p. 1.

reason and profit making when viewed in an environmental context. Whilst a summary history of philosophical, religious and other critiques of money-making are beyond the scope of this thesis, a couple of brief points bear mentioning.

It barely need be stated that technology and economics depend entirely on the environmental base from which they are ultimately derived and in which they are put to work, yet in one of the more salient examples of "irrational rationality", this contingency relation appears to have been reversed in practice and smoothed over with ambiguous terms and catchphrases designed to offer 'solutions' (i.e., compromises) between economic and environmental interests.[14] For example, the term 'development' is now usually prefaced by the term 'sustainable', although whether this refers to economic or environmental sustainability seems an open question. Secondly, and this is once again a conservative point that will be returned to below, technological deployment, production and economic growth are inextricably interrelated. Hence, if it is the case that the limitless status of money and profit making form the primary incentives of technical mediation then this arrangement becomes questionable on the basis that – sooner or later, (and arguably already) – many such limits are beginning to be reached.[15] Despite this knowledge being all the more evident today, defenders of perpetual growth cite the human capacity for invention and innovation which, on the surface is an appealing formula easily lent to a feeling of optimism on the part of its adherents. However, given the majority of the population of the planet understandably aspire to even a fraction of the continually escalating 'standards' set by the affluent nations, the level of innovation required to cater to such a population (whose appetites, if the affluent West is any indication would hardly be static) would appear to require little short of a second agricultural revolution. This also sets up a seemingly paradoxical contention which claims that the problems caused by the 'inappropriate use' of technology can be simply rectified by using it 'appropriately'...

> In the absence of an ethical imperative, environmentalism has been reduced to a technological fix, and as with all technological fixes, solutions are seen to lie once more in the hands of manager technocrats. Economic growth, propelled by intensive technology and fuelled by an

14 As the naturalist, John Livingston wrote: The words may change, but the message is constant. 'Resource management,' of course, is now a centenarian; of more recent arrival was 'resource development.' This soon mutated into the lunatic term 'ecodevelopment', (...) at roughly the same time we had 'appropriate technology,' which was perilously close to being internally contradictory. At the present moment we have 'sustainable development,' a full-blown oxymoron. What these slogans seem to say is 'How to plunder nature and get away with it.' See J. Livingston, *Rogue Primate,* (Ontario: Key Porter Books, 1994), p. 60.

15 Of course, whilst off-planet based resources cannot be entirely ruled out, given the money required to bring (say) Space-Based Solar Power or expeditions to nearby asteroids and planetary bodies online, it should be said placing hopes that such prospects could significantly offset current energy requirements appears radically incautious.

> excessive exploitation of nature, was once viewed as a major factor in environmental degradation; it has suddenly been given the central role in solving the environmental crisis.[16]

As with technological innovation, economic growth is also regularly cited as a cure all:

> The answer to almost every problem is 'more economic growth'. Unemployment is rife: only growth can create jobs. Schools and hospitals are underfunded: growth will improve the budget. Protection of the environment is unaffordable: the solution is growth. Poverty is entrenched: growth will rescue the poor. Income distribution is unequal: growth will make everyone better off.[17]

Unlike various other philosophers who have dealt with technology, Marcuse always acknowledged its intertwinement with economics. Efficiency could not merely be understood as technical efficiency, but economic efficiency; technological rationality was also economic rationality: "expediency in terms of technological reason is, at the same time, expediency in terms of profitable efficiency, and rationalisation is, at the same time, monopolistic standardization and concentration."[18] As he noted in a discussion of the analysis of Max Weber, the rationality of capitalism can be defined in terms of two historical facts:

1. the provision of human needs and calculable efficiency takes place within the private enterprise system and is geared toward the profit of the individual entrepreneur or enterprise;
2. the means of production are private property, and the labourers must sell their wage labour to the owner of the means of production to provide for their own needs.[19]

Since the "capitalist system is directed by the 'focal reality' of a market-exchange system and private property geared toward maximum profit, the 'calculable efficiency' of capitalist rationality is *directed towards the maximization of profit.*"[20] Furthermore, continual rises in affluence has fostered the expectation amongst consumers in the affluent nations for ever more commodities and products

16 R. Kothari, 'Environment, Technology, and Ethics', *Technology and Values: Essential Readings,* edited by C. Hanks, (Oxford: Blackwell, 2010), p. 431.
17 Hamilton, *op.cit.* (2003), p. 2.
18 Marcuse, *op.cit.* (1941), p. 46.
19 Marcuse, (1965c), 'The Containment of Change in Industrial Society', in *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse,* edited by D. Kellner, (New York: Routledge, 2001), p. 206.
20 D. Kellner, *Herbert Marcuse and the Crisis of Marxism,* (Berkeley: University of California Press, 1984), p. 266. (Emphasis added).

to the point where the promises of the advertisements have reached “transcendent” degrees that were not satisfiable. In short, Marcuse contended that the growing wealth of the capitalist system could not

> ...satisfy the needs which it creates. The rising standard of living itself expresses this dynamic: it enforced the constant creation of needs that could be satisfied on the market; it is now fostering *transcending* needs which cannot be satisfied without abolishing the capitalist mode of production.[21]

The legitimacy of ever-increasing levels of individual consumption appears irrational on the surface; having engendered an individual not merely accustomed to the expectation of little else but more of the same and expecting it as a natural right, even in Marcuse's time of writing this process appeared to be offering temptations it could not hope to provide for. In an economic network made more brittle by its increasing complexity, events as seemingly disparate as oil “shocks” (i.e. price spikes); revolutionary activities in far off nations, over-speculation, the bursting of real estate or other “bubbles”, not to mention outright fraud and criminality in the financial industries and property markets, stabilisation remains the prime directive of the reproduction of the status quo, and even if this does not *necessarily* require perpetual economic growth, at the least it continues to be accompanied by it. Politically, there seems to be broad agreement by most parties – whether social-democratic, conservative, and even green – that this must continue.[22] Although loudly touted, traditional political divides between left and right, conservative and liberal, Labor and Tory, Republican and Democrat, appear as one in their shared faith concerning the growth imperative and appear widely favourable to the continuation of what Marcuse considered to be the “mutilated” and “abbreviated” existence offered by consumerism.[23] Political and other sources of change appear at best beneficial in piecemeal terms, or at worst, impotent in carrying out the changes required or completely counter-productive. Instead, all energies are devoted to the task of ensuring growth

21 Marcuse, *Counterrevolution and Revolt,* (Boston: Beacon Press, 1972a), p. 16. As a caveat: it has been suggested by a number of environmental thinkers that it is large scale industry and the military who remain the largest polluters, and that motivating consumers to 'do their bit' can serve as a convenient strategy to deflect responsibility to change. For numerous examples of this strategy in Australian politics, see C. Hamilton, *Scorcher: The Dirty Politics of Climate Change,* (Melbourne: Black Inc. Agenda, 2007). For a more general discussion of the anti-environmentalist movement, see S. Beder, *Global Spin: The Corporate Assault on Environmentalism,* revised ed., (Melbourne: Scribe Publications, 2006).

22 On fraud in the finance industries, see S. Das, *Extreme Money: Masters of the Universe and the Cult of Risk,* (Upper Saddle River, NJ: FT Press, 2011).

23 Consumerism, Jeremy Seabrook claims, involves the individual being "...denuded of everything but appetites, desires and tastes, wrenched from any context of human obligation or commitment. It is a process of mutilation; and once this has been achieved, we are offered the consolation of reconstructing the abbreviated humanity out of the things and goods around us, and the fantasies and vapours which they emit." Quoted in T. Homer-Dixon, *The Upside of Down,* (Melbourne, Text, 2006), reference 74, p. 371.

continues unfettered and insignificant political change – if emerging at all – is reduced to glacial adjustments:

> The democratic process organized by this structure is discredited to such an extent that no part of it can be extracted which is not contaminated. Moreover, using this process would divert energy to snail-paced movements. For example, electioneering with the aim of significantly changing the composition of the U.S. Congress might take a hundred years, judging by the present rate of progress, and assuming that the effort of political radicalization continues unchecked (…) under these circumstances, to work for the improvement of the existing democracy easily appears as indefinitely delaying attainment of the goal of creating a free society.[24]

At this point the substantial differences between Marcuse and Marx become increasingly evident. Marcuse was extremely skeptical about the possibility of change emerging from the working class and was just as skeptical of its emergence from modern political sources. Secondly, whereas Marx envisaged a shift from capitalism to socialism, Marcuse emphasised the extent to which capitalism had thwarted such a historical 'necessity' through the inauguration of a counterrevolution.[25] The failure of the working class to emerge as an effective revolutionary class was made even more certain, as the workplace itself became a locus of the technological and economically rational values of "efficiency, productivity, performance".[26] Langdon Winner goes further:

> ...the rational arrangement of sociotechnical systems has tended to produce its own distinctive forms of hierarchical authority. Legitimized by the felt need to do things in what seems to be the most efficient, productive way, human roles and relationships are structured in rule-guided patterns that involve taking orders and giving orders along an elaborate chain of command. Thus far from being a place of democratic freedom, the workplace tends to be undisguisedly authoritarian. At higher levels in the hierarchy, of course, professionals claim their special authority and relative freedom by virtue of their command of scientific and technical expertise. At the point in history in which forms of hierarchy based on religion and tradition had begun to crumble, the need to build and maintain technical systems offered a way to restore pyramidal social relations. It was a godsend for inequality.[27]

24 Marcuse, *An Essay on Liberation,* (Boston: Beacon Press, 1969b), p. 63.
25 See Marcuse, *op.cit.* (1972a).
26 A. Gorz, *Critique of Economic Reason,* (London: Verso, 1989), p. 5.
27 See L. Winner, 'Techné and Politeia: The Technical Constitution of Society', in *The Whale and the Reactor: A Search for Limits in an Age of High Technology,* (Chicago: University of Chicago Press, 1986), p. 48.

Marcuse's point was that instead of being turned toward liberating alternatives from artificially sustained wage labour and increasing free time, increased efficiency and productive power were directed to increasing (economic) outputs, with efficiency being turned to minimise expenditure in inputs (i.e. replacement of obsolete machinery and labour, 'outsourcing', etc.). The problem of the diminished need for labour could be subverted by channelling it into the production of "surplus" products which could then not only be conspicuously consumed, but cast as genuine needs.

Marcuse's concern with the chief incentives which propel and guide technological proliferation show that he resisted the more broad critiques of modern technology offered by a number of his contemporaries such as Jacques Ellul.[28] This arguably allowed his philosophy of technology to retain significant explanatory value in the critique of the shared grounds of technology and the environment. Marcuse's views should not be dismissed as utopian, as they are not necessarily any more so than the assumption that growth can continue unabated forever. Marcuse makes the philosophy of technology practically useful by not isolating it from the dominant collective interests which drive and guide its development. Although certain elements of his critique of capitalism are outdated (specifically those reliant on his revisionary Freudianism), his discussions of the false gratifications of consumerism, his wariness of economism, and his regular denunciations of the one-dimensional pursuit of growth for growth's sake remain pertinent.

28 J. Ellul, *The Technological Society,* (New York: A.A. Knopf, Inc., 1964).

Chapter 5

The New Technology?

> "According to nature" you want to live? O you noble Stoics, what deceptive words these are! Imagine a being like nature, wasteful beyond measure, indifferent beyond measure, without purposes and consideration, without any mercy and justice, fertile and desolate and uncertain at the same time; imagine indifference itself as a power – how could you live according to this indifference![1]

As the philosophy of technology standardly involves an account of nature, this chapter will begin by critically addressing Marcuse's view of the topic and the role he thought it could take in the creation of a society liberated by a "new science" and a "new technology". As it will be argued, despite several problems existing in Marcuse's view of nature, it will be defended from criticisms levelled by Jürgen Habermas, Andrew Feenberg, and Steven Vogel.

New Science, New Technology

As Jürgen Habermas observed, “Long before the Club of Rome, Marcuse fought against 'the hideous concept of progressive productivity according to which nature is there gratis in order to be exploited”.[2] However, although prescient in various ways, Marcuse's views on this topic were also problematic, and have subsequently faced considerable criticisms from Habermas and others. Habermas' critique consists in a two-pronged attack, one aimed at Marcuse's concepts of a new science and technology, the other directed toward his view of nature. Over what follows, the former Marcusean concepts will be defended from the first part of Habermas' critique, with the remainder

1 F. Nietzsche, (1886), *Beyond Good and Evil,* 9, (New York: Vintage Books, 1966), p. 15.
2 J. Habermas, 'Afterword: The Different Rhythms of Philosophy and Politics For Herbert Marcuse on his 100th Birthday', in *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse,* vol.2, edited by D. Kellner, (London and New York: Routledge, 2001), p. 236.

of the discussion directed toward Marcuse's vision of the inherent, semi-teleological potential of nature. Whilst Marcuse's connection between a philosophy of technology and a philosophy of nature was important and is still generally lacking in much modern philosophical work purportedly concerned with technology, it cannot be ignored that his reasoning in this context remains confusing and abruptly alters course away from his early concern with “concrete philosophy” and praxis. Hence, his earlier, but brief acknowledgment of the preconditional status of the natural environment will be emphasised as opposed to his teleological and subjective approaches to nature.

Habermas provided reasons to doubt the coherency of the concept of a new science or new instrumentality, and criticised what he took as Marcuse's championing of the "secret hope"[3] of a "fraternal relation to nature."[4] As the outline of this debate has been attended to in sufficient detail elsewhere, and also given the idiosyncratic nature of Marcuse's theory of nature, a brief indication of what he did *not* appear to be arguing will be necessary.

Firstly, by "nature" Marcuse was not always referring to the environment, biosphere, or 'wild-nature' specifically, but usually uses it as a collective term which includes his Marxian view of human nature chiefly derived from the *1844 Manuscripts*, as well as his more specific discussion of “feminine nature” in *Counterrevolution and Revolt.*[5] Although he tended to generally distinguish "human" from "external" nature, he often took the concepts together, which can only be expected given the scope of his critique.[6] Secondly, Marcuse was not calling for a return to simpler times or championing a worldwide retreat to medieval agrarianism. Rather, he saw nature as a

> ...part of history, an object of history; therefore 'liberation of nature' cannot mean returning to a pretechnological stage, but advancing to the use of the achievements of technological civilization for freeing it from the destructive abuse of science and technology in the service of exploitation.[7]

---

3 J. Habermas, 'Technology and Science as "Ideology"', in *Toward a Rational Society,* (Boston: Beacon Press, 1970), p. 86

4 Feenberg leaves this quotation unreferenced in his *Questioning Technology* (London: Routledge, 1999), p.156. However, it appears arguable that Habermas's use of the concept of a "fraternal" relation to nature is invoked in order to illustrate a potential *implication* of the way nature may be treated in the advent of a 'new technology', not as a way of characterising Marcuse's view as a whole. See Habermas, *ibid.* (1970), p.88. However, Habermas *does* use this phrase in 'A Reply to My Critics' – see J. Thompson and D. Held, *Habermas: Critical Debates*, (London: Macmillan, 1982), p.241. See also S. Vogel, *Against Nature: The Concept of Nature in Critical Theory,* (Albany, State University of New York Press, 1996), p. 153.

5 See Marcuse, 'Nature and Revolution' in *Counterrevolution and Revolt,* (Boston: Beacon Press 1972a), pp. 59-78.

6 Marcuse, *ibid.* (1972a), p. 59.

7 Marcuse, *ibid.* (1972a), p. 60.

As should be evident in this passage, Marcuse was not asking what the Luddites referred to as "the machinery question",[8] and he was hardly against the idea of civilisation or technoscience *per se,* but what he took to be a historically specific mode of production directed primarily by the bottomless incentive of the profit-motive in which technoscientific powers had come to take on irrational and self-defeating forms.[9] "I suggest", Marcuse wrote in a 1968 speech, "that the desublimation which is demanded today is not an undoing of civilization but an undoing only of the archaic exploitative aspects of civilization. Far from undoing and regressing it is rather the reintegration into civilization of human faculties, needs and satisfactions which have been reduced, mutilated and distorted in the tradition of exploitative civilization."[10] However, it is less clear that Marcuse was not – at least implicitly – recommending a shift in emphasis to the *technical* as he defined it earlier in his career and as it is defined in this thesis.[11] He was advocating that a mature society and a mature technology would be conducted on the basis of its ultimate contingency upon nature, but that the horizon of this noble and necessary end had been obscured, visible only in abstraction from the currently dominant direction of development.

This brings the discussion to the first prong of Habermas's critique; the argument that modern technology represents a historically specific condition of civilisation. This was a major aspect of Marcuse's thought, one which some philosophers of technology find to be in accord with more recent sociological analyses of technics.[12] Without following this particular path further here however, Marcuse's position is that technics (and more importantly, the technological mode of production) are ultimately shaped by the societies and cultures in which they emerge.[13] Once again,

8 The "Machinery Question" was developed by David Ricardo in the chapter 'On Machinery' added to the third edition of his 1817 work, *Principles of Political Economy and Taxation,* (London: Barnes and Noble, 2005). See also K. Sale, 'The Achievements of "General Ludd', in *The Ecologist,* v.29, no 5, (August / September 1999), pp. 69-78.

9 The reduction of all environmental problems to "civilisation" appears to be the thesis of D. Jensen's *Endgame V1: The Problem of Civilization,* (New York: Seven Stories Press, 2006), as well as featuring prominently in the work of J. Zerzan. See for example his *Running on Emptiness: The Pathology of Civilization,* (Port Townsend, WA: Feral House, 2002), and the edited collection, *Against Civilization: Readings and Reflections,* (Port Townsend, WA: Feral House, 2005).

10 Marcuse, (1968), 'Beyond One-Dimensional Man', in *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse,* edited by D. Kellner, (New York: Routledge, 2001), p. 115.

11 See Marcuse, (1941), 'Some Social Implications of Modern Technology', in *Technology, War, and Fascism: The Collected Papers of Herbert Marcuse,* vol.1, edited by D. Kellner, (New York: Routledge, 1998), pp. 41-65. Feenberg also appears to allude to something very close to this approach in his effort to reform Marcuse's theory through an invocation of *techné*. See for example A. Feenberg, *Heidegger and Marcuse: The Catastrophe and Redemption of History,* (New York: Routledge, 2005), p. 112.

12 See for example, Feenberg, *op.cit.* (1999), pp.10-12.

13 The position Feenberg offers in *Questioning Technology* was subjected to critical discussion in a Symposia by I. Thomson, 'From the Question to Technology to the Quest for a Democratic Technology: Heidegger, Marcuse, Feenberg' and D.J. Stump, 'Socially Constructed Technology: Comments on Andrew Feenberg's Questioning Technology', as well as Feenberg's replies which are reproduced in *Inquiry,* (Summer, 2000), pp. 225-238. The second session included T. Veak 'Whose Technology? Whose Modernity?: Questioning Feenberg's Questioning Technology', and Feenberg's reply, 'Do We Need a Critical Theory of Technology?' in *Science, Technology and Human Values,* (Spring 2000), pp. 238-242.

he was speaking of concrete socio-political reality as he saw it; not merely offering a novel approach from which to continually reiterate the thesis that the design of technical artifacts have diverse socio-cultural origins.[14] For Marcuse, from the abstract stance of the purely ideal, technical artifacts appear as merely the materialisation of instrumentality and as such, they can be easily understood as ethically neutral. As the well-known saying goes: “guns don't kill people; people kill people.” But such a view is arguably too quick and not only ignores the context of praxis as well as the individual's concrete lived experience of *modern* technical mediation, it fails to acknowledge the historical (and evolutionary) novelty of the means of production as directed by the infinite convention of the profit motive on a *global* scale. As such, it is only in the "abstract" context afforded by separating technics from concrete human intentions and interests that motivate and direct their development, that such a view can seem sensible.[15]

What Marcuse thought was historically "new" about technology and the sciences in the modern epoch was that both had taken on controlling rather than liberating manifestations due to the nature and influence of the extant mode of production which provides the framework and rationalisation of their development. Borrowing a term from the existentialists, Marcuse contended that societies are always "...a historical-social *project*: in it is projected what a society and its ruling interests intend to do with men and things."[16]

> (Marcuse) concedes that technical principles can be formulated in abstraction from any content, that is to say, in abstraction from any interest or ideology. However, as such, they are merely abstractions. As soon as they enter reality, they take on a socially specific content relative to the "historical subject" that applies them.[17]

The idea that technics are neutral is then, as Andrew Feenberg continues, “a special kind of ideological illusion.” The “illusion” consists in treating technics and technology as if they were *unshaped* or removed from their underlying foundations in social causes and dominant interests, and that they form a singular, separate and generic historical process, largely discernible from merely a *technical* perspective. This not only appears to be Habermas's position,[18] but also tends to

14 This arguably summarises the approach of social constructivists of technology. This criticism will be expanded on in the final chapters of this thesis.
15 Marcuse, *op.cit.* (1964), p. 157-158. (Emphasis added).
16 Marcuse, (1968a), 'Industrialization and Capitalism in Max Weber', in *Negations: Essays in Critical Theory,* edited by J.J. Shapiro, (Boston: Beacon Press, 1969), p. 224.
17 Feenberg, *op.cit.* (1999), p. 160.
18 To be sure, Habermas is critical of the technical (i.e. as a form of instrumental conduct) intruding into the social-communicative sphere. However, (to drastically simplify), this does not appear to be a sufficiently pluralistic basis

concur with theories of technology from sources as diverse as Marshall McLuhan to *Wired*. However, arguably, Feenberg does not adequately follow this contention where it appears to lead. Like most other philosophers who concern themselves with technology, its chief guiding and motivational incentives seem to be largely passed over in favour of different explanations, arguably more attuned to what Feenberg refers to elsewhere as the "temper of the times".[19] This not only tends to divert a critical theory of technology away from its chiefly *economic* guiding incentives, but also obscures the fact that economic rationality has concrete, explicit implications for individual political participation – short of outright revolt – the only means by which social changes may be inaugurated. For example, as Elaine Bernard argues:

> At least in a democracy each person is formally equal. The humblest citizen, the most prestigious citizen still has only one vote. But when we move that power over to the marketplace, the humblest and the wealthiest are totally asymmetrical. One has such immense power that they can literally crush the other completely and utterly and fully.[20]

As such, if Feenberg's statement that "the fundamental problem of democracy today is quite simply the survival of agency in this increasingly technocratic universe", the responsibility to address the fundamental connection between modern production and the implications of constant growth for the environment must surely be brought to prominence.[21] Passing over them does not merely imply sidelining the chief incentives Marcuse always took as peculiar to the technological mode of production, but also appears to separate the last two centuries of well-explored trends in the history of technical mediation from the tremendous rupture that occurred when the incentives which came to drive it shifted from the *technical,* to the deferred conventions of technological and economic rationality. The views of Marcuse's friend André Gorz are of specific relevance in this context, and deserve to be quoted at length:

> Economic rationality has never (…) in essence, been *in the service* of a *determinate* goal. Its object is the maximization of the type of efficiency that it knows how to measure arithmetically. The main indicator of this efficiency is the rate of profit. And the rate of profit

from which to arrive at an environmental, or animal ethics. This contention will be further delineated below. For more on the topic, see Vogel, *op.cit.* (1996).

19 Feenberg, 'A Fresh Look at Lukács: On Steven Vogel's *Against Nature',* in *Rethinking Marxism,* (Winter, 1999b), p. 85.

20 Elaine Bernard, quoted in J. Bakan, *The Corporation: The Pathological Pursuit of Profit and Power,* (London: Constable and Robinson LTD, 2004), p. 146.

21 Feenberg, *op.cit.* (1999), p. 101.

> depends, in the last analysis, on the productivity of labour. The pursuit of an unlimited maximum of efficiency and profit would therefore demand the greatest possible growth of the productivity of labour and, as a result, of production.[22] (…) The economic rationalization of labour did not, therefore, consist merely in making pre-existent productive capacities more methodical and better adapted to their object. It was a revolution, a subversion of the way of life, the values, the social relations and relation to Nature, the *invention* in the full sense of the word of something which had never existed before. Productive activity was cut off from its meaning, its motivations and its object and became simply a *means* of earning a wage. It ceased to be a part of life and became the *means* of 'earning a living' (…) the satisfaction of 'producing works' together and the pleasure derived from 'doing' were abolished in favour of only those satisfactions that money could buy. In other words, concrete labour could only be transformed into what Marx called 'abstract labour' by turning the worker / producer into a worker / consumer: that is, the social individual who produces nothing she or he consumes and consumes nothing he or she produces; for whom the essential objective of work is to earn enough to buy commodities produced and defined by the social machine as a whole.[23]

As previously noted, rather than address the major incentive which shapes technological design, production and deployment as a whole – the economically rational growth imperative – Feenberg appears more interested in pursuing a social-constructivist approach which incorporates other agential interests which play more or less informative and / or influential roles in the design and production of technical artifacts. Generally, Marcuse's thought appears to be compatible with such a view, but his critique cuts deeper than the acknowledgment that agents or interests are somehow working or contributing to technical designs in various ways, providing the motive and direction of their instantiation, etc. In other words, to borrow a well-known term from Langdon Winner, Marcuse would have agreed that "artifacts have politics", but with the caveat that these are ultimately shaped not only to some extent by the actions of individual agents, but more fundamentally by the social mode of production in play.[24]

In the historical context traced by Marx, Marcuse and Gorz, it should not be surprising that Marcuse's call for change was explicitly world-historical in scope; a “total transformation of the entire traditional culture”.[25] This follows from his understanding of the content and influence of

22 A. Gorz, *Critique of Economic Reason,* (London: Verso, 1989), p. 114.
23 Gorz, *ibid.* (1989), pp. 21-22.
24 See Winner, 'Do Artifacts have Politics?', in *The Whale and The Reactor,* (Chicago: Chicago University Press, 1986a), pp. 19-39.
25 Marcuse, *op.cit.* (1972a), p. 79.

technology as manifest in both ideological and social contexts, (technological) as well as the instrumental (technical) realm. As he contended, what was crucially unprecedented about modern technics was that it no longer served as an extension of human capacities as such, but as a means of legitimating and reproducing the capitalist status quo through the exercise of "new forms of control".[26] In short, technological rationality was now applied to the management, organisation and adjustment of individuals themselves, prescribing their interests and behaviours rather than strictly binding individuals to them, drawing them into productive, "compliant efficiency".[27] But this affected production as well; no longer was it geared toward purely *instrumental* or 'internal' concerns, i.e.: no longer was technical project *x* produced in order to address or engage with problem *y;* rather, the incentives of production were radically narrowed to the goal of creating profits. This paralleled the rationality of the technical appropriation and evaluation of nature; as Marcuse frames the situation, the natural environment and the organisms, minerals, materials and energies within it are located, quantified, harvested, processed and distributed in a manner once again very similar to Heidegger's description of both human and non-human nature being "challenged" to "offer itself up" as a well of resources which are then practically expedited as "standing stock".[28] The problem with Heidegger's critique then, as Marcuse later came to suspect, was that despite its purported concern with the concrete, it had neglected to countenance socio-economic reality. Marcuse was more concerned to reveal a more everyday, but pressing reality: no longer could technics and the sciences be defined simply along instrumentalist lines as augmentations, prostheses, instruments, 'tools' produced and used to increase human capacities and remaining firmly under their control, but as a means of administration, productive uniformity and regimentation of the labouring classes toward securing the end of perpetual growth. Habermas summarises Marcuse's position:

> At the stage of their scientific-technical development, then, the forces of production appear to enter a new constellation with the relations of production. Now they no longer function as the basis of a critique of prevailing legitimations in the interest of political enlightenment, but become instead the basis of legitimation. *This* is what Marcuse conceives as world-historically new.[29]

---

26 See Marcuse, *op.cit.* (1964), chapter one.
27 Marcuse, *op.cit.* (1941), p. 49.
28 See Heidegger, *op.cit.* (1954), pp. 296-301.
29 Habermas, *op.cit.* (1970), p. 84. Max Weber notes that the rupture within of the relations of production was not merely technical, but *economic.* As he mentioned, one of the most evident signs of the irrationality of capitalism was that the individual now existed "...for the sake of his business, instead of the reverse." See Weber, (1905), *The Protestant Ethic and the Spirit of Capitalism,* (London: Routledge Classics, 2004), p. 32.

In a manner not far removed from Habermas's own "colonisation thesis", Marcuse thought that technological rationality had become formatively implicated within a tremendous dispersion of life-world domains which were previously technologically *un*mediated. To be sure however, he was not merely expressing his distaste in regard to this tendency, but sought to emphasise the novelty and difference of the mechanism of legitimation which fostered and rationalised such forms of technical colonisation. Whilst valuing that which can be quantified (i.e. subject to measurement in money, distance, energy, time, etc.), and rendering the supposedly unquantifiable up to subjectivity and often relativism, any number of *social* domains – even and especially verbal communication itself – became subject to the operationalistic principles of technological rationality, a contention which Habermas appears to agree with if only in broad terms. Thus – to reiterate – Marcuse was not merely engaging in a critique at the level of technics or design, but arguing for the complete reform and renewal of basic individual attitudes spanning the institutional-bureaucratic, governmental, public and technical domains through to individual psychological renewal, a goal which he believed could only be achieved with an end to the capitalist status quo.[30]

> If the phenomenon on which Marcuse bases his social analysis, i.e. the peculiar *fusion of technology and domination,* rationality and oppression, could not be interpreted otherwise than as a world "project," as Marcuse says in the language of Sartre's phenomenology, contained in the material *a priori* of the logic of science and technology and determined by class interest and historical situation, then social emancipation could not be conceived without a complementary revolutionary transformation of science and technology themselves.[31]

As Samir Gandesha has observed, Marcuse's use of the Sartrean term 'project' in this context is important, as it denoted a "specific way of experiencing, interpreting, organizing and changing the world, a specific historical project among other possible ones, not the only necessary one."[32] For Marcuse, alternative forms of technological rationality were available, even those that may lead to a restoration of its essential “end”. Therefore, qualitatively different societies were available, just because of the riches and advancements so lauded by the defenders of capitalism. As a result, Marcuse contended *Ananke* or the "reality principle" had been invalidated, yet, *Ananke* remained, this time mediated by the "performance principle", which "manipulates instinctual desires through

30 See Marcuse, *op.cit.* (1964), pp. 44-45.
31 Habermas, *op.cit.* (1970), p. 85.
32 Marcuse, (1965a), 'On Science and Phenomenology,' in *The Essential Frankfurt School Reader,* edited by A. Arato and E. Gebhardt, (New York: Urizen, 1978), p. 469. See also S. Gandesha, 'Marcuse, Habermas, and the Critique of Technology', in Abromeit and Cobb, *op.cit.*(2004), pp. 188-208.

the creation of false needs as soon as the old ones are satisfied, thus making individuals in the capitalist society to work more and perform well".[33]

Despite this *artificial* suspension of the powers of technology in the service of the renewal of the status quo, Marcuse's optimism regarding the prospects of a new science and new technology in turn implies that there are alternative ways in which the natural environment may be approached, treated, or used, and that these were ideally means which treated it in accordance with what he considered were *its own* inherent potentials. As it will be discussed below, this is arguably where Marcuse's approach runs into some significant barriers, however, at this point it is sufficient to note his belief that the given was always a state of affairs which could be subjected to change:

> Marcuse envisages not only different modes of theory formation but a different scientific methodology in general. The transcendental framework within which nature would be made the object of a new experience would then no longer be the functional system of instrumental action.[34]

Once again, although he was critical of the "colonization of life world by system" and the "technization of the life-world"[35] and shares with Marcuse a general suspicion regarding the modern spread of instrumental rationality into the realm of symbolic / communicative discourse, Habermas pays little attention to technics in his later works, and it does not feature as a category in his media theory at all.[36] Aside from this, Habermas nonetheless appears to be in broad agreement with Marcuse's concern that the governing principles of "purposive-rational action" (i.e. those governing technics) are inappropriate if applied in the social realm, however he does not agree that they are inappropriate if applied to nature.[37] As a form of purposive-rational action, there can only be one technological rationality in Habermas's thinking, so invoking a 'new' technology, science or instrumentality are not simply suspect on the basis of their inherent romanticism, but because of their philosophical incoherency; in short, Marcuse was simply making a category error, or "boundary violation".[38] As Steven Vogel summarises Habermas's position: "...there is no such thing as a new science, there is no alternative to the science and technology we have, because these are

33 J.V. Ocay, 'Technology, Technological Domination, and the Great Refusal: Marcuse's Critique of the Advanced Industrial Society', in *Kritike,* vol.4, no.1, (June 2010), p. 68.
34 Habermas, *op.cit.* (1970), p. 86.
35 See Feenberg, *op.cit.* (1999), p. 167.
36 A lacuna Feenberg attempts to remedy in his revised version of the media theory and his concept of "technical codes". See Feenberg, *ibid.* (1999), pp. 87-89.
37 Feenberg, *ibid.* (1999), p. 167.
38 Vogel, *op.cit.* (1996), p. 111.

associated with a fundamental project of the human species, and not one that is socially variable."[39]

> In Habermas as in Weber, scientific-technical rationality is nonsocial, neutral, and formal. By definition it excludes the social (...) it is neutral because it represents a species-wide interest, a cognitive-instrumental interest which overrides all group-specific values. And it is formal as a result of the process of differentiation by which it abstracts from itself from the various contents it mediates. In sum, science and technology are essentially indifferent to interests and ideology and represent the objective world in terms of the possibilities of understanding and control.[40]

Once again taking up the argument from the basis of Marcuse's criticism of Weber, Feenberg questions Habermas's apparently blanket contention with reference to the concept of efficiency. If merely seen in abstract terms as "the ratio of inputs to outputs", Feenberg contends such a concept "would apply in a communist or capitalist society, or even in an Amazonian tribe"; the point is that efficiency comes to be embodied in different manners in different societies and cultures...

> Concretely, when one actually gets down to applying the notion of efficiency, one must decide what kinds of things can serve as inputs and outputs, who can offer and acquire them and on what terms, what counts as discommodities, waste, and hazard, and so on. These are all socially specific, and so, therefore, is the concept of efficiency in any actual application.[41]

It is not difficult to find many other examples which further endorse Feenberg's point, as any number of cultural forces can shape productive forays in varying ways. Ritual, spirituality, and culturally varying standards of conduct and decency can come to play both instructional roles in the production and use of technical artifacts, as well as providing the incentives for their production in the first place. The principles of “scientific management” or Fordism may be more efficient *per se* in a society of mass-production, but this sort of efficiency is not necessarily the same as (say) the routines and rituals which informed traditional Japanese sword craft. Hence, Feenberg believes this aspect of Marcuse's thought attests to its continual relevance in the modern period. What Feenberg refers to as the "*neue Sachlichkeit,* or "new sobriety" is therefore brought into question if environmental concerns are added to the already extensive list of Marcuse's criticisms of capitalism.

---

39 Vogel, 'Marcuse and the New Science', in *Herbert Marcuse: A Critical Reader,* edited by R. Abromeit and W.R. Cobb, (New York: Routledge, 2004), p. 242.
40 Feenberg, *op.cit.* (1999), pp. 159-160.
41 Feenberg, *ibid.* (1999), p. 160.

As Feenberg mentions, whereas Habermas's brief sojourn into the philosophy of technology was suited to "a time when we tamed our aspirations", despite its optimism, Marcuse's account of technology appears to have stood the test of time better than his colleague.[42] For Feenberg, this seems at least partly due to its similarity with more recent work in sociological and philosophical approaches to technical development, such as that of social constructivism, (a field that certain other prominent philosophers of technology have not been so favourable towards),[43] but for the current purposes, it also provides grounds for optimism, as the potential to exercise a renewed sense of responsibility over the power and damage technics have wrought remains open in the Marcusean view, but appears less clear from Habermas' perspective.

However, Marcuse's "subjectivisation" of nature cannot be defended as easily, and is beset with a number of significant problems. His thoughts on this score will now be described and subjected to various criticisms which can be summarised as follows:

1. that Marcuse appears to have an overly optimistic regard for human nature and contends that first nature contains inherently "liberating", positive qualities;
2. that Habermas was generally correct to consider Marcuse's endorsement of nature as a 'subject' a category error; and
3. by placing hope in revolutionary social change and replacing the current technologically rational incentives of production with those belonging to the aesthetic dimension sidelines the now *practical* necessity to confront the ecological crisis with an instrumental response – in short, a basis by which the incentive of the growth imperative can be replaced by an ecological imperative is arguably of foremost importance.

Firstly, Feenberg notes his agreement with "most commentators that there are insuperable problems in the dizzying multiplication of categories in which Marcuse attempted to cloth his position after *One-Dimensional* Man".[44] Indeed – rather than clarifying his position – Marcuse's conceptual apparatus arguably increases the gulf between theory and practise. As mentioned, his final major works, specifically *Counterrevolution and Revolt* and *The Aesthetic Dimension,* substantially differ from earlier writings in terms of their renewed optimism, but also in their almost playfully ironic

42 Feenberg, *ibid.* (1999), p. 157.
43 For a critique of the social constructivist approach to technics, see L. Winner, (1993), 'Social Constructivism: Opening the Black Box and Finding it Empty' in Dusek & Scharff, *op.cit.*(2007), pp. 233-242. For a rejoinder to Winner's critique and his counter-response, see M. Elam, 'Anti Anticonstructivism or Laying the Fears of a Langdon Winner to Rest', in Dusek and Scharff, *ibid.* (2005), pp. 612-616.
44 Feenberg, *op.cit.* (2005), p. 83.

tone and their bewildering categorial complexity. Within them Marcuse places a renewed emphasis on nature (both human and non-human variants) and looks to the domain of art and aesthetics as a basis upon which to construct a renewed harmony between agents and things.[45] For example, he referred to the "rediscovery of nature as an *ally* in the struggle against the exploitative societies in which the violation of nature aggravates the violation of man", and described nature's potential role "as a vehicle in the liberation of man".[46] He also deliberately calls for its treatment as a "subject",[47] and, citing Theodor Adorno, that he wanted to help it "open its eyes".[48] As will hopefully become clearer below, this implies more than merely allowing for the potentials of nature to be permitted release by humans in a more careful, less exploitative instrumental fashion, but in conformance with what Marcuse took to be its intrinsic, life-enhancing aspects.

As previously noted, Marcuse's philosophy of nature owes much to the philosophical-anthropology outlined in Marx's *1844 Manuscripts,* in which humanity's supposedly "essential" capacities; its "musical ear," and its "eye for the beauty of form"[49] can be released in accordance with the currently contained aesthetic qualities of nature:

> The emancipated senses, in conjunction with a natural science proceeding on their basis, would guide the "human appropriation" of nature. Then, nature would have "lost its mere utility," it would appear not merely as stuff – organic and inorganic matter – but as life force in its own right, as subject-object; the striving for life is the substance common to man and nature. Man would then form a living object.[50]

Although Marcuse aimed to re-establish the common ground between the "life affirming" aspects of human and non-human nature, he qualified that his view is not teleological and does not require a plan to be ascribed to nature, but a "postulate" of its objective status:[51] "the idea of the liberation of nature stipulates no (...) plan or intention in the universe; liberation is the possible plan and intention of human beings, brought to bear upon nature."[52] However, Marcuse's view does appear to assume the "potentialities" of nature are fundamentally *positive*.[53] For example, he described nature

45 See Marcuse, *op.cit.* (1972a), p. 59.
46 Marcuse, *ibid.* (1972a), p.59. (Emphasis added).
47 For example, see Marcuse, *ibid.* (1972a), p. 60.
48 Pointed out by Vogel, in his 'Marcuse and the New Science', in *Herbert Marcuse: A Critical Reader,* edited by J. Abromeit and W.M. Cobb, (New York: Routledge, 2004), p. 244.
49 Marcuse, *op.cit.* (1972a), p. 64.
50 Marcuse, *ibid.* (1972a), p. 65.
51 Marcuse, *ibid.* (1972a).
52 Marcuse, *ibid.* (1972a), p. 66.
53 Marcuse, *ibid.* (1972a), pp. 60-61.

as "receptive", and "opposed, not to productive activity, but to *destructive* productivity", and, playfully tempting criticisms from an anthropomorphic context, that "nature, too, awaits the revolution!"[54] He ascribes "gratifying forces and qualities" which can potentially be "uncovered and released", and that nature contains "life enhancing, sensuous, aesthetic qualities."[55] As he himself himself admitted, his approach is "outrageously unscientific",[56] but nevertheless, despite it being existential (in a socio-political, rather than ontological sense),[57] these remain broad, sweeping claims which apprehend biological and 'wild' nature as inherently positive or life affirming and would therefore appear to be open to various criticisms. Further, given the highfalutin feature of his ideas in this context, it is hard to see how it would be convincing in practice, rather than of merely philosophical interest.

Many of the problems Marcuse's philosophy of nature faces derive from Marx's view of the topic put forward in the *1844 Manuscripts* which the former largely uncritically inherits. From this source, Marcuse reads a means by which humanity might "understand nature as a universe which becomes the congenial medium for human gratification to the degree to which nature's *own* gratifying forces and qualities are recovered and released."[58] As Feenberg notes, "Marcuse never distinguished his idea of nature from Marx's. Instead, he tried out a whole series of unsatisfactory explanations for the concept of nature he derived from Marx."[59] It must be mentioned that, amongst these "unsatisfactory explanations", Marcuse's attenuation of the Marxian view of nature with recourse to Freudian depth psychology is merely the most obvious,[60] however, this avenue of criticism will be passed over here in order to make a case for a more plainly philosophical criticism of inconsistency.

Simply put: Marcuse's view of nature appears beset with confusing antinomies. As noted previously, on one hand he advocated a view of nature as an "external" realm upon which human survival crucially depends on.[61] Yet he also offered a view roughly in accord with the thesis that nature must be understood as a historical category or "social construction".[62] As such, this appears to be in direct

54 Marcuse, *ibid.* (1972a), p. 74.
55 Marcuse, *ibid.* (1972a), p. 67.
56 Marcuse, *ibid.* (1972a), p. 65.
57 See Marcuse, 'Existentialism: Remarks on Jean-Paul Sartre's *L'Être et le Néant,'* in *Philosophy and Phenomenological Research,* vol.3, no.3, (March, 1948), pp. 309-336.
58 Marcuse, *op.cit.* (1972a), p. 67.
59 Feenberg, *op.cit.* (2005), p. 126.
60 However, it should be known that Marcuse was not uncritical of Freudianism. See for example his (1970c) 'The Obsolescence of the Freudian Concept of Man', in Shapiro, (ed., 1970), pp. 45-61.
61 See for example, Marcuse, (1972b) 'Ecology and Revolution', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* edited by D. Kellner, (New York: Routledge, 2005), pp. 175.
62 György Lukács appears to be the first Marxist thinker to explicitly describe nature as a social construct in his

conflict with Marcuse's other contention that nature contains *inherently* liberating, and hence positive properties. However, it also raises tensions between Marcuse's almost Heideggerian-sounding recommendations to let nature be and to allow it to flourish "as a life force in its own right."[63]

> Marcuse says that "nature is a historical entity" and eloquently insists that the role of a new science and a new technology is to rebuild the world; but on the other hand he constantly writes as though the model for this rebuilt world is to be found somehow in a noumenal nature's 'own' 'objective' or 'inherent' qualities.[64]

Furthermore, Vogel adds that the influence of the views of the early Marx on Marcuse's theory of nature compound the problem, that "it is not the active character of knowledge that the new science is supposed to emphasize but rather (and quite inconsistently) its *receptive* character".[65] Vogel's proposed solution will be discussed below, however, these are not the only difficulties which arise due to Marcuse's reliance on Marx's philosophical-anthropological view of human nature in which nature's inherent properties become objectified through the transformative power of labour and technics. In Marcuse's early "phenomenological" reading of the *1844 Manuscripts,* the senses (by which Marcuse means not merely sensory organs but the body in its entirety),[66] also come to play a defining role as "theoreticians in practice."[67] However, this seems to be of little help either; as Feenberg summarises Marcuse's position: "...in a free society labor both humanises nature and liberates it to the free development of its own potentialities."[68] But this still appears to demand an explanation as to how the prospect of a "human appropriation" of nature can be liberated (by humans) and at the same time pursue *its own* ends. If "ends" or "functions" can be ascribed to nature *in toto* at all, they are either in the service of the methodological procedures of the sciences, or – in the case of natural selection – simply to reproduce, pursue opportunity, and avoid the threat of pain

---

History and Class Consciousness, (Cambridge: The MIT Press, 1968), p. 234. See also N. Smith, *Uneven Development: Nature, Capital and the Production of Space,* (Oxford: Blackwell, 1990), pp. 64-65. See also Vogel, *op.cit.* (1996). For a critique of *postmodern* views of nature as a social construct, see G. Sessions, 'Reinventing Nature, ...?' A Response to Cronon's *Uncommon Ground',* in *The Trumpeter: Journal of Ecosophy,* vol.13, no.1, (1996), pp. 33-38.

63 Marcuse, *op.cit.* (1972a), p. 65.

64 Vogel, *op.cit.* (1996), p. 136.

65 Vogel, *ibid.* (1996).

66 See Ocay, *op.cit.* (2010), pp. 68-69.

67 See for example, K. Marx, (1932), 'First Manuscript' in E. Fromm, *Marx's Concept of Man,* (New York: Contiuum, 2004), pp.84-85. See also Marcuse, 'New Sources on the Foundation of Historical Materialism', in *Heideggerian Marxism,* edited by M. Abromeit and R. Wolin, (Lincoln: University of Nebraska Press, 2005), p.102. The "phenomenological" aspects of Marcuse's discussion of the *1844 Manuscripts* is noted by Feenberg, *op.cit.* (2005), pp. 122-126.

68 Feenberg, *ibid.* (2005), p. 124.

or death. The earlier Marxian response proffered by Marcuse, that "man is not *in* nature; nature is not the *external world* into which he first has to come out of his own inwardness. Man *is* nature"[69] appears to deviate from his later comments that the end of capitalism was not just a matter of political or psychological renewal, but of survival.[70] Furthermore, in *Capital,* Marx is not necessarily so attentive to the inherent value of the environment in any case: "(Man) ... develops the potentialities slumbering in nature, and subjects the play of its forces to *his own sovereign power.*"[71] Once again, in advocating the liberation of the supposedly suppressed potentials of nature, Marcuse clearly stated he was not arguing civilisation should be abandoned to the weeds, but in advocating letting nature be what it might like to be a significant antinomy arises. Marcuse's calls for a new sensibility which could allow for the "emancipation of the senses";[72] a profound, global raising of consciousness which in his words would have the effect of making individuals "physically and mentally incapable of creating another Auschwitz", though inspiring, lacks practical efficacy.[73] Such a prospect may at least be philosophically conceivable, but is extremely difficult to envision in the context of the daily business of the consumer society, staunchly defended as it is by deeply-entrenched politico-economic practises which tend to be uncritically aligned with economic and technological rationality, which arguably undercuts their frequent references to objective / normative ideals such as justice or morality. As Feenberg notes, modern (mainstream) politics appears to consist in little more than a technocratic lubrication for deciding "who gets what and how they get it."[74]

Aside from these practical political concerns, Habermas's criticism of Marcuse's philosophy of nature are rather more straightforward. In a related manner to his criticism of the coherence of a new science and technology, Marcuse's invocation of a subjective approach to nature flows from this original category error. Habermas' position differs from Marcuse's insofar as the latter retains a basically monological outlook in regard to the anthropological centrality of labour – a position Marx made clear in the *1844 Manuscripts.* Yet Habermas famously splits action, initially into the separate contexts of "work" and "interaction", and later into "communicative" and "instrumental"

69 Marcuse, *op.cit.* (1932), p. 97.
70 Marcuse, *op.cit.* (1972b), p. 174.
71 Marx, (1867) *Capital,* volume 1, part 3, chapter 7, (London: Penguin Classics, 1990), p. 283. (Emphasis added). In the *Grundrisse,* Marx goes further: “for the first time, nature becomes purely an object for humankind, purely a matter of utility; ceases to be recognized as a power in itself; and the theoretical discovery of its autonomous laws appears merely as a ruse so as to subjugate it under human need.” Cited in Hay, *op.cit.* (2005), p. 294. For an extensive discussion of Marx's theory of nature, see Alfred Schmidt's *The Concept of Nature in Marx,* (London: Verso, 1973).
72 Marcuse, *op.cit.* (1972a), pp. 64-65.
73 Marcuse, 'Ecology and the Critique of Modern Society', in *Capitalism, Nature, Socialism,* vol.3, no.3, (1979), p. 38.
74 Feenberg, *op.cit.* (2005), p. 87.

domains.[75] Vogel summarises the Habermasian position as follows:

> Whereas scientism on the one hand takes categories appropriate to nature and misapplies them to the social realm, what happens in Marcuse is that categories appropriate to the social realm get misapplied to the natural one. Thus it is simply a category mistake, Habermas argues, to talk about "dominating" nature or "liberating" nature. Domination and liberation are ethical categories that have to do with relations between people, and nature is not a person.[76]

In defence of Marcuse, it should be emphasised that although he called for the treatment of nature as a *subject*, he was not arguing that it ought be treated as one would a person or a moral agent as such.[77] Yet Vogel persists with this characterisation. For him, Marcuse's view of nature and the new science is a "romantic dream" which posits a "nature with whom we could speak, a nature that is itself a moral agent and with whom a reciprocal moral relation is a possibility".[78] However, despite his use of subjective terminology in describing the close correspondences between the treatment of human and non-human nature under the technological mode of production, Marcuse often appears to speaking metaphorically. For example, he wrote that "the pollution of air and water, the noise, the encroachment of industry and commerce on open natural space *have the physical weight* of enslavement, imprisonment."[79] Marcuse was not arguing here that nature is *literally* imprisoned, implying an entrapped subject with the desire for release, but speaking figuratively by drawing a comparison between the reduction of human and non-human nature into the status of mere resources in a manner reminiscent of Heidegger.[80] For Marcuse, there was nothing inevitable about this situation; control, production or management *per se* were not inherently aggressive or exploitative, rather, these repressive elements were the result of a particular socio-historical condition or mode of production, one which Marcuse held could be subjected to widespread changes. The emergence of a new sensibility could allow the threateningly materialistic animating incentives of modern technology to be replaced by alternatives – specifically those of imagination and creativity found within certain great works of art.[81] Despite phrases such as "mastery of nature" no doubt connoting domination, perhaps even aggression and exploitation, as ever for Marcuse, there were other dimensions in which such terms could be understood; there can be dominating,

75 See Vogel, *op.cit.* (1996).
76 Vogel, *op.cit.* (2004), p. 243.
77 Feenberg, *op.cit.* (1999), p. 156.
78 Vogel, *op.cit.* (1996), p. 111.
79 Marcuse, *op.cit.* (1972a), p. 61. (Emphasis added).
80 See Heidegger, *op.cit.* (1954).
81 See Marcuse, *op.cit.* (1978).

exploitative forms of mastery, or there can be liberating ones.[82] As he pointed out, these apply to control and management in a number of contexts:

> If it were demonstrable that the abolition of domination is biologically impossible, then I would say, the idea of abolishing domination is a utopia. I do not believe that anyone has yet demonstrated this. What is probably biologically impossible is to get away without any repression whatsoever. It may be self-imposed, it may be imposed by others. But that is not identical with domination. In Marxian theory and long before it a distinction was made between rational authority and domination. The authority of an airplane pilot, for example, is rational authority. It is impossible to imagine a condition in which the passengers would tell the pilot what to do. The traffic policeman is another typical example of rational authority. These things are probably biological necessities, but political domination, domination based on exploitation, oppression, is not.[83]

Hence, Marcuse's view, although confusing at times, makes more sense once it is realised that he was not collapsing technics and science in their entirety into 'domination', but criticising their prevailing directive impetus under the current mode of production. Of course, technical development itself can only *but* be directed toward a mastery of various elements of nature; those that are mastered in the production of the artifact itself, and those ends that the artifact was intended to perform.[84] Indeed, to save nature (and potentially ourselves) from the continuing history of human plunder, certain levels of mastery over it (for example, scientific knowledge of its workings) obviously remains necessary. To note a trivial example: the very process of understanding which leads to a knowledge of the properties of plants leads on to the knowledge that we require them for our own well-being quite literally.[85] Hence, as Marcuse continually emphasises, the advance of technoscience as a means of uncovering nature's secrets remains amongst the most important of human activities. Marcuse was thus not calling for merely technical reform or advance, but something far more fundamental. It is not sufficient that technics should merely be remodelled with nature in mind or made 'sustainable', but informed by very different social incentives and attitudes than those currently prevailing. For him, the reduction of 'wild nature' and human nature were

82 See Marcuse, *op.cit.* (1964), p. 240.
83 Marcuse, *op.cit.* (1967), pp. 80-81.
84 Of course, artifacts can also be used to carry out functions that may be unintended by designers. This topic will be addressed in detail in the subsequent chapter.
85 Nevertheless, it should be acknowledged that the abuse of individual sentient creatures for "false" reasons (for example, to test a 'new' cosmetic product which is nothing more than the most recent in a line of functionally identical, "rebranded products") is ethically abhorent.

parallel; the former viewed as a collection of resources to be plundered for profit, the latter narrowly defined as a self-interested and largely amoral agent, consumed by the conflation of material acquisition and happiness.

As mentioned, as well as a move to socialism, Marcuse placed his hopes in the liberating potentials of art and aesthetics to provide a framework from which nature could be viewed and engaged with on a new footing. Instead of being segmented and removed from everyday experience and distantiated to the elite realms of the "higher culture", he advocated that the arts should be given a new prominence and made into a "productive force in material as well as cultural transformation".[86] Instead of being mediated by commercial or market interests, Marcuse turned his focus back not just to his 1932 article on the *1844 Manuscripts,* but his earlier concern with the aesthetic dimension. This approach called for a unification of the arts, nature and the productive forces, with art's "political function and potential" as a model for revolutionary social change granted specific import.[87] With this late turn to the arts (particularly the literary arts), Marcuse was returning to a subject he had been intimately acquainted with from the beginning of his philosophical career where he argued in his doctoral thesis that in premodernity, the union of artist and society was far closer than in modern times.[88] Today, the imagination, interests and expression of the artist tend either to be co-opted into industrialised, commercial forms, sequestered away as special interests, or confronted with opposition by certain sectors of society. From this vantage point, he argued that "great art indicts and protests against the existing society and its ideology, values and reality principle" and therefore contained liberatory potential:

> Authentic art, for Marcuse, contains a vision of liberation that preserves images of freedom and happiness denied in the everyday world. Furthermore, in a world in which language, philosophy and the sciences are incorporated into an apparatus of domination, in which one-dimensional thought prevails, art remains a refuge of critical truths. That is, by its very nature, art pertains to another world and can thus speak truths other than the conventional wisdom.[89]

According to Feenberg, the reasons why Marcuse selected art for such a formative role were

86 Marcuse, *An Essay on Liberation,* (Boston: Beacon Press, 1969b), p. 32.
87 See Marcuse, *op.cit.* (1978), p. ix.
88 Feenberg, *op.cit.* (2005), p. 93. Marcuse's doctoral dissertation concerned *Der deutsche Künstlerroman,* (the German artist novel') and was intended as a "social critique of bourgeois society". See Marcuse (1922), 'The German Artist Novel: Introduction', translated by C. Reitz, in *Art and Liberation: The Collected Papers of Herbert Marcuse,* vol.4, edited by D. Kellner, (New York: Routledge, 2007), pp. 71-80. See also Kellner, *op.cit.* (1984), pp. 347-357.
89 See Kellner, *ibid.* (1984), p. 348.

twofold:

> In the first place, with speculative metaphysics discredited, he needs an experiential basis for identifying potentialities transcending the given. Second, he needs a more concrete and imaginatively rich value criterion than morality by which to measure the social world. Even if the advanced industrial society criticised in *One-Dimensional Man* could meet basic moral standards, it would still constitute a social universe hostile to human being and nature. This is related to problems in its technical structure that must be met with aesthetically informed solutions.[90]

Marcuse's view of the role of the arts also has strong analogies with his view of nature; both are alternative worlds to the given reality; both offer an experience starkly different to that of 'work', whether from the perspective of the assembly line or the office cubicle; and both offer the prospect of escape from the fumes and noise of the traffic, urban sprawl, and ungratifying, often wasteful consumption. As mentioned above, Marcuse's invocation of the redemptive features of art are arguably grounded once again in his belief that nature itself contained inherent aesthetic, life-affirming and positive properties which, like those aspects of *human* nature he contended were repressed under capitalism, lay inert or exploited due to the narrowed evaluations permitted under the sway of technological and capitalist-economic rationality. From this point, on the surface at least, it seems to follow logically from Marcuse's premise that the arts could provide a model of liberatory potential. Yet although it has not been argued here that such ideas are untenable *per se*, as practical means toward qualitative change, it may be asserted that Marcuse could have set his sights on somewhat more realistic strategies. For example, in a purely practical context, it is difficult enough today even to save certain natural enclaves or species from the onslaught of commercial 'development', let alone nature as a whole. Nevertheless, rather than just calling for the "decommercialisation" or "deindustrialisation" of parts or aspects of art or nature, Marcuse was placing his hopes in far more radical goals, and it is in his final works that this vision reaches its most optimistic proportions.

In one sense, this is confusing as Marcuse was a philosopher who had long stressed his concern for philosophy to have practical as well as theoretical worth; to address and critique the concrete, lived experience of modern life in the advanced industrial nations.[91] Of course, he could not necessarily

90 Feenberg, *op.cit.* (2005), pp. 94-95.

91 For an early example of this intention, see Marcuse, 'On Concrete Philosophy', in Abromeit and Wolin, (eds), *op.cit.* (2005), pp. 34-52.

have envisioned how soon concerns such as resource depletion, mass extinction, pollution and environmental degradation in general would come to pose dangers to civilisation on a global scale despite him earlier mentioning that qualitative change was now a matter of "survival",[92] but as such concerns are now in the background of an increasing number of discourses, it seems likely that were he alive today, they would play a more significant role in his philosophy. Indeed, given the urgency of questioning technology in an environmental context, calling for production to be driven by values other than the acquisition of money, power, and the consequential exploitation of nature are of the utmost importance, however, again, it seems vanishingly likely that such motivations could be replaced by those within the aesthetic realm any time soon. Despite the forces of production remaining directed toward the plunder and desolation of nature, the time for experimenting with aesthetics rather than considering concrete praxis appears to be dwindling.

Perhaps, as Gandesha points out, the "ambiguity" regarding Marcuse's understanding of nature can be clarified when it is recalled that the two major sources informing his critique are historical materialism and phenomenology.[93] For Gandesha, this amounted to "an ambivalent juxtaposition of technology as neutral instrumentality, fettered only by society's production relations, on the one hand, and technology as a world-disclosing *project* on the other."[94] Of course, as he continues, Marcuse's ambivalence in regard to technology is further diminished by the distinction he placed between technics (ethically neutral artifacts if viewed in abstraction from the mode of production) and technology (a value-laden "social process"), in which the rationality of the latter serves as an *a priori* which forms both the precondition and horizon guiding the development of the means and relations of production.[95] In this move, a comparison with Heidegger's thesis in 'The Question Concerning Technology' is again obvious; in the final analysis, both thinkers appear to be in agreement that any philosophy of technology (that is to say, one which addresses technology as a whole rather than individual technical artifacts) is insufficient if it is limited to the latter, as this would be to exclude that which Heidegger characterised as a "mode of revealing" and "nothing technological, nothing on the order of a machine", and that Marcuse refers to as a social process and mode of production.[96] Both thinkers contrast the technical practices of the past which they claim were driven by "the realization of essential potentialities" with those of the present, which now tend

92 See Marcuse, *op.cit.* (1972b), p. 174.
93 See Gandesha, *op.cit.* (2004), p. 195.
94 Gandesha, *ibid.* (2004), p. 196.
95 See Feenberg, *op.cit.* (2005), p. 105; and Marcuse, *op.cit.* (1964), p. 157.
96 Heidegger, *op.cit.* (1954), p. 305.

to be relativised and treated as the "democratic" satisfaction of personal preference, administered by a technical edifice "which 'enframes' nature and society in a rationality of calculation and control."[97] Finally, both look for alternatives in art. However, instead of addressing technical mediation in ontological terms and recommending a patient acquiscence in regard to its apparently semi-autonomous revelations *as per* Heidegger, Marcuse's Marxian approach led him to address its concrete socio-political manifestations, ideology and impacts, as well the interests and incentives of the human agents behind its workings.

However, even with this influence taken into consideration, the ambivalence of Marcuse's somewhat romantic view of nature is not rectified quite so easily as his understanding of technics and technology. As will now be argued, it is the optimistic nature of Marcuse's broader claims concerning human nature *and* first nature that both secures the continual relevance of his philosophy, but is not without its problems.

Misapprehending Nature

In agreement with Vogel, the major problem facing Marcuse's view of nature is not that he was arguing domination or exploitation are inherent features of production, but that nature embodies *inherently positive* features that tend to be contained and concealed by the peculiarly singular rationality of the technological mode of production.[98] Yet whilst a "human appropriation" of nature which would aim to restore and emphasise its "life-enhancing" and "aesthetic qualities"[99] is a noble vision, it seems excessively optimistic on the basis of Marcuse's own critique of the 'one-dimensional' society, and insufficiently cautious in the context of the role of capitalism in providing further stimulation to the predicament. Furthermore, Vogel's solution to this problem – that 'nature' is a social construction – is arguably of little help also. What follows will therefore firstly provide a concrete example as to how Marcuse's optimism may actually diminish the potential for change, before briefly taking a critical look at the treatment of Marcuse's view from Vogel.

Firstly, any number of examples that attest to the many ways in which nature *per se* is nurturing,

97 Feenberg, *op.cit.* (2005), p. 88. For an argument to this effect in relation to the media specifically, see R. Hoggart, *Mass Media in in a Mass Society: Myth and Reality,* (London: Continuum, 2004).
98 Vogel, *op.cit.* (2004), p. 244.
99 Marcuse, *op.cit.* (1972a), p. 67.

life-enhancing or positive can be contrasted with just as many examples which illustrate its harshness, violence, and starkly inhuman aspects. This counts not just for 'first nature', but for human nature – as Dostoevski noted; it is only humans that are "artistic" and "picturesque" in the context of their violence; only (some) humans seem capable of authentically evincing the concept of gratuitous cruelty, so it can be admitted that this appears to be a *social* construction.[100] Indeed, unless we are to consider the tendency of the domestic feline to toy with its prey as a form of 'sport' or even 'psychopathy', considering nature as a whole as either essentially good or evil would appear to ignore its supreme indifference to such distinctly human conceptions, as well as the extent to which just this indifference was in fact a motivation for human technical capacities in the first place.[101] Despite the positive potential of natural selection, it consists in a process which is – by supposed 'human standards' – grisly; a brutal competition delimited by opportunity on the one hand and the avoidance of death on the other, in which the vast majority of mutations are disadvantageous. Furthermore, human nature may well be able to be countenanced in terms of subjective and intersubjective status, as may – albeit in varying degrees – a great many species of non-human animals, yet the same cannot be said for nature *as a whole.* Conceived either in biological / evolutionary, chemical or physical forms, once again, nature *per se* is oblivious to suffering, notions of ethical conduct, aesthetic sensibilities and beauty, despite all these things ultimately originating from it.

It is important to recall that Marcuse was not entirely against approaching nature in an instrumental fashion which separates his thought from various schools of environmental ethics which are critical of the instrumentalisation of nature on the basis of its inherently masculine, reductionistic, or anthropocentric features.[102] On the contrary, Marcuse expressed his hope that nature could serve as a

100 F. Dostoevsky, (1880), *The Brothers Karamazov,* book V, chapter four, (London: Penguin, 2003), p. 311. See also Feenberg, *op.cit.* (2005), p. 133.

101 A feature of early philosophy of technology, now, unfortunately usually relegated to the more radical branches of philosophical-anthropology was the theory of "organic substitution", owed to Ernst Kapp's work, *Grundlinien einer philosophie der technik: Zur entstehungsgeschichte der cultur aus neuen gesichtspunkten,* (Ann Arbor: University of Michigan Library, 1877). Other examples of this theory can be found in A. Gehlen, (1965), 'A Philosophical-Anthropological Perspective on Technology', in *Philosophy of Technology: The Technological Condition,* edited by R.C. Sharff and V. Dusek, (Oxford: Blackwell, 2005), pp. 213-220; *Der Mensch. Seine Natur Und Seine Stellung in Der Welt,* (Düsseldorf: Akademische Verlagsgesellschaft Athenaion, 1974). See also J. Ortega y Gasset, (1939), 'Thoughts on Technology' in *Philosophy and Technology,* edited by C. Mitcham and R. Mackey, (Cambridge MASS: The MIT Press, 1983), pp. 290-313. For a recent palaeoanthropological approach with strong similarities to the theory of organic substitution, see T. Taylor, *The Artificial Ape: How Technology Changed the Course of Human Evolution,* (London: Palgrave-Macmillan, 2010).

102 For a brief introduction to the ecofeminist critique which establishes parallels between the domination of women and the domination of nature, see K. Warren, 'The Power and Promise of Ecofeminism', in *Ethics: The Big Questions,* edited by J. P. Sterba, (Malden, MASS: Blackwell, 1998), p. 414. The deep ecology movement is also broadly critical of the instrumentalisation of nature. See for example the collected volume *Deep Ecology for the 21st Century,* edited by G. Sessions, (London: Shambhala, 1995).

"gauge" that could promote a very different attitude or sensibility which would inform both the relations and means of production and replace their current repressive instantiations.[103] Again, following Marx – he contended that such treatment may not only be informed by incentives of plunder and exploitation, but in "conformance with the laws of beauty".[104] In the new society, nature would take on the status of "subject-object"; "as a *cosmos* with its own potentialities, necessities, and chances."[105] Taken on face value, such comments once again appear perfectly laudable; as Feenberg summarises the point in reference to a comment in *Counterrevolution and Revolt* : "the point is not to avoid disturbing nature but to avoid 'violating' it."[106] But again: the "laws of beauty" are *human* laws; unless one is to accept (say) Vogel's contentions that nature is a social construct, they occur only accidentally in the context of nature *per se*.[107] Just as problems emerge in conceiving of nature in terms of the language of rights emanating from the liberal, social contract tradition, speaking of the 'violation' of nature appears to imply a subject capable of consent at one end of the scale, or at the other, at least an inherent *telos*, a 'principle of order' which is being forcibly overridden by an agent somehow removed from the natural scheme of things.[108] This is to return to the second prong of Habermas's criticism, but aside from this, Marcuse's move arguably verges on both inductive generalisation and anthropomorphisation.[109] Whilst it can be agreed that industrial practises such as coal-mining have a destructive effect upon the surrounding environment and atmosphere, to refer to them as a form of 'violation', despite its poetic or emotional appeal, appears procedurally inappropriate. Although doubtless the vast swathes of animals subjected to the grisly prospects of human consumption and experimentation may be said to be violated in *individual* manners, this is precisely because they are sentient beings, capable not just of suffering and pain, but having an interest in resisting or avoiding them.[110] As Epicurus famously thought, the avoidance of pain and suffering and the pursuit of pleasure were not merely the basis of human moral conduct, but common to all beings / subjects capable of experiencing them.[111] Yet once again,

103 See Marcuse, op.cit. (1969b), p.27; (1972a), pp. 79-128; and (1978).

104 K. Marx, 'First Manuscript: Alienated Labor', XXIV, in Fromm, *op.cit.* (1961), p.84. See also Marcuse, *ibid.* (1969b), p. 27.

105 Marcuse, *op.cit.* (1972a), p. 69.

106 Feenberg, *op.cit.* (2005), p. 107.

107 To clarify further: it is not being argued here that certain individual creatures or species are not capable of carrying out ethical conduct or capable of enjoying pleasure – on the contrary – anyone who has stroked a dog's belly knows this position is false. Secondly, it also goes against the weight of the findings of modern ethological research which indicates exactly the opposite in a large variety of species. See for example J. Balcombe, *Pleasurable Kingdom: Animals and the Nature of Feeling Good,* (London: Palgrave Macmillan, 2007) and C.D.L. Wynne, *Animal Cognition: The Mental Lives of Animals,* (London: Palgrave Macmillan, 2002).

108 For a critique of the language of rights applied to nature, see M. Midgley, 'Duties Concerning Islands' in *Environmental Ethics,* edited by R. Elliot, (Oxford: Oxford University Press, 1995), pp. 247-261.

109 Although the sentiment can be agreed upon, John Gray arguably commits this error by referring to the human species as "*Homo rapiens*" in his *Straw Dogs,* (London: Granta, 2003), p. 7, 184.

110 See P. Singer, *Animal Liberation,* 2nd ed., (London: Pimlico, 1995), pp. 9-16.

111 See N.W. DeWitt, (1954), *Epicurus and his Philosophy,* (Minneapolis: University of Minnesota Press, 1964), p. 220

nature as a whole cannot be apprehended as such a "subject" as it neither experiences nor is motivated by either "static" or "kinetic pleasure", despite many of its denizens arguably being capable of such states. Nor does nature as a whole have anything that could be described as "interests"; these instead derive from beings with the cognitive capacity to accommodate some sort of internal will or instinct, some will to pursue or resist, something which plankton or slime-moulds may only possess to limited degrees, but orang-utans and ferrets in a far greater sense. The point is, nature as a whole does not possess these things, and it has little more than methodological instrumental value for theory to presume that it does.[112] Evidently, Marcuse was aware of such problems,[113] however, his response is arguably far from satisfactory and further propels his late social-critical theory further away from concrete practicality.

Marcuse's problem arguably emanates from his "monistic" approach to nature which entails "that a single moral philosophy of ethical theory is required to generate our correct duties and obligations toward the environment". As Andrew Light continues, this can be contrasted with that of the "pluralist" approach which contends that "the sources of value in nature are too heterogeneous in kind, and because the multitude of contexts in which we find ourselves in different kinds of ethical relationships demand a diverse set of methods for fulfilling our moral obligations."[114] This arguably has the effect of vitiating Marcuse's view, which tends to subsume various aspects of nature ('first nature' itself, feminine nature, non-human animal natures, etc.), into a unified whole. Furthermore, placing the majority of emphasis on the prospect of human liberation may have the effect of stultifying or discouraging various other practical ecological or liberatory strategies which are not only achievable *now*, but in contrast with Marcuse's far more lofty aspirations, less difficult, risky and radical. Take diet as an example: the practical project of diminishing the pollution, environmental degradation, waste and suffering that are the obvious and necessary results of the modern intensive or "factory farm" style system of animal production is possible and quite feasible in the affluent nations. Yet reducing the tendency toward such 'farming' operations may be discouraged for the reason that Marcuse believed such projects must come second to the liberation of humanity as a whole:

> Can the human appropriation of nature ever achieve the elimination of violence, cruelty and brutality in the daily sacrifice of animal life for the physical reproduction of the human race?

112 See T. Lewens, *Organisms and Artifacts: Design in Nature and Elsewhere,* (Cambridge, MASS: The MIT Press, 2005).
113 Marcuse, *op.cit.* (1972a), p. 65.
114 A. Light, 'Are All Anthropocentrists Against Nature?' in *Rethinking Marxism,* 11:4, (1999), p. 97.

> To treat nature "for its own sake" sounds good, but it is certainly not for the sake of the animal to be eaten, nor probably for the sake of the plant. The end of this war, the perfect peace in the animal world – this idea belongs to the Orphic myth, not to any conceivable historical reality. In the face of the suffering inflicted by man upon man, it seems terribly "premature" to campaign for universal vegetarianism or synthetic foodstuffs; as the world is, priority must be on *human* solidarity among human beings. And yet, no free society is imaginable which does not, under its "regulative idea of reason," make the concerted effort to reduce consistently the suffering which man imposes on the animal world.[115]

This passage is both provocative and telling, and is arguably an aspect of Marcuse's theory that invites strong criticisms, not least his dubious alignment of the sentience of the Hibiscus to that of the Chimpanzee. Initially, it may be asked to what extent the goal of "perfect peace" in the *human* world is a utopian aspiration, but even if it is, surely Marcuse would have contended that this ought not undermine the chances for incremental improvements. Although he did not go so far as to fallaciously assume that the prospect of (say) the diminution of animal suffering *excludes* improvements to the human lot, his comment that such actions appear "premature" is certainly questionable, as the goal of the former is hardly isolated from that of the latter. Aside from questions as to how animals ought to be treated in an ethical context, there are many practical environmental reasons to contend that the relatively minor choice to adopt a vegetarian or vegan diet, or at least significantly reduce one's consumption of meat products is – if not exactly environmentally *beneficial* – far less detrimental than a carnivorous diet, and also potentially healthier.[116] Secondly, as Peter Singer has repeatedly argued, adequately feeding the entire population of the Earth is obviously contingent on the amount of food available, and with the global population expected to rise and then plateau between roughly 9 and a half to 10 billion individuals by the 2050s through to the 2070s, feeding the human population is actually *hampered* by the increasing technologically, economically rational tendency to treat farms as "corporate agribusiness entities", or as simply means of profit rather than genuine forms of practical technical advance:

> Some people think that factory farming is necessary to feed the growing population of our planet. The truth, however, is the reverse. No matter how efficient intensive pork, beef, chicken, egg and milk production become, in the narrow sense of producing more meat, eggs

115 Marcuse, *op.cit.* (1972a), p. 68.

116 On the health benefits of a vegetarian diet, see for example A. Pan *et al,* 'Red Meat Consumption and Mortality', *Archives of Internal Medicine,* American Medical Association, (March, 2012), pp. 555-563. See also R. Stanton, 'A Plant-Based Diet – Good for Us and Good for the Planet', in *The Medical Journal of Australia Open, 1,* Supplement 2, (04.06.2012).

> or milk for each pound of grain we feed the animals, raising animals on grain remains wasteful. Far from increasing the total amount of food available for human consumption, it reduces it.[117]

Obviously, it is not being argued here that Marcuse would have explicitly excused – let alone endorsed – the morally vacant, economically-rationalised modern technoscientific processes of intensive farming, live exports and so on, but that he does not connect them to the irrational rationality he himself was so attentive to in his social critique. To be sure however, it may well be in the domain of our conduct toward animals that this irrational rationality is most starkly evident. In distancing what can easily be accomplished in practice – especially in the affluent societies that certainly do not lack for protein or fats – the potential for change seems to be passed over by Marcuse due its apparently piecemeal efficacy. In lieu of the goal of "world-historical change" this approach easily leads to the dismissal of not only ethical / environmental vegetarianism / veganism, but those who refuse other environmentally destructive advantages afforded by the advanced industrial nations. If such efforts can be so quickly dismissed as premature, Marcuse appears to have missed a crucial and potentially formative opportunity for *some* change at the expense of awaiting the perhaps overly-optimistic goal of "qualitative change". Such views – even amongst contemporary environmental thinkers – are not unusual. For example, as James Lovelock claims:

> In theory, we could eat less and save energy, but in practice we never will, unless made to do so (...) If our leaders were all great and powerful they could ban the keeping of pets and livestock, make a vegetarian diet compulsory, and fund a huge programme of food synthesis by the chemical and biochemical industries: doing this might limit the loss of life to pets and livestock only (...) almost certainly, it will never happen this way.[118]

Affluent individuals – if they so choose – could *easily* halve, or even halt their consumption of factory farmed products tomorrow and hence send a considerable message that even the market would acknowledge, for there is nothing *determining* them to not do so. Some statistics arguably bear out these contentions. For example: surely it is *irrational* to drain aquifers in order to irrigate grain crops that could be fed directly to the hungry rather than to beef cattle which are then consumed by individuals affluent enough to meet their nutritional requirements without it. As a recent report by the United Nations Food and Agriculture Organisation noted, it is only

117 P. Singer and M. Mason, *The Ethics of What we Eat: Why Our Food Choices Matter,* (London: Text, 2006), p. 210.
118 J. Lovelock, *The Vanishing Face of Gaia,* (London: Allen-Lane, 2009), p. 49.

economically rational to permit modern 'farming' practices of raising, feeding, transporting and producing livestock which cause ecologically destructive effects on a "massive scale".[119] To expand on this contention, current rates of livestock production allegedly contribute around "14 to 22 percent of the of the 36 billion tons of 'CO2 equivalent' greenhouse gases the world produces every year",[120] and beef is the least efficient animal-production form of all, requiring "an energy input to protein output ratio of fifty four to one", closely followed by sheep at fifty to one,[121] and contributing fifty seven times the amount of greenhouse gases to the atmosphere than growing potatoes.[122] In terms of protein inputs and outputs, around "41 million tons of plant protein is fed to US livestock to produce an estimated 7 million tons of animal protein for human consumption."[123] In simple terms, this represents a figure of approximately 6 kgs of plant-based protein input to produce 1kg of beef, and in other countries the input required is significantly higher. To be sure however, despite improvements in efficiency, what is not often taken into account in such figures is "the fact that only about half the weight of a steer is boneless beef. 13 pounds (5.89 kgs) of grain are required to produce that single pound (.45 kgs) of beef."[124] On a global scale, irrigating this grain-based protein for stock is said to utilise "70 percent or more of all water used", and once again: despite the estimates of the amount of water required to produce a steer varying significantly from country to country, and also on the method of calculation used,[125] a kilogram of grain-fed beef requires "at least 15 cubic metres (15,000 litres or 15 tonnes) of fresh water."[126] Worse still, these forms of aggressive, mechanised production are also aspired to by the populations of developing nations as they pursue economic growth, and if the trends continue, the more affluent a country becomes, the more meat their populations are likely to consume.[127] To put this into context, a study by Vaclav Smil cited by Singer and Mason calculated that if everyone in the world was to consume the equivalent amount of meat devoured by the affluent nations at 2000 levels, "in the absence of some unforeseen advances in bioengineering, (this would) require 67 percent more agricultural land than the world possesses."[128] Furthermore, the methane emissions from the livestock themselves contribute to global warming, making pastures requires land-clearing and deforestation, and the

119 H. Steinfeld, P. Gerber, T. Wassenaar, V. Castel, M. Rosales, and C. De Haan, 'Livestock's Long Shadow: Environmental Issues and Options', a report for the United Nations Food and Agriculture Organisation (FAO), (Rome, 2006), p. xx.
120 Steinfeld et al, *ibid.* (2006), chapter three.
121 D. Pimantel, 'Livestock Production: Energy Inputs and the Environment', *American Journal of Clinical Nutrition*, vol.78, no.3, (September, 2003), pp. 660-663.
122 N. Fiala, 'How Meat Contributes to Global Warming', *Scientific American,* (February 4, 2009).
123 A. Berntell, executive director of the Stockholm International Water Institute (SIWI), quoted in A. Kirby, 'Hungry World "Must Eat Less Meat"', *BBC News*, (August 16, 2004).
124 Singer and Mason, *op.cit.* (2006), p. 212.
125 See Singer and Mason, *ibid.* (2006), pp. 212-215.
126 Berntell, *op.cit.* (2004).
127 See Steinfeld, et al, *op.cit.* (2006).
128 Singer and Mason, *op.cit.* (2006), p. 211.

livestock industry's dependence on government subsidies and petrochemicals in order to produce pesticides, fertilisers, and to fuel machinery need only be cited.[129] Yet compounding the irrationality even further, influential apologists and lobbyists for the livestock industries and their governmental "regulators" appear utterly impotent even to put effective regulatory guidelines into place that would ensure the slaughter of the unfortunate stock is carried out with minimal suffering. Despite the horror stories regularly featuring on news and current affairs programs featuring torture, dismemberment, terror, and other forms of barbaric abuse to non-human animals sufficient even to ignite the meat-eating public's outrage,[130] in their defense, the regulators continue to emphasise the money generated by the industry, the jobs and livelihoods of the families involved, all the while invoking oxymoronic public relations phrases such as "sustainable development" and "ethical slaughter". Even advocates of meat-consumption such as Hugh Fearnley-Whittingstall and Michael Pollan have strongly criticised intensive farming operations.[131] For example, the former writes:

> The vast majority of our food animals are now raised under methods that are systematically abusive. For them, discomfort is the norm, pain is routine, growth is abnormal, and diet is unnatural. Disease is widespread and stress is almost constant.[132]

Roger Scruton – an unrepentant carnivore (and defender of fox hunting) – has written that "a true morality of animal welfare ought to begin from the premise that this way of treating animals is wrong".[133] Hence, in summary, not only are there obvious reasons for intensive farming to be rejected on ethical grounds, there are equally solid reasons to reject it on environmental and even health grounds.[134] Yet it is not rejected. Why not? Unfortunately for the philosophers, the answer seems to be quite simple: the example set by the affluent nations – which continue to eat more meat than ever before at a point when they could most afford *not* to do so – reveals a paradigm of irrational rationality, a paradigm that will likely not be overcome with more information, more knowledge, or more elegant philosophical arguments, but only through widespread attitudinal

129 This theme can be explored further in works such as *Food, Inc.,* edited by K. Weber, (New York: Public Affairs Press, 2009); and P. Singer and J. Mason, *Animal Factories: What Corporate Agribusiness is Doing to the Family Farm,* (New York: Three Rivers Press, 1990).

130 It must be emphasised that – due to the necessary subterfuge required on behalf of the livestock industry to divert the public's attention, such footage overwhelmingly comes from groups courageous enough to violate the law by trespassing on private or corporate owned operations.

131 See M. Pollan, 'An Animal's Place', *The New York Times* Sunday Magazine, (November 10, 2002). See also Pollan, *The Omnivore's Dilemma: A Natural History of Four Meals,* (New York: Penguin, 2006).

132 H. Fearnley-Whittingstall, quoted in Singer and Mason, *op.cit.* (2006), p. 218.

133 R. Scruton, quoted in Singer and Mason, *ibid.* (2006), p.219. See also Scruton's *Animal Rights and Wrongs,* (New York: Continuum, 2006).

134 See for example, R. Stanton, 'A Plant-Based Diet – Good For Us and For the Planet', in *Medical Journal of Australia Open,* (2010), 1, suppl. 2: 5-6.

change; the sort of “new sensibility” Marcuse continually emphasised. To the extent that the goal of human liberation requires a truly sustainable source of adequate nourishment, ignoring or sidelining animal-rights issues and the impact of modern agriculture on the environment is – on the contrary – arguably deleterious to such a prospect. Despite the utopian context of "perfect peace in the animal world" obviously being close to impossible, at least a rudimentary attempt at restoring some sanity and morality ought not be left to await the answer to the question as to whether the prospect is equally utopian in the human world. Other than their taste for meat-products, there are no substantial reasons – let alone technologically deterministic forces – to stop affluent individual consumers from opting out of contributing to the unnecessary suffering of sentient beings and adopting a more conservative version of "the Great Refusal" in response to the waste and excess that is the necessary result of intensive farming.

It has been the aim thus far to argue that Marcuse's optimism concerning the scope of the prospects of qualitative change may leave certain vital ethical and practical concerns in abeyance.[135] As such, his conviction that little short of a world-historical revolution is required to bring about change could be seen as playing a stultifying rather than liberating role. To be sure, at least Marcuse did not share Habermas's initially somewhat flippant disregard of these particular concerns, a position the latter made abundantly clear in his association of vegetarianism with "taboo", "mystically inspired philosophies of nature", and the "anthropomorphising treatment of house pets."[136] As Vogel understandably retorts:

> The supercilious tone – not to speak of the glaring *petitio principii* involved in relegating vegetarianism without argument to the status of an irrational taboo, or in trivializing concerns for animals into sentimentality about pets – doubtless sets one's teeth on edge; Habermas seems blind to the serious kinds of concerns expressed by proponents of an ecological ethics.[137]

The topic of human conduct toward its sentient non-human cousins has been raised for the reason that it arguably represents a superior "gauge" than nature in general by which one can at least

135 For a critique of Marcuse's view of human nature from a 'biological' perspective, see J. Noonan, 'Marcuse, Human Nature, and the Foundations of Ethical Norms', in *Philosophy and Social Criticism,* vol. 34, no. 3, (March, 2008), pp. 267-286. See also Mason, *op.cit.* (1982).

136 Quoted in Vogel, *op.cit.* (1996), p. 153.

137 Vogel, *ibid.* (1996), p. 153. Vogel does note however that Habermas later softened this position considerably. See Habermas, 'A Reply to My Critics', in *Habermas: Critical Debates*, edited by J. Thompson and D. Held, (London: Macmillan), p. 245.

anecdotally measure the willingness of individuals – especially those in the affluent societies who do not necessarily have to consume meat in order to receive sufficient nourishment or nutrition – to reduce their strain on the Earth as well as markedly reduce the quotient of non-human suffering.[138] Suffice to say, currently the gauge appears to be registering a low probability of change. Unfortunately however, at worst, Marcuse's views could be seen to play into the hands of the more visceral detractors of animal ethics who commonly award precedence to human interests, enthymematically assuming that doing one precludes doing the other. As there remain human beings who continue to suffer, the ethical vegetarian or vegan is therefore easily painted in the public mind as at best, a pretentious quirk of affluent, middle-class society, naive and insensitive to the more significant problems affecting humans worldwide; or at worst, dangerous radicals, "extremists", and even "terrorists". However, as has been argued, this is far from the case, and carries the tacit presumption that human and non-human problems are isolated from each other. Worse, such dismissals arguably also provide an excuse for a lack of practical action on the part of the affluent public who are culturally conditioned to defend their meat consumption with all the tenacity one would usually afford a natural right.

Nature as Social Construction

Other philosophers who have dealt extensively with Marcuse's theory of nature have been led to similar difficulties. For example, although not attempting to retrieve Marcuse's late concepts of a new technology and a subjectivisation of nature from obscurity, Feenberg tries to make sense of them by placing them into a variety of other philosophical frameworks, specifically phenomenology, which appears to be the only context in which Marcuse's views may be rendered coherent.[139] Although Feenberg offers many constructive suggestions, the major problem facing Marcuse's theory was the attempt to reconcile his reliance on the philosophical-anthropological views of the early Marx, and – as has already been briefly noted – Marx's views do not square easily with Marcuse's account of nature which attempts to understand it in terms of its own potentials. Although Feenberg notes that "what is truly innovative in Marcuse's position is the hypothesis that once increasing wealth releases society from the struggle for existence, perception can transcend the given toward unrealized potentialities foreshadowed in art",[140] Marcuse's

138 See Stanton, *op.cit.* (2010).
139 See Feenberg, *op.cit.* (2005), chapter six.
140 Feenberg, *ibid.* (2005), p. 128.

approach appears to once again fall into a number of considerable problems.

Another prominent critique which has already been touched on above is that of Steven Vogel, who is justifiably critical of how nature was conceived not just by Marcuse, but in the Western Marxist tradition as a whole.[141] As this latter element is the target of his focus, what follows will be limited to Vogel's treatment of Marcuse as well as critically attending to Vogel's proposed solution: that nature is a "social construct".

Vogel finds those aspects of Marcuse's view where he sounds like a proto-social constructivist appealing, however, as it has already been noted, Marcuse also argued that nature was an external domain; that it was literally 'out there', independent of and external to human minds.[142] Despite this leading Marcuse's approach into ambiguous territory, this very ambiguity seems sensible in the sense that, on the one side, it can be understood that our *concepts* of nature, the environment, etc. are, as Marcuse claims, "historical" – which is to say socially constructed – which is hardly a controversial idea. Equally uncontroversial is that nature also exists independently of human experience, yet Vogel's main contention is that philosophical consistency requires adopting one option at the exclusion of the other, but as will become clear below, he went significantly further than arguing our 'concept' of nature was a social construction.

As discussed in the first part of this thesis, Marcuse's view of nature was highly indebted to Marx who – in some moods – also sounds mildly like a proto-social constructivist. As Marcuse noted, the instrumental evaluation of first nature emerges as a necessary side effect of humanity's self-creation; "...not only man but also nature 'comes to be' in history, insofar as it is not something external to and separated from the human essence but belongs to the transcended and appropriated objectivity: "world history" is "the transformation of nature *for* man."[143] Although Vogel's position has considerable philosophical relevance in regard to the somewhat rarefied vantage point of the treatment of nature by the critical theorists, the thesis that nature is a social construction arguably leads to various other problematic implications, especially in terms of our practical dealings with the environmental crisis. As Vogel's work encompasses a number of the major figures of the

141 See Vogel, *op.cit.* (1996).

142 In one of his final speeches, Marcuse repeatedly noted nature's "external" status, speaking of the "pacification of external nature". See Marcuse, 'Ecology and the Critique of Modern Society' in *Capitalism, Nature, Socialism,* 3:3., (Copyright © 1992 by Peter Marcuse), p.36. See also Marcuse, *op.cit.* (1972a), p. 59.

143 Marcuse, (1932), 'New Sources on the Foundation of Historical Materialism' in *Marcuse: A Critical Reader,* edited by J. Abromeit and W.M. Cobb, (New York: Routledge, 2004), p.102. Compare the comment in Marcuse, *op.cit.* (1972a), p. 2.

Western Marxist tradition (Lukács, Horkheimer, Adorno, Marcuse and Habermas), a sustained critique of his entire thesis will not be possible here, instead, some criticisms will be offered in regard to his major conclusion.

The thesis that nature – or indeed, reality itself – is a social construction remains common, although perhaps not so common as it was in the late 1980s through to the mid 1990s.[144] Perhaps the most famous version of the view to appear in recent times was made by Bill McKibben, who since the release of his 1989 bestseller, *The End of Nature,* has continued to argue that the biosphere, the oceans, the weather – even the planet itself – are no longer external to humanity, but are shot through at virtually every level with the signs of material human presence.[145]

> The storm that might have snapped the hot spell may never form, or may veer off in some other direction, not by the laws of nature, but the laws of nature as they have been rewritten, blindly, crudely, but effectively, by man. (...) A child born now will never know a natural summer, a natural autumn, winter, or spring. Summer is becoming extinct, replaced by something else which will be called 'summer'.[146]

Although Vogel's point is less starkly conveyed than McKibben's and is explicitly epistemological and ontological, following his argument where it leads ends up at the similar conclusion that nature is not merely isolated; "Other", or in Adorno's words, "the nonidentical";[147] it is, and always was an *artifact*, and that the concept of nature itself is too problematic and ambiguous to be of any assistance to environmental ethics. To be sure – both McKibben and Vogel's illustration of this thesis are believable to certain extents; the former is obviously correct in claiming that the weather (for example) is no longer entirely 'natural' in the same sense as it was prior to the growth of human industry. Yet even McKibben agrees that there is – or was – something *out there*, so to speak; some*thing* that has been changed, tampered with, tainted, is worthwhile attempting to recover, and that its essence is not exhausted by the signifiers attached to it. However, Vogel's thesis explicitly

144 See for example V. Burr, *An Introduction to Social Constructionism,* (London: Routledge, 1995); W. Chaloupka and R. McGreggor Cawley, 'The Great Wild Hope: Nature, Environmentalism, and the Open Secret', in *In the Nature of Things: Language, Politics, and the Environment,* edited by J. Bennett and W. Chaloupka, (Minneapolis: University of Minnesota Press, 1993), pp. 3-23, and E.A.R. Bird, 'The Social Construction of Nature: Theoretical Approaches to the History of Environmental Problems', in *Environmental Review,* 11, (1987), pp. 255-64.

145 See B. McKibben, *The End of Nature,* (London: Penguin-Viking, 1989), and *Eaarth: Making Life on a Tough New Planet,* (Melbourne: Black Inc, 2010). Vogel discusses McKibben's thesis in 'Environmental Philosophy after the End of Nature', in *Environmental Ethics,* vol.24, issue 1, (Spring, 2000), pp. 23-39.

146 McKibben, *ibid.* (1989), p. 54.

147 See T. Adorno, (1966), *Negative Dialectics,* (London: Routledge, 2006).

denotes that nature has only ever been a social construct is therefore arguably far more radical. Once again, if limited to an epistemological claim, i.e., if Vogel's concern was restricted to how nature comes to be conceived, understood, apprehended, etc. then it is hardly radical that whatever understanding of it is given will be socially constructed. This also entails such 'understandings' are culturally variable: the culture of Hesiod had a different account of the dynamics of the movement of the sun to the cultures from which the Inca or Einstein emerged. Yet Vogel's claim goes quite a deal further than this, opting for a "strong" version of the constructivist approach, in which nature is *just* an artifact or sub-set of the social; hence, it can be viewed as something we construct. Unlike various other theorists to have adopted the social constructivist stance in regard to nature, Vogel's argument does not equivocate or vacillate between the separate contentions that *nature* is a social construct and that our *concept* of nature is socially constructed.[148] After offering criticisms of Habermas' views, he describes his position as follows:

> Nature cannot both be constituted by us and independent of us, not produced by interests and the origin of these interests; one or the other claim has to be given up. I have already indicated that I think it ought to be the latter; this seems to me to be the lesson to be learned from the trajectory of Western Marxist thought on nature as a whole from Lukács to Habermas. There is no "nature in itself," or at least none we can say anything about or that it does the slightest good for our epistemology to assume.[149]

As Vogel makes clear at the onset of his discussion, the "specific form in which the thesis that 'nature is a social construct'" will appear in his book consists in a "quasi-Hegelian" approach which emphasises "the way in which the environment that surrounds us and that we take for granted as 'natural' turns out on investigation to be the product of human labor and hence *literally* socially constructed."[150] Human labour is of course, intellectual, physical, instrumental action, and so nature *in toto* is conceived as "umwelt"; a mind-dependent entity that is always already human. There are seemingly obvious problems immediately emerging from this view, but this is not to say that they should be ignored. For example, as David Kidner notes:

> ...most of us would accept that the way we see an animal will be affected by the type of binoculars we use. However, we might be more reluctant to accept that the animal is

148 D.W. Kidner notes this tendency in various sources in his 'Fabricating Nature: A Critique of the Social Construction of Nature', in *Environmental Ethics,* v.22, (Winter, 2000), p. 343.
149 Vogel, *op.cit.* (1996), p. 123.
150 Vogel, *ibid.* (1996), pp. 6-7.

constructed by the act of looking through the binoculars, or that it has no independent existence aside from this act.[151]

Nevertheless, the final sentence is exactly what Vogel is arguing. As he writes: "we do not think the world, or imagine it, but rather build and rebuild it through concrete action that is difficult and sometimes fails."[152] As a consequence, it appears that any evaluation of nature based on (say) its rarity, its 'untouched' or 'pristine' condition must be abandoned; old growth forests and monocultural plantations, genetically engineered species of wheat and the progenitor species it was derived from are ontologically one and the same.

The chief incentives motivating Vogel's argument are apparently philosophical consistency and a keenness to avoid the naturalistic fallacy which plagues various schools of environmental ethics – especially Deep Ecology – in their haste to construct non-anthropocentric and non-instrumental approaches to the moral worth of the natural environment. As Andrew Light notes in his discussion of Vogel's thesis, "the overwhelming majority of environmental ethicists are, at best, hostile to anthropocentrism and indifferent to questions of built space and, at worst, see anthropocentric views and questions of built space as *a priori* excludable from the terrain that we can properly call environmental ethics."[153] Nevertheless, Light cautiously notes that it is not clear how Vogel's contention can carry much normative weight:

As with any constructivist view, a fair question is how we are to determine the right way of coming up with norms about nature. But how do we know and on what grounds can we tell if we have failed to build the world correctly? One answer would be to make a purely procedural claim that we can fail to build the world correctly when we do so in a manner that violates the proper function of a communicative ethics. But beyond this recommendation, I find it hard to discern other ways to differentiate good decisions from bad ones, or rather the creation of better or worse structures in the world.[154]

Perhaps the dichotomy Vogel draws on between the view that nature is either independent of us or constructed by us is too sharp; the question may after all come down to degree rather than type. For example, just because one human sets foot in a pristine environment, (or contemplates the

151 Kidner, *op.cit.* (2000), p. 343.
152 Vogel, *ibid.* (1996), p. 139.
153 Light, *op.cit.* (1999), p. 94.
154 Light, *ibid.* (1999), p. 99.

atmosphere of Venus), this hardly makes either of these entities an "extra-social" artifact. As Peter Hay comments on this contention in relation to McKibben's view, "Whilst the time may come when nature is reduced to a sub-set of culture, we have not reached that time yet...

> Why should it be assumed that the smallest incursion of culture into nature constitutes the end of nature? It is just as logical to argue the opposite – that, because trees grow in London's parks, and geraniums in its window boxes, London has ceased to become part of the realm of culture, and has become nature.[155]

Vogel's argument therefore seems to be the exact inversion of what Hay refers to as the "clever-dick riposte" which entails that, because humans are natural, then so is everything they do. "So human-induced species extinction is 'natural', and so are chemical weapons, and so was Chernobyl, and so was Bhopal..." etc.[156] If this seems vacuous, then what of the very opposite view which holds that Olympus Mons, isopods, ferret-fur and phenotypes are socially constructed? Either view is arguably descriptively lacking, yet if the 'natural' solely consists in human labour, their own status as natural organisms appears to come into question. For example, if nature is a social construct, this appears to imply that as soon as *Homo sapiens sapiens* emerged (from...*something*), this something disappeared, never to be evinced again. This appears to leave humans in a peculiar predicament; Vogel hardly appears to be denying that humans originally emerged from a domain which long predates them, but if immediately subsequent to the event of a comparatively odd species of primate beginning to use language, symbolic thought, etc. 'nature' disappeared, then it seems to follow that humanity itself is not natural. Whilst it can be agreed that rigid 'folk' dichotomies between such broad concepts as 'natural', 'unnatural', and 'artificial' lead to various epistemological problems and may not be sufficiently epistemologically acute to articulate the evolutionary novelty of human nature, this does not appear to be sufficient reason to discard such terms entirely.[157] In any case, as theorists from a diverse array of backgrounds have argued, our comparatively peculiar physical / cognitive evolution seems to be strongly contingent on our technical capabilities. As a number of philosophers and anthropologists such as Arnold Gehlen and more recently, Timothy Taylor have posited, compared to their closest primate cousins, humans are peculiarly *deficient* beings if viewed in isolation from their extra-genetic heritage.[158] Indeed, the theory of "organic projection" was an early feature of the work of the early philosopher of technology (and apparently the first to name

155 P. Hay, *Main Currents in Western Environmental Thought,* (Sydney: UNSW Press, 2005), p. 21.
156 Hay, *ibid.* (2005), p. 23.
157 For more on the development and interplay of these terms, see B. Bensaude-Vincent and W.R. Newman, (eds.), *The Artificial and the Natural: An Evolving Polarity,* (Boston MASS: The MIT Press, 2007).
158 Gehlen himself traced it back to the work of Johann Gottfried von Herder. See Gehlen, *op.cit.* (1974).

the discipline as such), Ernst Kapp, who in his 1877 work, *Philosophie der Technik* situated technical capacities specifically in the context of "the connection between man's organic shortcomings and his inventive intelligence."[159] This view implies that humans were not only always already technical, but that they were always already cast *against* nature, manipulating it in order to secure ourselves from its external dictates. Unfortunately, such a philosophical-anthropological approach to the technological phenomenon is now rather rare, but arguably philosophers of technology would benefit from revisiting it in their work.[160]

To reiterate, although Vogel's thesis provides an interesting contrast to the concepts of nature owed to the critical theorists, it remains difficult to see how his approach can carry much practical efficacy in facing up to exigent environmental threats. As Holmes Rolston III concisely put it: "All those persons who did not think that 'lion' refers to a real predator lurking in the grass are extinct".[161] Consider also the theory and reality of anthropogenic climate change. As Kidner notes, "If the demolition of nature stems, in part at least, from the dissociation between culture and nature, then it is difficult to see how this demolition could be countered by theories which arise out of and perpetuate this same dissociation."[162] Furthermore, if Vogel is right, the use of the term *anthropogenic* (which is used to contrast the human, 'artificial' destabilisation of biospheric cycles from natural rates of change) must once again be logically incoherent as after all, humans are not disturbing or intruding in anything other than their constructions. One cannot help but imagine how enraptured the inappropriately named 'climate change skeptics' would be on hearing this particular implication of Vogel's thesis.

A final brief criticism involves the notions of physical suffering and pain. As bioethicists, ethologists and an assortment of other physiologists and evolutionary biologists (and likely most of the rest of us) accept that a great many creatures aside from ourselves are sentient. That the capacity to feel pleasure or pain and to be equipped with instinctual drives and “interests” to maximise the former and minimise the latter has been a very successful evolutionary strategy need only be noted in passing. What is of importance is that suffering seems to be persistently *natural* in the sense that it cannot (yet) be simply socially-constructed away. Of course, it barely needs to be stated that the

159 Gehlen, (1965), 'A Philosophical-Anthropological Perspective on Technology', in *Philosophy of Technology: The Technological Condition,* edited by R.C. Scharff and V. Dusek, (Oxford: Blackwell, 2005), p. 213. To give Kapp's work its full title: *Grundlinien einer Philosophie der Technik: zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten,* (Ann Arbor: University of Michigan Library, 1877).

160 See for example, J. Ortega y Gasset, (1939), 'Thoughts on Technology' in *Philosophy and Technology,* edited by C. Mitcham and R. Mackey, (Cambridge MASS: The MIT Press, 1983), pp. 290-313.

161 H. Rolston III, quoted in Kidner, *op.cit.* (2000), p. 345.

162 Kidner, *ibid.* (2000), p. 342.

practice of medicine involves a technoscientific attempt (which is to say, an *actual* 'construction') by which suffering may be alleviated. Yet to confine the unmistakable noumenal clarity of intense pain to something we humans have constructed is, quite simply, a bizarre idea. As any sentient creature capable of experiencing its more severe variants is made well aware (consciously or instinctually), pain appears as the immanent fusion of signifier and signified. Of course, that which causes pain may well be a result of our actions, but then again, it also may not. As Vogel appears intent on arguing for the former, then it seems that the wind which snapped the branch that fell and hit Eugene on the head was an agential force. As 'natural causes', accidents, etc. appear to be ruled out, at the very least, the implications for insurance firms, courts of law – not to mention the design argument – appear considerable.

Figuring out the conceptual status of severe pain or suffering or how it may be treated in a philosophically consistent manner generally arrives *a posteriori* to the fact. Just as technics was something long considered best in terms of the doing, and thus arguably neglected by philosophers other than for metaphorical use,[163] suffering is for the sufferer something undergone immanently; it is a feeling, not a construct unique to language-bearing agents. In short, those who suffer generally suspend intellection and simply want it to stop, and it is in this way that Vogel appears to be putting the cart before the horse; nature is not something that comes *after* humans, but quite the opposite; nature is not constructed from our technical capacities – on the contrary – our technical capacities are constructed from it. Until only very recently has our species enjoyed the luxury of philosophising otherwise, as for the vast duration of human evolution, technical capacities comprised the chief means of adjusting, adapting, and coping with nature's (external, indifferent) dictates. Of course, one could counter from a full-blown idealist perspective that suffering is mind dependent, (or at least dependent upon nervous systems), yet it still must be accepted that suffering is not contingent or unique to human minds. Suffering seems to come from somewhere – or some*thing* else, and is obviously experienced by a great number of non-human species, as Vogel regularly acknowledges.[164] Hence, the capacity to experience pain or pleasure seems far more widespread in life than scales, feathers or fur – and is not limited to beings capable of evincing distinctions between phenomenal and noumenal experience. Hence, the brute starkness of suffering appears very much like the sort of natural phenomenon Vogel wants to contend must be socially constructed – by humans only. Kidner goes further:

163 See for example, G.W. Leibniz, (1714), *Monadology,* section 17, (Charleston, SC: Forgotten Books, 1898), p. 4.
164 See for example, Vogel, *op.cit.* (1996), pp. 153-154. 156-167.

> Social constructionism (...) can be seen as rooted within a broader reconstructive project which reconfigures both humanity and the nonhuman world according to an industrialist blueprint. The physical and ideological replacement of nature, understood as the larger order out of which we grow, by a reduced order based on industrialist rationality finds its academic counterpart in the doctrine that nature is a mere part-actor in the wider drama of human life and language.[165]

As has been discussed, with the exception of his fleeting comments to the effect that the question of technology and the environment is now a matter of survival, Marcuse's overall view of nature is arguably too problematic to suffice as the foundation of any (current) environmental ethics. It belongs to a future time in which humans acquire a "new sensibility", as the restoration of nature would appear contingent on this event. However, this is not to say that this overall prospect is incoherent, nor does it diminish its urgency. Despite the various confusions and antinomies of Marcuse's approach to nature – his conclusion: that radical changes in the directions and incentives of technical development and proliferation, arguably remains firm. Little short of a refusal of the capitalist logic of growth for the sake of growth and an end to the inanity of a culture that determines an individual's worth by their spending capacity and material acquisitions is required for such a change. However, despite Vogel's obvious environmental concerns, he does not appear to be interested in these particular factors. Indeed, in a rare moment of barely concealed frustration, he dismissively claims that "Marcuse's view" is one which

> ...hates the world, the real world that is, although that hate is hidden behind a utopianizing metaphysics that claims to discern behind the real world a secret erotic one where lion and lamb no longer quarrel (...) The dream of total automation that never lies far below his words is the symptom of a wish that the real world would go away so that humans could spend all of their time in that other phantasy one.[166]

To summarise, it has been argued that the major problem confronting Marcuse's hopes for the emergence of a new sensibility is that emphasis he placed on the supposed inherent teleological value of first nature and the optimism he afforded to human nature. Following his own concern with addressing the concrete practical reality of the impacts of the technological mode of production, the problems addressed above provide a cautionary warning that retains the major aspects of Marcuse's

165 Kidner, *op.cit.* (2000), p. 346.

166 Vogel, *op.cit.* (1996), pp. 139-140. Given Vogel's overall thesis in *Against Nature*, one cannot help but wonder what constitutes the 'real world', and what may distinguish it from Marcuse's 'phantasy' one.

critique of capitalism and his philosophy of technology, but attempts to attenuate its more overtly optimistic proposals in line with modern environmental exigencies. Indeed, by the standards he himself set in the more pessimistic moments of *One Dimensional Man,* the idea that nature could come to be treated as a subject – valuable in its own right – and that technics could then become a poetic play motivated by sensuous, aesthetic principles seems highly improbable in concrete socio-political praxis, riven as it is by denial and inaction. Nevertheless, the necessity for widespread change is hardly diminished, but needed more than ever. In the face of the social, economic, not to mention existential risks of the global environmental crisis, rapidly escalating technoscientific capacities, etc., neither the displaced convention of profit making, nor art, nor even theory or more knowledge appear to be required to face down the situation, but as Marcuse argues, an alteration in basic attitudes and sensibilities which can begin at the locus of the excessive consumption habits typical of the affluent nations and a far more cautious approach in regard to the deployment of the means of production is required.

Chapter 6

A Critique of Instrumental Theories of Technology

In this chapter Marcuse's view of technics and technology will be critically contrasted with recent versions of two prevalent schools of thought on technological development or 'evolution', and the nature and functional status of specific technical artifacts. As it will be shown, each of these broad views of technics are structurally analogous with the debate concerning free will and determinism, and hence, may be presented in the form of an aporia:

1. Instrumental theories of technology – the artificing causes of (tokens of) technoscience are all agential.
2. Compatibilist theories of technology – agents and technoscientific systems and rationalities together constitute a co-evolutionary, ensemble system.
3. Autonomous theories of technology – agents are isolated from causal explanations of modern technoscience.

It will be argued here and in the subsequent chapter that division #2, which is exemplified by Marcusean philosophy of technology is preferable to #1 and #3 on both descriptive and practical grounds. Division #1 will be introduced in this chapter by briefly discussing the ancient distinction between organisms and artifacts posited by Aristotle, before moving to critically address two of the most well-known versions of the theory from contemporary philosophers of technology, Don Ihde and Andrew Feenberg. The formers' application of an analogue of the intentional fallacy to technical artifacts will take up the majority of the discussion,[1] but it will also be argued that the latter's social constructivist-informed approach ends up in a similar and unsatisfactory position which under-rates the influence of the dominant incentives driving contemporary technical mediation.

The subsequent chapter will critically address division #3 with specific reference to the so-called "technological singularity" and its concurrent contention that technical development consists in an

1 See D. Ihde, 'The Designer Fallacy and Technological Imagination', in *Philosophy and Design: From Engineering to Architecture,* edited by P.E. Vermaas, P. Kroes, A. Light and S.A. Moore, (Netherlands: Springer, 2008), pp. 51-59.

"evolutionary process", isolated from agent causation.[2] As well as contrasting them with the revised Marcusean distinction between technics and technology posited earlier on an epistemological level, the practical implications of taking divisions #1 and #3 will also be noted, for if #3 is accurate and technical development is not under the control of agents, then there can obviously be little hope of redirecting production away from potential environmental calamity. Furthermore, if #1 is sound, then although technical artifacts remain firmly under the control of agents, this appears to strongly imply that it is the 'end-user' which takes priority in technical mediation and overlooks the original (social, political, and especially economic) incentives behind technical mediation. In Marcusean terms, such accounts therefore appear to remain focussed on the 'technical' and neglect the technological mode of production. The discussion will now begin by briefly presenting the instrumental approach to technology.

Organisms and Artifacts

The discussion will begin by introducing the instrumental theory of technology with recourse to its first and most prominent discussion in the work of Aristotle as well as by noting Martin Heidegger's more recent discussions of the topic. Subsequently, the discussion will present and critically engage the so-called “designer fallacy” offered by Don Ihde, as well as the similar implications of Feenberg's social constructivist approach to technical mediation with aim of defending the Marcusean view.

Arguably, the instrumental understanding of technology is the most common approach to the subject and tends to view technology as the totality of tools or technical artifacts, as well as implying their ultimate ethical neutrality. In short, as both the producers and users of technology, the instrumental theory contends that human agents are ultimately in control of technical artifacts, their development and proliferation, as well as playing originating, causal roles in their production. Martin Heidegger famously makes reference to this seemingly self-evident view in his essay, 'The Question Concerning Technology' as follows:

2 This term is owed to L. Winner, *Autonomous Technology: Technics Out of Control as a Theme in Political Thought,* (Cambridge, MASS: The MIT Press, 1977). Arguably the most prominent and detailed account of technological singularity are Ray Kurzweil's *The Singularity is Near: When Humans Transcend Biology,* (London: Penguin, 2005) and *The Age of Spiritual Machines,* (London: Viking, 1999).

> We ask the question concerning technology when we ask what it is. Everyone knows the two statements that answer our question. One says: Technology is a means to an end. The other says: Technology is a human activity. The two definitions of technology belong together. For to posit ends and procure and utilize the means to them is a human activity. The manufacture and utilization of equipment, tools, and machines, the manufactured and used things themselves, and the needs and ends that they serve, all belong to what technology is. The whole complex of these contrivances is technology. Technology itself is a contrivance – in Latin, an *instrumentum.*[3]

Heidegger goes on to label this definition "the instrumental and anthropological definition of technology", which can be traced at least as far back as Aristotle who distinguished arts (specifically *techné* or "craft knowledge") from organisms in the *Nichomachean Ethics* on the basis of their origins; the former require pre-existing human agents, whereas the latter emerge through autopoietic means. In short, the role of the (human) agent is defined as the originating, external cause of the existence of artifacts, whereas the originating causes of organisms are internal to themselves.

> Every art is concerned with bringing something into being, and the practise of an art is the study of how to bring into being something that is capable either of being or of not being, *and the cause of which is in the producer and not in the product*. For it is not of things that are or come to be of necessity that art is concerned, nor with natural objects (because these have their origin in themselves).[4]

Without entering into the debate as to whether Aristotle did or did not accept that technics imitated nature or completed it,[5] it should be noted that his distinction is not synonymous with the somewhat confused modern 'folk ontology' which tends to separate the artificial (as the activity of human agents) and the natural (which seems to serve as a general description of events aside from human

3 M. Heidegger, (1954), 'The Question Concerning Technology', in *Basic Writings,* edited by D.F. Krell, (New York: Harper Perennial, 1977), p. 288.

4 Aristotle, *Nichomachean Ethics,* book 6, iv; 'Art or technical skill' (*techné*), (London: Penguin Classics, 1976), p. 208. See also Aristotle's discussion in the *Metaphysics,* book VII, chapter seven, 1032a. It should be emphasised that by 'art' Aristotle means forms of *human* teleological, productive activity (*techné*), requiring what we would call 'technical skill' or 'know-how'; so one can speak of the *art* of medicine, the *art* of astronomy, the *art* of the sculptor, etc.

5 On this topic, see J. Schummer, 'Aristotle on Technology and Nature', in *Philosophia Naturalis,* 38, (2001), pp. 105-120.

activity). Secondly, Aristotle was not restricting how things come to be to either art (i.e. teleological human productive activity) or nature only, but acknowledges the role of chance (*tyche*) in the former activity. Rather, he was pointing out that the origins of natural entities is internal to them, which contrasted with the origins of artifacts, which can only emerge as a result of external agencies.[6] Technics is therefore contingent upon human activity, as it is by and for human ends that they owe their existence.

Unless one is convinced that nature is a social construct,[7] as a theory of the *emergence* of technical artifacts, Aristotle's view seems difficult to disagree with. Even if many artifacts are produced by machines and increasingly automated processes today, at some past stage, human agents were causally responsible at certain definite times for the origin of each artifact, system or process that together constitute the overall scheme and at the least, the operators of the artifacts themselves continue to play varied roles in their performance. Furthermore, the view allows that the actual motives of the agents may not themselves address the 'intended' function of the artifacts they are producing; they may be tempted into their activity due to their overriding need to earn a wage for example. Yet this appears about as far as Aristotle's distinction appears to go; although establishing grounds for the seemingly sensible contention that human agents are the necessary prior causes of technical artifacts, such an account is decreasingly accurate in terms of the actual lived experience of technical mediation in advanced industrial societies, and leaves other questions unanswered. For example, how many artifacts in an average affluent person's home (including the home itself) are – on average – designed or produced by the owner or occupants? Of course, they were still ultimately produced by *agents*, themselves deriving their plans, materials and tools from still other individuals. But the division of labour has widened considerably since Aristotle's time, and this provides the first hint that its applicability in differing historical . If one takes a Marxian angle on the topic, the prevailing incentives behind the overwhelming majority of technical forays in Ancient Greece were largely conducted on the basis of their use-value. Of course money existed and certain technical tasks (creating tools as well as using them) would have been carried out for the coin, but it did not have the same widespread relevance in technical mediation as it does today.

Aristotle's aim in the passages referred to above was to distinguish the fundamental causes of technical artifacts from organisms, not to address the *experience* of technical mediation on the part of end-users, and although not incorrect, this appears to be the major reason why it appears

6 Aristotle also notes "of things that come to be, some come to be by nature, some by art, some *spontaneously.*" See *Metaphysics,* book VII, chapter seven7, 1032a.

7 See the previous chapter.

insufficient for a full-blooded account of technical mediation in the modern period. As one examines the length and complexity of the paths of innovation that have led to the modern technical network, the traditional distinction that held for such a long period between the producer and end-user has become further and further distanced; rather than having anything much to do with the origins of any of the artifacts surrounding them – the experience of modern technical mediation consists in the end-user selecting, operating, keeping watch over, purchasing and consuming. The modern mass-production of spanners (say) does not merely occur on the basis of their use value, but also on their exchange value or profitability. In short, due to increases in automation, the increasing economisation of labour, mechanisation, mass-production, etc., the individual's experience of modern technical mediation tends to be *participatory* rather than *causal*. Of course, although certain agents are ultimately behind its workings, such is the level of sophistication of many modern technical artifacts and systems, when one breaks down or malfunctions, replacing it may be cheaper than repairs, and if opting for the latter, this would likely be carried out by a technical expert with certain relevant skills. However, this 'expert' can only ever have a certain amount of specialist technical skills, and aside from these, they are in the same position as the rest of the general population.

As the current discussion aims to emphasise distinctions between modern and pre-modern production incentives, the blanket claim that the human is the ultimate cause of the technical has limited explanatory value in regard to modern technical mediation. In both the context of the end user and the actual experience of modern productive work, its relevance as an account of modern technical mediation appears to have be more descriptive of *Homo fabre* rather than *Homo economicus*. Its implications at the species-level are not directly analogous to the modern experience of the technical, scientific, or engineering expert, let alone that of the modern participant in technics.

Although analysis of systems of mass production can eventually lead back to certain agents who are ultimately behind their construction as technics is a stratigraphic, sedimentary process; each edifice and system is – often quite literally – built on past innovations, and many artifacts – from microchips to aluminium smelters – could not emerge without them. Given the novel ubiquity of technics in the advanced industrial civilisations, individuals tend not to confront nature first-hand by constructively deploying it in order to alter and change nature in individual, local or regional contexts as was done for the vast duration of the past. They don't (generally) need to, as they live within the most sophisticated, advanced and globalised technical scheme so far as can be known.

That they must acclimatise themselves to it as if it were a second nature is perhaps one of the initial thoughts which motivate some to the conclusion that the modern technical phenomenon is autonomous.[8] Without entering into this question here, with few exceptions, the technical activities and 'work' that tend to be carried out under the modern technological mode of production consists in labour for interests that are not directly the worker's own, but those of the owners of the company, the administrators of the institution, etc. As the incentives of their work shifts from the merely technical, to the economic – (in order to earn regular wages), workers are functionally integrated into the wider productive process. Despite the diversity of tasks available, as a result, labour and technical activity are removed even from instrumentality itself and become vehicles for earning a monthly pay packet. For both the workers and the owners of the means of production, use value itself comes to be colonised by exchange value.[9] As Marcuse put it, "the concept 'wages' refers to the group 'wage-earners,' integrating all personal histories and special jobs into one concrete universal."[10]

Aristotle's view relates to a time in which technical production was carried out in a more individual or localised manner, ideally that which befitted the scale of the *pólis* and the *oikos*. Pointing out that the instrumental incentives of human agents are ultimately behind the causal origins of technics therefore does not discern in a sufficiently fine-grained manner the extent to which modern technical mediation has come to recently, sharply differ from the long duration of its historical and pre-historical development.

The designer fallacy to be discussed below also arguably constitutes a version of the instrumental theory of technology, but it offers something of a flip-side to the Aristotelian account. Instead of drawing attention to the agent as the originating cause of the technical, it argues for an understanding of technical artifacts that draws concern away from the originating agents or interests to emphasise how artifacts come to be *reappropriated* by end-users in fashions unintended by their designers and producers. As it will be argued, although this has the effect of undermining the incentives and intentions behind artifacts and their production, the designer fallacy is not an autonomous theory of technology, indeed, it instead is formed in the wake of a constructivist reaction against such views of technical mediation, albeit, an arguably excessive one. Before this contention can be taken further, it should be understood that both the Aristotelian distinction

8 See the following chapter.
9 André Gorz discusses this tendency in detail in his *Farewell to the Working Class,* (London: Pluto Press, 1982). See also his *Critique of Economic Reason,* (London: Verso, 1989), pp. 39-50.
10 Marcuse, (1964), *One-Dimensional Man,* (London: Routledge, 2004), p. 116.

between organisms and artifacts and the designer fallacy are sub-classes or versions of the instrumental theory of technology, but the former can be distinguished from the latter on the basis that it approaches the causes of technics *in esse,* with the latter describing technics in terms of *in fieri* causes. On the surface of this distinction, the limitations of Aristotle's view are revealed once again if one is interested in exploring how technical artifacts come to be used (and indeed, how they come to 'use', determine or direct human agents), *post* construction and initial deployment, whereas the designer fallacy leaves the question of the how the designer / producer's incentives come to inform artifacts open, and thereby similarly ignores the extent to which technics come to play determining roles under certain modes or conditions of production. Furthermore, as versions of the instrumentalist approach, artifacts are considered as neutral tools that can, in Marcuse's words, either "revolutionize or retard a society" depending upon how they are used.[11] As it will be argued, without taking into consideration the extent to which technics also play determining, controlling roles both in regard to their own development and upon human conduct, neither perspective offers a sufficiently accurate, nor practically useful account of modern technical mediation in the current context of its causal role in endangering the environment, and thereby, the human future.

The "Designer Fallacy" and the Creative Reappropriation of Artifacts

> If I had to say which was telling the truth about a society, a speech by a minister of housing or the buildings put up in his time, I should believe the buildings.[12]

Although the intentional fallacy has been widely criticised as a method of assessing literature,[13] various prominent philosophers of technology as well as sociologists of technology in the social constructivist school continue to apply a closely analogous approach in their discussions of technical artifacts and technology *per se*. What follows now aims to level various criticisms at two current representatives of the approach from a Marcusean perspective which will attempt to show it lacks sufficient attention to the primary incentives driving technical development and proliferation.

11 Marcuse, *ibid.* (1964), p. 157.
12 Kenneth Clark in Episode 1 of the documentary series, *Civilization,* (BBC, 1969).
13 See for example, M. Wreen, 'Three Arguments against Intentionalism in Interpretation', in *The Proceedings of the XXII World Congress in Philosophy,* vol.1, (2008), pp. 283-287 and Z. Lindong, 'The Intentional Fallacy Reconsidered', in *Canadian Social Science,* vol.8, No 2, (March, 2012), pp. 34-39.

The chapter will conclude by pointing out some general disanalogies between technics and artistic literature with the assistance of Marcuse's aesthetic theory.

In his essay 'The Designer Fallacy and Technological Imagination', the contemporary phenomenologist and philosopher of technology, Don Ihde, contends that instead of investigating the intentions and motives of designers in technical mediation, what is required of a philosophy of technology is to take the "functionally multistable" nature of artifacts seriously.[14] Whilst this constitutes only one aspect of Ihde's approach to technology, it is addressed for the reason that it is indicative of a general reticence amongst various philosophers of technology to address the primary incentive of modern technological development with sufficient seriousness.

What Ihde means by functional multistability is that technical artifacts, once constructed, may be turned to functions aside from those that were originally 'designed in'. Andrew Feenberg has also emphasised various cases which – borrowing a term from the social construction of technology – he refers to as evidence of the "interpretive flexibility"[15] of technical artifacts, which may lend themselves to various "creative appropriations" on the part of savvy and interested users.[16] Thirdly, Langdon Winner has explored how technical systems and artifacts may contain "political" content beyond their more obvious utile ends.[17] These discussions are well-known in philosophy of technology circles and are not just of theoretical or conceptual value; they arguably constitute genuine points of resistance to the often gloom-ridden accounts of technological domination, reductionism and determinism that lurk in the corpus of the "humanities philosophy of technology" and elsewhere.[18] Instead of being determined by an oppressive, impersonal technoscientific framework or *gestell*,[19] the accounts of Ihde and Feenberg appear to offer some hope for the preservation and extension of creative agency in a world increasingly penetrated and colonised by a rationality that – in the words of the latter – makes the fundamental question of democracy today

14 See Ihde, *op.cit.* (2008).
15 Feenberg's use of "Interpretive flexibility" is owed to T. Pinch and W. Bijker, (1984), 'The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other', in *Social Studies of Science,* vol. 14, no. 3, (August, 1984), pp. 399-441.
16 See A. Feenberg, *Alternative Modernity: The Technical Turn in Philosophy and Social Theory,* (Los Angeles: University of California Press, 1995a), chapter 7; and by the same author, *Questioning Technology,* (New York: Routledge, 1999), pp. 125-129.
17 Winner, 'Do Artifacts have Politics?', in *The Whale and the Reactor: A Search for Limits in an Age of High-Technology,* (Chicago & London: Chicago University Press, 1986a), pp. 19-39.
18 See C. Mitcham, *Thinking through Technology: the path between engineering and philosophy.* (Chicago: University of Chicago Press, 1994).
19 See Heidegger, *op.cit.* (1954).

the “survival of agency in this increasingly technocratic universe”.[20] The often simplistic reductionism of technological determinism is therefore hopefully averted, and the focus turns to how the end-user's interests play various undeniably formative roles in technical mediation. However – to borrow a computing metaphor – it will be contended here that taking such an approach to its logical extent comes to endanger its own relevance and explanatory value in considering how the (technical) hardware comes to be appropriated without recourse to the intentional (software) which played the formative role in its origination, and that the prioritisation of the whims of the end-user over the “designer” – or more generally but accurately, the *producer*, may tend to side-line certain crucial considerations regarding the formative implications of the growth imperative which has been argued previously as constituting the major incentive guiding modern production *per se*.

A preliminary caveat ought to be noted: it will not be the aim to argue here that the theory of functional multistability is factually incorrect; rather, it will be acknowledged that artifacts, both individually and in their totality, are often amenable to various forms of reappropriation. In short, it can be agreed that artifacts can be used for purposes *other* than what their designers or producers intended of them, within certain structural limits. To be sure, this is a necessary premise of Marcuse's concept of the “technological mode of production”, for this view entails that production as a whole must function in a double-sense; both 'internally' (i.e. through use value), as well as for the *ancillary* function of generating profits (i.e. exchange value). If the means of production advance and proliferate to the extent that their directive impetus can basically be commandeered by monetary incentives, what is arguably required in understanding some of the most pressing questions of technoscience is a view sensitive to both the incentives and the intentions of users *and* producers, participants *and* 'designers'. Therefore, rather than seeking to undermine the concept of functional multistability outright, what follows will attempt to establish grounds for suspicion that both instrumentalist theories (and later, autonomous theories) share a tendency to ignore or undermine the economic incentives and intentions that drive the development of modern technoscience and industry, and in so doing neglect its political content and dangerous environmental implications.

As Ihde notes, the designer fallacy is analogous to the well-established concept of the 'intentional fallacy' in literary criticism originally conceived by W.K. Wimsatt and Monroe Beardsley. As they wrote in their essay, 'The Intentional Fallacy': “The design or intention of the author is neither

20 Feenberg, *op.cit.* (1999), p. 101.

available nor desirable as a standard for judging the success of a work of literary art."[21] Ihde describes his technical analogue of this well-known literary approach as follows:

> In simple form, the "designer fallacy," (…) is the notion that a designer can design into a technology, its purposes and uses. In turn, this fallacy implies some degree of material neutrality of plasticity in the object, over which the designer has no control. In short, the designer fallacy is 'deistic' in its 18th century sense, that the designer-god, working with plastic material, creates a machine or artifact which seems 'intelligent' by design – and performs in its designed way.[22]

The designer fallacy is hence "parallel" to its literary analogue. Just as the intentional fallacy and the New Criticism aimed to question and revise the well-worn custom of regarding a given author's intentions as playing a significant role in literary works and to shift the emphasis to what the reader brings to the interpretation of texts, Ihde contends that an analogue of the intentional fallacy is at least as implicit "in the history of technical design,"[23] which leads him to "deconstruct the utility"[24] of the "cult of the individual designer" and the consequential emphasis on her intentions.[25] For Ihde, the "designer-plastic material-ultimate use model" is over-emphasised, and the analysis of technics instead requires "...a description which recognizes much more complex relations between designers, technologies and the ultimate uses of technologies in variable social and cultural situations."[26] Rather than being "more complex", it will be the aim to argue here that a Marcusean approach can show that the designer fallacy and similar social-constructivist views of technical mediation are in fact, too simplistic.

Ihde argues that technical artifacts are *functionally multistable;* i.e. they are not reducible to the functions which their designer's intended, but come to be expressed in diverse and manifold fashions previously unenvisioned or unenvisionable to their original designers / producers. To expand his case, he emphasises the extent to which different instruments and artifacts come to be embedded in varying cultural contexts and as such are "field located".[27] Taking his example of the windmill, this that transcultural or transhistorical concepts of such devices (for example, a

21 W.K. Wimsatt and M. Beardsley, (1946), 'The Intentional Fallacy', reprinted in *The Verbal Icon: Studies in the Meaning of Poetry,* (Lexington, The University of Kentucky Press, 1954), p. 3. (Emphasis added).
22 Ihde, *op.cit.* (2008), p. 51.
23 Ihde, *ibid.* (2008).
24 Ihde, *ibid.* (2008).
25 Ihde, *ibid.* (2008), p. 56.
26 Ihde, *ibid.* (2008), p. 54.
27 Ihde, *ibid.* (2008).

definition of 'windmill' which claims it is an artifact which utilises vanes, blades, sails, etc. so as to harness the power of the wind in order to generate movement and motor-force), are little more than simplistic, ahistorical abstractions. Ihde details the functional trajectory of various incarnations of the pinwheel and windmill through the ages and the various uses they were put to, from sending prayers in ancient India, to milling in ninth century Mesopotamia, to their use by the Dutch and other Europeans in providing power for pumps in the same century.

However, can it not be said at the outset that the designers of such devices (whether or not they themselves came to be their end-users, and regardless of the eventual use the device came to perform), had at least *some* intentions that were evidently fulfilled in their constructions? I.e. that they *intended* to create a windmill rather than some other artifact? Indeed, if we accept the definition of the function of windmills above, then by virtue of their designer's intentions, it appears windmills are generally discernible from (say) steam-hammers or vices regardless of the particular cultural use such devices are put to. If this is the case, surely this is no ahistorical abstraction, it is instead an indication that designer's intentions carry sufficient efficacy to at least define that *x* artifact will be a windmill and not a wheelbarrow. While it can obviously be granted that how a windmill or pinwheel *comes to be used* may not be exhausted by the intentions of its designer / producer, which is to say: the use of wind to turn vanes or blades does not determine that the device either grind wheat, shift water, or serve as an automated means of communicating with the divine, but if it doesn't have the basic properties previously described of windmills, it is hard to see how the device qualifies as such. Hence, there seems to be at least one (rather important) definitional aspect of windmills that separates them from toner cartridges or Volkswagens; an 'intention' that is ultimately founded in the designer / producer after all.

Of course, this is not to say that many (perhaps even all) technical artifacts *can* be used in ways that their designers may not have originally or “intentionally” designed the product to perform. For example: a vase may serve as a receptacle, capable of containing any number of substances and may be composed by any number of materials; used to display flowers, to accentuate the décor of an interior, or as a projectile hurled at an unwelcome intruder. Ihde provides various examples of functional multistability, and as the scope of potential technical reappropriation is a veritable Library of Babel, examples are not difficult to come by. He chooses a number of prominent, influential technical devices such as Thomas Edison's phonograph, Alexander Graham Bell's telephone, the typewriter, and the now well-known example of Robert Moses' Long Island bridges

originally owed to Langdon Winner.[28] The first two inventions prompted the beginnings of capacities which are so common in the modern world as to be barely noticed, but only a short while ago they must have appeared almost magical: the capacity to record and play back audio, or to speak to people that could be located hundreds or thousands of kilometres away. Ihde tells how the recording machine gave rise to a number of consequences unintended by its designer, such as the emergence of the recording industry, the length of the pop-song, and of course, sweeping changes to musical performance practices and production. As he mentions, "the new machine calls for new practices, but in this case not 'intended' ones."[29] Feenberg makes similar remarks concerning the French Minitel system.[30] The Minitels were originally intended as a kind of precursor to the internet which was freely distributed to users as an "adjunct" to the modern telephone in order to convey news and information in a similar manner as the early "bulletin boards" which made use of a telnet system and modem. Soon however, certain users realised they could use the Minitels to engage in the sort of largely anonymous on-line communication which has now become ubiquitous with the internet. Referencing McLuhanesque terminology, Feenberg writes:

> The design of the Minitel invited communications applications which the company's engineers *had not intended* when they set about improving the flow of information in French society. Those applications, in turn, connoted the Minitel as a means of personal encounter, the very opposite of the rationalistic project for which it was originally designed. The "cold" computer became a "hot" new medium.[31]

Thus far, the theory of functional multistability appears sound to the extent that it is a repetition of the theory of unintended consequences. The contention that technical artifacts can be turned to uses apart from those described in their instruction manuals seems hard to deny, and threatens to consign designers to a similar fate as that of the traditional image of the lone inventor bringing on a technical revolution.[32] But can it be agreed that the designer fallacy "may well be the rule rather than the exception"?[33] Perhaps rather than helping his case, Ihde's reference to Langdon Winner's example of Robert Moses' bridges on Long Island may in fact do the opposite. Winner's example aims to demonstrate that artifacts have political content and forms part of a debate within the field of the social construction of technology, however, unlike Ihde and Feenberg, Winner is highly

28 Winner, *op.cit.* (1986b).
29 Ihde, *op.cit.* (2008), p. 52.
30 See Feenberg, *op.cit.* (1995), chapter 7.
31 Feenberg, *op.cit.* (1999), p. 126. (Emphasis added).
32 See for example, J. Bourke, *Connections,* series 1, (BBC, 1978).
33 Ihde, *op.cit.* (2008), p. 54.

critical of the varied approaches he contends can be classed under this banner.[34] Winner's article, 'Do Artifacts Have Politics', initiated a debate over the extent to which the political views of Robert Moses came to be embodied and reinforced in the bridges over the parkways at Long Island, just east of Manhattan. The bridges served their functional purpose *as* bridges, but only, Winner contends, to a selected few. As he describes them, the bridges were designed in such a way as to function as a kind of socioeconomic and racial filter, which he argues originated in Moses' intention to inhibit certain types of traffic predominantly owned by individuals he deemed unsavoury. Winner writes that the "Automobile-owning whites of 'upper' and 'comfortable middle' classes (as Moses reputedly referred to them):

> ...would be free to use the parkways for recreation and commuting. Poor people and blacks, who normally used public transit, were kept off the roads because the twelve-foot tall buses could not handle the overpasses. One consequence was to limit access to racial minorities and low-income groups to Jones Beach, Moses' widely acclaimed public park. Moses made doubly sure of this result by vetoing a proposed extension of the Long Island Railroad to Jones Beach.[35]

Winner explicitly notes in relation to evidence collected by one of Moses' biographers that the dual functional status of the bridges (as a means for affluent whites to get in and out, and to discourage non-affluent whites and the majority of the African American population from doing so) reflected Moses' "social class bias and racial prejudice."[36] It should be noted that the extent to which Moses himself was *actually* responsible for transmitting these intentions into his design – a claim which has been subjected to some criticism, is not of concern here.[37] It need only be conceded that such actions were and are possible or feasible, or were enacted for a while. At the least, the first option is difficult to deny as Winner's example arguably shows that technical artifacts *can* embody and convey politico-ideological content and act as a means of bringing them into concrete social effect regardless of whether he is right or wrong about this particular case. Indeed, the opposite is an almost nonsensical prospect; any number of examples of technical artifacts, systems and processes throughout history were designed to reflect, embody or conjure any number of other political,

34 See for example, Winner, 'Social Constructivism: Opening the Black Box and Finding it Empty', in *Philosophy of Technology: The Technological Condition,* edited by V. Dusek and R.C. Scharff, (London: Blackwell, 2007), pp. 233-242.
35 Winner, *op.cit.* (1986), p. 23.
36 Winner, *ibid*. (1986).
37 See for example B. Joerges, 'Do Politics Have Artifacts?' in *Social Studies of Science*, vol. 29, no. 3 (June 1999), pp. 411-431.

emotive, religious, aesthetic or ideological responses, impulses, instincts, or other impressions in the observer or participant. According to Winner, the bridges on Long Island merely went one step further by not merely functioning to *purvey* a certain ideological / political view (as, say, a statue or purely aesthetic work may), but by functioning to bring about a particular social effect in concrete practical terms. Precisely such intentions have efficacy in technical domains as diverse as the architect's brief on the one hand, and the motivation of the archaeologist on the other. Yet just how, it might be asked, does such content come to be embodied in technical artifacts in the first place?

Surely (in conformance with the thoughts of Marcuse) the only answer is that they were *transferred* into them by their designers, producers and builders. Ihde notes that due to the Eisenhower Interstate development requiring bridges to be built higher so as to let through trucks carrying ballistic missiles during the cold war, Moses' plans were thwarted. Yet rather than invalidating Winner's thesis, it adds to its legitimacy: at the time the authorities simply changed their intentions which were then concretely reflected in certain changes in design. This does not preclude the contention that the bridges served the purpose Winner claimed they served at least for a while, or that they *could* have served their purpose in theory even if they were never constructed. As Ihde mentions in a footnote: “it was pointed out that there is a difference between initial designer intent, and subsequent design modification, but the argument I am making is that in neither case is there simple designer control over outcomes”,[38] these presumably being left up to the end-users. In other words, for Ihde, the 'meaning' of the artifact is ultimately subject to the end-user's reappropriation / interpretation. Yet for example, to say to the architect that her intentions and strivings to invoke a particular aesthetic, mood or atmosphere in the mind of the observer, or to order the movement of people in such and such a fashion within a given structure in fact has little or no bearing on how the building will be interpreted or used appears to consign much of the former's intentions (and those of a great number of other technical fields) to folly. Ihde appears to acknowledge this implication when he notes that some may “worry that this recognition may be demotivating”,[39] and it may well be that the building, once used for *x* task may later be used for something very different later on. However, does this imply that the designer's original intentions never had any efficacy and ought to be overlooked? How exactly could the commuters subject to the social filter of the Long Island bridges creatively appropriate the bridges for their own ends? Questions such as this therefore leave one slightly puzzled as to why Ihde makes note of Winner's example at all for the reason that the purpose of the argument of the latter appears to have been that it was Moses' *intention* that the

38 Ihde, *op.cit.* (2008), p. 53.
39 Ihde, *ibid.* (2008), p. 59.

bridges serve as a mechanism of segregation. As he writes, "It turns out (…) that some two hundred or so low-hanging overpasses on Long Island are there for a reason. They were *deliberately designed and built that way* by someone who wanted to achieve a particular social effect."[40]

In the context of the current prerogatives of discussion, it may also be arguable that the designer fallacy tends to underestimate the extent to which certain broader incentives dominate the intentions that drive, guide and limit modern technical design (not to mention production *per se*), as well as the extent to which the process of design itself has altered as a consequence. To return to an earlier example, it was noted that there are reasons to conclude that the modern context of technical production presents novel difficulties that blur the traditional conceptions of *H. fabre* or the notion of "man the maker", and the nature and significance of design itself has similarly altered. For the majority of human evolution, and in some technically "underdeveloped" cultures still extant today, design and construction were and are carried out by selected members of the community. In prehistoric times, even though each individual tended to have their own specialisations or functional roles, the scope of the toolkit appears to have been small, mobile, and able to adapt to locally available resources and conditions.[41] Once again, in stark contrast, modern technical mediation in the advanced industrial nations could not be further removed from the environment of evolutionary adaptiveness. To reiterate: very few individuals in advanced industrial society are "designers", let alone builders or makers, as these fields have largely been efficiently divided into fields of specialisation and expertise. A fitter and turner or construction engineer are highly unlikely to also design microchips, and designers of microchips may only have rudimentary knowledge of diesel engines or agricultural techniques. Furthermore, much of the work of design is not for one's own direct interests and needs, but is mediated by – and integrated within – a wider ensemble of interests. The design of elaborate or complex technical artifacts and systems such as passenger jets or automated assembly lines are hardly carried out by one person, or a few, but by masses of assorted experts organised into teams of specialisation, as well as with recourse to any number of other forms of technical apparatus and knowledge scattered around the globe. The human role in modern production can therefore be described as one of piecemeal contribution to wider productive schemes (from mining operations and factories to research departments, call centres and universities).

40 Winner, *op.cit.* (1986), p. 23. (Emphasis added).

41 See for example B. Fowler, *Iceman: Uncovering the Life and Times of a Prehistoric Man found in an Alpine Glacier,* (Chicago: University of Chicago Press, 2001), pp. 105-106. See also the discussion of Ötzi in T. Taylor, *The Artificial Ape: How Technology Changed the Course of Human Evolution,* (London: Palgrave-Macmillan, 2010).

However, despite the dilution of the role of the designer in the modern period into a number of more specialised vocations, this does not warrant throwing out all recourse to their intentions and how they may affect artifacts. Even those who do play major active roles in design (i.e. not usually the designers themselves, but the overarching interests that pay their wages and provide their briefs), have very definite, visible intentions and incentives that they naturally endeavour to fulfill. Although design still obviously plays a significant role in production, in Marcusean terms, it cannot be considered fundamentally descriptive of the contributory performances the individual *per se* plays under the technological condition of production, but is largely relevant from a merely *technical* perspective. Arguably then, to the extent that Ihde is stretching the analogy of the "death of the author"[42] to a technical context in order to show how traditional notions of the lone designer and / or inventor are devoid of explanatory value, then this can be readily accepted. However, Ihde is arguably going further than this by advocating that the incentives and intentions of designers are of little explanatory value *at all* in accounting for artifacts or technics in general, and that a more complex conceptual approach appears to be required.

> ...it should appear by now that the 'designer fallacy' may well be the rule rather than the exception. While it may be the case that some technologies have come into being and performed as 'intended' by their designers (I admit, I can think of none which have served solely in this way), there would seem to be none which cannot be subverted to other, to unintended, or unsuspected uses and results.[43]

However, this seems to depend on a number of other factors, such as the stage of development the artifact under analysis has reached, whether its primary function can be agreed upon, etc. For example, if one was asked of the function of the Saturn V rocket they would probably reply something to the effect that it served as a means of transporting individuals and equipment into space and the moon. Today of course, the vehicle is no longer used for this purpose and it exists only in the form of test sections and replicas set up in various displays across the U.S., yet whether or not the heads of the design team – Wernher von Braun and Arthur Rudolph – ever intended it to 'function' in this latter fashion seems neither here nor there. Instead, it seems their intentions (and those of the other designers, scientists, government officials, NASA employees, etc.), was to design a vehicle that functioned for the purpose noted above, which it performed marvellously. It may well have served peripheral purposes such as inspiring the American public to become more interested in

42 See R. Barthes, (1977), 'The Death of the Author', in *Image, Music, Text,* (New York: Noonday Press, 1989), pp. 142-148.
43 Ihde, *op.cit.* (2008), p. 55.

space, or perhaps also to gain a propaganda advantage over the Soviet Union, or – if one believed President J.F. Kennedy – simply because the task was a challenge, but if these peripheral outcomes can be referred to as 'functions' at all, they are contingent upon the successful performance of its primary or *internal* functionality; the function that its designers and builders were employed to build into it in the first place.

Advocates of the designer fallacy may reply that Saturn V is actually a type of rocket, and an account similar to Ihde's discussion of the windmill could be provided which may note that in the long and diverse history of propulsion technics, some cultures used rockets as forms of entertainment, others as weapons, and still others as means of transport. Hence, the rocket appears to be a functionally multistable device after all. However, such a reply seems so general as to elide the historico-cultural sensitivity which appears to strongly motivate Ihde and Feenberg's views. Saturn V was after all not merely a 'rocket' in the generic sense, but a very specific type of rocket, which functioned in a way guided missiles and fireworks do not, namely as a vehicle. Of course, vehicles come in highly diverse forms and perform a myriad of functions also, some intended, and no doubt many unintended, but is pursuing this long and complex entanglement really necessary in order to understand the function of such an artifact as Saturn V?

Leaving this topic aside, the potential applications and uses of technical artifacts (and, indeed, natural objects) are extremely wide in scope. For example, a dedicated 'Space Invaders' arcade cabinet *could* be used as a makeshift bar if it was turned on its side, elevated somewhat and affixed with beer and cider taps. A car *could* be used as a projectile (as indeed they are when they are used for the purpose of "ram-raiding"), and a washing-machine *could* be used to mix gravy or concrete (although most probably only for a short time). But what of the *original* imperatives, intentions and incentives that led to the production of these devices in the first place? If the implication of the designer fallacy is valid, these are barely worthy of consideration, and critical analysis should instead be directed to the interventions of the end-user. Again, one appears to be led to the somewhat questionable contention that washing-machines and rocket-ships just happened to emerge for reasons and intentions that were not particularly interesting and lend little explanatory value, with the decision to wash clothes or blast astronauts into space only arising later. The designer fallacy therefore seems to be advocating an approach to the analysis of technical artifacts which views them as if they were mushrooms which grow in the night, and that in order to understand them, the investigator ought be careful to limit their inquiry into how they were prepared and served. Both unfortunately and somewhat ironically, this appears to leave this particular take on the

instrumental theory of technology in a somewhat analogous position to autonomous theories of technology: by avoiding the very human interests and economic incentives which play such a formative role in modern technoscientific mediation, the primary motivational influences in play are obscured. The designer fallacy and similar accounts of technics therefore appear more appropriate as discussions of uses that happen to be compatible with the artifact in question, rather than paying due consideration to the reasons the artifact came to exist in the first place. Hence, that the properties and forms of spare computer parts or indeed natural, unworked objects such as rocks makes them functionally compatible for use as doorstops, paperweights, or projectiles were they to be reappropriated for such ends does not appear to be pointing out anything especially significant. Furthermore, it appears to sideline any reference to the fairly certain contention that the mass-production of such artifacts may be guided by an ancillary function, namely; the *intention* to maximise profits.

Disanalogies Between Art, Text and Technics

As the designer fallacy is intended as a technical analogue of the intentional fallacy in literature, presumably there must be strong similarities between the works each fallacy aims to address, namely literary texts and technical artifacts. However, there appear to be a number of significant *dis*analogies between these two classes of entity, and if these disanalogies can be shown to be sufficiently salient, presumably it can be conjectured that what may apply to one may not apply to the other.

Although it may be used in the critique of non-fiction works, perhaps the most obvious difference between the designer fallacy and the intentional fallacy is that – specifically adhering to Wimsatt and Beardsley's original definition – the latter appears to be aimed at works of literature; novels, drama, plays, short-stories, poetry and fiction; in short, *art.*[44] Whilst it can be acknowledged that those still under the influence of postmodernist / poststructuralist philosophy extend the so-called "death of the author" to works of non-fiction, as the intentional fallacy is the chief analogue of

44 See Wimsatt and Beardsley, *op.cit.* (1946), p. 3. Contemporary commentators on the intentional fallacy appear to concur: "From Eliot to the deconstructionists we find that there has been a persistent attempt to banish the author in the name of achieving impersonality and objectivity or even 'free play' of meaning in a work of art." See S. Das, 'The Reader and the Death of the Author', in *Twentieth Century Literary Criticism,* 5th ed., (New Delhi: Atlantic, 2005), p. 69.

Ihde's designer fallacy, the stronger anti-foundationalist accounts will be passed over here.

As they may come to be subjectively apprehended and beautiful or aesthetically striking in one way or another contingent upon one's taste or preferences, technical artifacts are not necessarily originally designed to fulfil artistic visions, but instrumental wants and needs, whether they be genuine or artificially stimulated. Can it be said in a similar manner that artworks are instruments? This leads to such philosophical questions as 'what is art?' which are also well beyond the scope of this thesis, however, it can be ventured that – although they obviously require tools, technical skills and media for their instantiation and are classifiable to this extent as 'technical artifacts' – in their 'essence', works of art are not necessarily intended to function as tools or artifacts themselves but their product. With the exception of forms of art which require physiological capacities alone (such as singing and dancing), technics serve as a way to produce or create an artistic experience. Marcuse's own discussions of art are arguably of some assistance in this context. The boundary between artistic works and technical objects may often be hazy, however, as noted in the previous chapter, they were significant enough for Marcuse to believe they offered vision and imagination sufficiently distinct from technological rationality to become a productive, guiding force in the liberated society.[45] Furthermore, the arts could reveal "truths" that were unencumbered, contained or directed by the dominant mode of production, and to this extent could stand opposed to the given as a force of critique:

> The world intended in art is never and nowhere merely the given world of everyday reality, but neither is it a world of mere fantasy, illusion, and so on. It contains nothing that does not also exist in the given reality, the actions, thoughts, feelings and dreams of men and women, their potentialities and those of nature. (...) As fictitious world, as illusion (*Schein*), it contains more truth than does everyday reality. For the latter is mystified in its institutions and relationships, which make necessity into a choice, and alienation into self-realization. Only in the "illusory world" do things appear as what they are and what they could be. By virtue of this truth (which art alone can express in sensuous representation) the world is inverted – it is the given reality, the ordinary world which now appears as untrue, false, as deceptive reality.[46]

Once again, Marcuse's point in this passage is typically bipolar and controversial, and no doubt intuitively difficult to accept. After all, what is clear is that he is arguing that the so-called “world of

45 See Marcuse, *The Aesthetic Dimension,* (Boston: Beacon Press, 1978).
46 Marcuse, *ibid.* (1978), p. 54.

illusion" – not the concrete given of everyday reality – is that which reveals "truth", as it centres attention on what he took to be the basic essence of human and non-human nature; to be able to live in accord with one's own potential, a potential which had in past times been expressed in the aesthetic dimension and in the second dimension of critical reason.[47] This is obviously the complete inverse of the idea that art reflects the *given* reality, that it is for example, in Iris Murdoch's words: "...a selfless gazing at and recording of *what is there.*"[48] Once again, Marcuse distinguishes his critique of art from other Marxist critics insofar as he not only recognised "...art in the context of the prevailing social relations, and ascribes to art a political function and a political potential." But as he immediately adds,

> ...in contrast to orthodox Marxist aesthetics I see the political potential of art in art itself, in the aesthetic form as such. Furthermore, I argue that by virtue of its aesthetic form, art is largely autonomous vis á vis the given social relations. In its autonomy art both protests these relations, and at the same time transcends them. Thereby art subverts the dominant consciousness, the ordinary experience.[49]

Marcuse believed that the "ordinary experience" of capitalism and technological rationality made art all the more important, but had undercut and artificially suspended the actualisation of the potentials that remained visible within it and thereby the likelihood of their embodiment in a future society. In short, in the "one-dimensional society", the Freudian "reality principle" held firm. Hence, as he found no recourse for social liberation in either a revolutionary uprising by workers or oppressed minorities,[50] nor in ethics or metaphysics,[51] Marcuse came to place emphasis on the liberatory qualities of the aesthetic dimension, especially within the literature of the eighteenth and nineteenth centuries, which he contended may also apply to the other arts.[52] Again, regardless as to whether or not this approach was sound or successful, one can see Marcuse's reasons for opting for such a strategy, as arguably, when subjected to industrialisation and commodification (not only in the consumer-capitalist society), the work of art tends to become either sequestered, commandeered, diluted, or mediocratised by ratings and focus-group-led marketing strategies. In other words, it becomes subject to instrumentalisation and technological rationality.

47 See Marcuse, (1941), 'Some Social Implications of Modern Technology', in *Technology, War and Fascism: The Collected Papers of Herbert Marcuse,* vol. 1, edited by D. Kellner, (New York: Routledge, 1998), pp. 41-65.
48 Iris Murdoch, quoted in R. Hoggart, *Mass Media in a Mass Society,* (London: Continuum, 2004), p. 193.
49 Marcuse, *op.cit.* (1978), p. ix.
50 See for example, Marcuse, (1965b), 'Repressive Tolerance', in R.P. Wolff, B. Moore Jnr. & H. Marcuse, *A Critique of Pure Tolerance,* (Boston: Beacon Press, 1969), pp. 111-112.
51 See for example, Marcuse, *op.cit.* (1964), p. 151.
52 Marcuse, *op.cit.* (1978), pp. ix-x.

Marcuse's view of the role of art in the creation of the new society also reveals crucial differences between art and technics. For example, in the advanced capitalist societies, instances of authentic art – to the extent that they are either not receptive to or actively militate against commercialisation – tend to retreat to the "higher culture"; they are of interest largely to those who pursue "art for art's sake". Secondly, art is easily co-opted and instrumentalised. Those forms of art which can be effectively utilised within the consumer-capitalist framework – even many forms of expression that at least claim or appear to be overtly *anti*-commercial – have long been put to good economic use just because of the allure of 'resistance' and 'rebellion', particularly amongst the young. Such proclivities are absorbed into marketing strategies aimed once again at getting consumers to *identify* with product lines and part with their money. Hence, "alternative" or "fringe" forms of music or art appears to be oxymoronic to the extent that they can be profitably exploited; graffiti is turned to the purposes of marketing and branding; and music is reduced to the music "industry". Any such sentiment, ideology or desire that can be seized upon and economicised – just because it may appear resistant or radical to the status quo – is especially receptive to co-optation and "repressive desublimation."[53]

Returning to Ihde, he appears to give most priority to examples of technical uses that no mortal designer could ever envision or predict in anything other than a speculative manner, but in so doing obscures the (genuine, concrete) intentions that may have constituted the original ground from which the secondary uses (i.e. profit-making) emanated from. For example, he notes that the original innovators of powered flight could not have envisioned that this capacity would then lead to any number of other uses (in war, recreation, sport, the transportation of zoo animals, etc.). But why stop at the original innovation of powered flight? One might as well contend that the designers or producers of the timber from the 'giant spruce' (*Picea sitchensis*) which was used to construct the 1903 Wright Flyer could not have envisioned that it could one day lead to the construction of a flying vehicle, but surely in all fairness no one would call this a lack of imagination on their part. Rather, they may have had a vague idea that wood could be used for all sorts of different purposes, and whether they could discern them is again, beside the point.

The designer fallacy therefore appears to be an overreaction to the perception that the “designer-intent model of technological development” has dominated the understanding of technics in an

53 See Marcuse, *op.cit.* (1965b).

almost dictatorial fashion.[54] Once again, although it is not altogether *incorrect,* if the benefits of Ihde's theory are that it will lead to a "more cooperative, mutually co-critical approach"[55] to design and production, arguably these goals are outweighed by its costs, the major one being not merely a diminution of significance, but a clear call for the *disappearance* of concern with the intentions and motives of the designer agents / agencies in understanding technical mediation. Yet even though it can be admitted that the original design intentions are not necessarily always carried out on the part of the end-user, surely it must be acknowledged that many of them are. Consider purchasing a washing machine or refrigerator that does not work (i.e. it fails to perform the internal function for which it was designed). The typical purchaser of a washing machine (unless they are a collector or enthusiast) is hardly going to be happy with reappropriating the device as a bench. Indeed, this is the reason that such artifacts usually come with a "replacement guarantee" if it does not perform its specific function adequately, as well as a manual which describes how to operate the machine to its (designed) specifications. Secondly, Ihde does not mention the extent to which specific values other than the strictly utile also come to feature in design or in the sheer number of artifacts. Although his article rightly draws focus to how various innovations come to be embedded and instantiated in different cultures and how certain artifacts opened up possibilities for further innovations, in undermining the designer's intentions, the designer fallacy arguably does not appear capable of acknowledging ulterior motives which may dominate the reasons for production. On this basis, one cannot help but wonder whether Ihde accepts that economic incentives (or 'intentions') play any role at all in modern technoscientific mediation worthy of philosophical investigation.

In a Marcusean context, the designer fallacy gives undue priority to the end user in its approach to understanding technology. Indeed, it largely passes over the reasons why such artifacts as washing machines are constructed in the first place, which must include the profit motivation to be viable at all. To put this another way, Ihde's theory neglects to acknowledge that technical artifacts – in the affluent societies – are also *commodities*. Passing over this fact may serve to provide a veneer of political impartiality, but it also disallows the designer fallacy's capacity to account for technology in any sort of full-blooded fashion, and so would appear inadequate to address the sort of questions Marcuse was posing in regard to modern technics. However, this is not due to specifically Marxian aspects of his thought, but for a much more basic reason – specifically – a presumption about the nature of technical production Marcuse's theory shares with a great deal of other thinkers. Contra to the designer fallacy, Marcuse argues that the interests of the designers and producers of technics are

54 Ihde, *op.cit.* (2008), p. 55.
55 Ihde, *ibid.* (2008), p. 59.

reflected in artifacts themselves, their number and diversity, as well as the routines, processes and actions that are (or were) associated with them. One need not be at all sympathetic to Marxian thought to share something very close to this contention. Indeed, that the various interests of past civilisations can – to varying degrees of accuracy – be 'read' from the examples of production they leave behind is a basic premise guiding such scholarly disciplines as archaeology, palaeoanthropology, etc. The only difference between this basic contention and Marcuse's claim that the rationality and ideology of the dominant interests of society are transmitted through the vehicle of technics is that Marcuse is not interpreting societies of the past, but of his present. As Feenberg wrote:

> ...Marcuse is not merely complaining about a system he doesn't like. He is imagining how it will appear to a backward glance rooted in the wider context of values evolved over past centuries and destined to achieve realization in future ones. The obsolescence of that system will be obvious in this hypothetical future, justifying the obstinacy of those who persisted in critique through these difficult times.[56]

Ihde makes reference to the similarities between the designer fallacy and the theory of unintended consequences, and one of the most prominent and potentially dangerous examples of these are the environmental "externalities" of human technical mediation.[57] Although of course, there is a great deal more to be learned from the impacts of humanity on the biosphere, arguably there is sufficient knowledge concerning the impacts of a variety of polluting, dangerous, or otherwise dubious technical capacities that their continuation can no longer be authentically referred to as "unintended". However, as the designer fallacy advises that searching for designer intentions is an exercise in folly, its explanatory value in terms of addressing such wider questions concerning technical mediation as a whole appears limited for the reason that it ignores the role that profit-motives have played and continue to play as the major incentives driving production. Although Ihde has pointed out in other works that he considers environmental questions of foundational significance in the philosophy of technology, such topics do not feature at all in his discussion of the designer fallacy.[58] Perhaps this is because – again, like Feenberg – Ihde appears concerned to distance himself from the "rhetoric of alarm" that each philosopher associates with a supposedly

56 Feenberg, 'Commentary I', in Marcuse, 'Ecology and the Critique of Modern Society', in *Capitalism, Nature, Socialism* 3:3, p. 40.
57 Ihde mentions this theory specifically in relation to the E. Tenner's *Why Things Bite Back: Technology and the Revenge of Unintended Consequences,* (New York: Vintage, 1997).
58 Ihde, *Bodies in Technology,* (Minnesota: University of Minnesota Press, 2001), p. 123.

discredited neo-Malthusianism.[59] Without pursuing this topic here, the time seems well overdue for a rhetoric of radical *caution* inspired by the peculiar novelty of modern technical civilisation which should be amongst the primary tasks for a philosophy of technology to analyse. Although once again, both Ihde and Feenberg address environmental issues at length, calling for an understanding of artifacts which emphasises the end-user at the expense of the designer / producer's intentions arguably has the effect of drawing critical attention away from the historically, evolutionary peculiar economic imperatives propelling the vast majority of production in the modern epoch.

In this chapter I have argued that although neither the Aristotelian approach to technics nor the designer fallacy can fairly be claimed to be outright false, for reasons specific to each approach, they are not sufficient to warrant the ascent of the instrumental theory as a full-blooded approach to the analysis of modern technical mediation. While the designer fallacy correctly draws attention to the fact that technical artifacts are functionally multistable and calls for a more complex approach in understanding the forces and influences which (in some cases) destabilise the notion of a sole designer or inventor building her intentions into artifacts, it has been argued that it is too quick to move from this generally sensible proposition to the conclusion that the theorist ought bypass the intentions of the agencies behind the production of artifacts *per se.* If this is the case, then the designer fallacy appears to be doing little more than repeating self-evident, conventional wisdom; that artifacts may be used in ways previously not considered by the producer or built into their designs. While drawing attention to the end-user's functional priorities is warranted, this is only half the story, and ought not come at the expense of ignoring the most influential incentives which strongly feature in the intentions behind the designers of modern production overall, incentives which Marcuse's approach takes with the utmost seriousness.

The next class of approaches to technical mediation go further than the designer fallacy and represent the opposite end of the agent-technics question. Not merely aiming to undermine the status of the designer in technical mediation, autonomous theories of technology undermine both the end-user *and* the producer. In short, autonomous theories render the status and efficacy of human agency in technical mediation to an impotent status, and so it is to these theories that the discussion now turns.

59 See for example, Ihde, *ibid.* (2001), pp. 115-117. Another critique of supposedly neo-Malthusian thinkers such as Paul Ehrlich can be found in Feenberg, *op.cit.* (1999), pp. 45-70.

Chapter 7

A Critique of Autonomous Theories of Technology

> A new device merely opens a door; it does not compel one to enter.[1]

Although Marcuse's philosophy of technology is still considered deterministic in some circles, this chapter will argue that he resisted the contention that technology is autonomous and suggest that later attempts to argue for such autonomy have problems which suggest his scepticism was well-founded. It will conclude by showing that Marcuse offered a middle-road between the instrumental and autonomous views by offering a philosophy of technology compatible with both.

The theory that technological development is an autonomous phenomenon may at first strike one as odd. Nevertheless, the view persists in many domains, and is often tacitly implied in a great deal of social theory. As well as branding him as a pessimist, reductivist, and elsewhere as a radical utopian, various commentators continue to mistakenly describe Marcuse's philosophy of technology as a form of technological determinism, which is a version of the autonomous theory,[2] and it must be acknowledged that in some places, it is not difficult to see why. For example, in commenting on the encroaching "total administration" of the masses with recourse to the "technological apparatus of production, distribution and communication", Marcuse contended that, due to its scale and "rationality": "...individuals, and even groups of individuals, are powerless against it."[3] Nevertheless, as one of his chief expositors has written: "any critique of Marcuse as a technological

1 L. White Jnr., *Medieval Technology and Social Change*, (Oxford: Oxford University Press, 1966), p. 28.

2 Various academics continue to cast Marcuse as a technological determinist or at least, "associate" him with the view. See for example, S. Wyatt, 'Technological Determinism is Dead; Long Live Technological Determinism', in E.J. Hackett, *et al,* (eds.), *The Handbook of Science and Technology Studies,* third ed., (Cambridge, MASS: The MIT Press, 2008), p. 169. Others have also incorrectly label him a "technological reductivist", "abandoning" his earlier concern with the individual. See for example, M. Schoolman, *The Imaginary Witness: The Critical Theory of Herbert Marcuse,* (New York: The Free Press, 1980). Douglas Kellner has listed previous thinkers who similarly misconstrued Marcuse's approach in his response to Schoolman: 'Schoolman on Marcuse', in *New German Critique,* no.26, "Critical Theory and Modernity", (Spring-Summer, 1982), p. 195.

3 Marcuse, (1965c), 'The Containment of Social Change in Industrial Society', in *Toward A Critical Theory of Society: The Collected Papers of Herbert Marcuse,* vol.2, edited by D. Kellner, (New York: Routledge, 2001), p. 82.

determinist, technocrat, or technophobe is both obsolete and extremely misleading."[4] This can be shown with recourse to various examples in which he made his position clear in a thoroughly unadulterated fashion, and through his criticisms of those he contended saw technics as a self-governing force. For example, despite the similarities of their approaches, Marcuse was strongly critical of the Heideggerian view of technology, which he contended left technics "reified, hypostatized as Fate", and treated them as if they were "...forces in themselves, removed from the context of power relations in which they are constituted and in which determine their use and function."[5] Clearly frustrated by those who considered his view to be deterministic, in *An Essay on Liberation,* Marcuse asked*:*

> Is it still necessary to state that not technology, not technique, not the machine are the engines of repression, but the presence, in them, of the masters who determine their number, their life span (planned obsolescence), their power, their place in life, and the need for them?[6]

Marcuse's point is that the problems he thought endemic to the function of technics under capitalism are not a result of anything *inherent* in technics, economics, or technological rationality *per se*, but in their prevailing direction under the consumer-capitalist status quo. "In Marcuse's view, the most striking feature of advanced industrial society is its ability to contain all social change and to integrate all potential agents of change into one smoothly running, comfortable and satisfying system of domination."[7] That the ensemble of capitalism and technological rationality was such a "smoothly running" and "comfortable" system was not the result of the autonomous dispensations of an external technological entity, nor the iron fists of technocratic dictators, but are arguably best understood with recourse to the collective consequences of an incentive which, once widely

4 Kellner, *op.cit.* (1982), p. 195.

5 'Heidegger's Politics: Interview with Dr. Herbert Marcuse by Harold Keen', in *Heideggerian Marxism,* edited by R. Wolin and A. Abromeit, (Lincoln and London: University of Nebraska Press, 2005), p. 168.

6 Marcuse, *An Essay on Liberation,* (Boston: Beacon Press, 1969b), p. 12. Marcuse put his position unequivocally in a letter to the New York Times criticising the view of Charles Reich, who wrote in his *Greening of America* that "no one is in control" of the prevailing rationality Marcuse had been criticising. As the latter wrote: "Nobody in control of the armed forces, the police, the National Guard? Nobody in control of the outer space program, of the budget, the Congressional committees? There is only the machine being tended to? But the machine not only must be tended to, it must be designed, constructed, programmed, directed. And there are very definite, identifiable persons, groups, classes, interests which to this controlling job, which direct the technical, economic, political machine for the society as a whole. They, not their machine, decide on life and death, war and peace – they set the priorities. They have all the power to defend it – and it is not the power of the machine but *over* the machine: human power, political power." Marcuse, (1970a), 'Charles Reich – A Negative View', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* vol.3, edited by D. Kellner, (London and New York: Routledge, 2005), p. 48. It should be noted that Reich's own views on the matter appear ambiguous: "The revolution must be cultural. For culture controls the economic and political machine, not vice-versa. The machinery turns out what it pleases and forces people to buy. But if the culture changes, the machine has no choice but to comply." See C. Reich, *The Greening of America,* (New York: Bantam, 1978), p. 329.

7 D. Kellner, *Herbert Marcuse and the Crisis of Marxism,* (Berkeley: University of California Press, 1984), p. 243.

accepted by the populace, came to provide the major motivation and direction of production. Marcuse's perhaps overly-optimistic hope was that at some stage the hitherto "repressed" second dimension of critical reason may allow individuals to begin to view technology, society, and politics critically, opening the possibility for them to begin to recognise the iniquities he saw in the system and take steps to alter them. To be sure, Marcuse indicated that his use of the concept of repression is not intended in the "technical, psychoanalytic sense", but in a broader manner, to emphasise the extent to which the end of technological rationality had been artificially subverted and contained. Its opposite: "Authentic technological rationality" (would be) "characterized by the unrestricted reduction of socially necessary labor, of toil, and of repression."[8]

Marcuse viewed technics as a medium by which not only instrumental ends could be enacted, but a means by which political or ideological content, aesthetic or ethical values could be embodied within as well as transferred through and imposed upon the populace, with the origins of this transferral ultimately being founded in "vested interests". Unlike those in the public sphere who vocally denounce the reduction, reification, objectification, or alienation of humanity out of a false need to merely appear impartial and democratic, Marcuse instead took these features with the utmost seriousness. In characterising humans in terms of their essential potential to be other than what they are, they are free to construct a different sort of society when the technical means to do so emerge. Yet, the tragedy and danger Marcuse lamented in the one-dimensional individual and society was the apparent complacency and even happiness in the trade-off between increases in material affluence and authentic freedom, an arrangement which the modern consumer-capitalist society had "perfected":

> ...This society has achieved a condition in which individuals reproduce their own servitude: men themselves repel their own liberation. It is a voluntary servitude and, it seems a perfectly rational servitude, because in accepting the socially preformed and preconditioned needs and satisfactions, the individuals actually live better than before.[9]

For Marcuse, this outcome was not conceived as a betrayal as such, but a dereliction of our aforementioned existential capacity to pursue our own potential and thereby, to exercise responsibility over technical mediation. If such a will to dereliction and abdication is active, (and it receives strong support from the contention that technology is autonomous), it seems but a short

8 Marcuse, *op.cit.* (1965c), p. 83.
9 Marcuse, *op.cit.* (1965c), pp. 84-85.

step away from the irrational rationalisation of satisfying ever increasing hedonistic desires in the face of seemingly far distant concerns of environmental breakdown. Artificial 'false needs' came to dominate everyday life not because they were the *determined* product of a self-governing process, but because – in their own free will – there are understandable reasons why the majority of individuals tend to choose them.[10] In this sense, Marcuse appears to have once again following the position of Marx, who, despite much being made of his deterministic-sounding phrase concerning the hand-mill, also wrote:

> The *alien* being to whom labour and the product of labour belong, to whose service labour is devoted, and to whose enjoyment the product of labour goes, can only be *man* himself. If the product of labour does not belong to the worker, but confronts him as an alien power, this can only be because it belongs to a *man* other than the worker.[11]

Marcuse's view is therefore resistant to both the idea that technology is autonomous as well as outright technological determinism not just because of his avidity for Marx, but – in a manner owing more to Aristotle – due to the emphasis he placed on human potential. It is this very potential that is ultimately objectively realised in the concrete forms of technical artifacts, systems, work-relations, etc., but were considered by Marcuse to currently consist in a repressive arrangement in which technology appears to play the major causal role in social and individual affairs. It is this containment of potential which Marcuse insisted must be changed.[12] In other words, limiting philosophical accounts of the technical phenomenon to either 'under control' or 'out of control' (i.e. a dichotomy consisting in division #1 and #3 as noted in the previous chapter), appears to be misleading. Without neglecting to notice that technics can play a determining role in social affairs (if the "vested interests" so dictate), the Marcusean approach stops well short of assuming it is an autonomous phenomenon, thereby providing space for agents – and indeed nations – to make practical, informed decisions regarding its development and proliferation, not just in piecemeal

10 See Marcuse, *ibid.* (1965c), pp. 84-86, and 91. Once again, Marcuse's approach here echoes that of Lewis Mumford, who wrote: "Technics and civilization as a whole are the result of human choices and aptitudes and strivings, deliberate as well as unconscious, often irrational when apparently they are most objective and scientific: but even when they are uncontrollable, they are not external (…) he who does not see choice in the development of the machine merely betrays his incapacity to observe cumulative effects until they are bunched together so closely that they seem completely external and impersonal." See Mumford, (1934), *Technics and Civilization,* (New York: Harcourt and Brace, 1963), p. 6.

11 Karl Marx, quoted in L. Winner, *Autonomous Technology: Technics Out of Control as a Theme in Political Thought,* (Cambridge, MASS: The MIT Press, 1977), p. 40. (Emphasis added).

12 Chapter 8 of Kellner *op.cit.* (1984), offers a more cohesive critique of the contention that Marcuse was a technological reductionist than space permits here. Amongst others, Kellner lists the Marxist-Leninist R. Steigerwald's *Herbert Marcuses dritter Weg,* (Cologne: Pahl-Rugenstein, 1969), as well as various critical attacks in the volume edited by Jürgen Habermas, *Antworten auf Herbert Marcuse,* (Frankfurt am Main: Suhrkamp, 1968).

terms, but as a whole. To this extent therefore, Marcuse's multidimensional view can be seen to accord with division #2: technics and humanity are interwoven in a causally reciprocal, or co-evolutionary manner. It is this multidimensional element of his thought which on the one hand implies the simple assumption that technics can and ought to be brought under stricter control and regulation, and on the other hand – that the enormity of this task is so complex and radical as to "mean the collapse of the social and political institutions which are based on the permanent necessity of labor and of the struggle for existence."[13]

I now examine two examples of the autonomous theory of technology – technological determinism and the theory of technological "evolution" – as well as their recent fusion in the form of the 'singularity hypothesis' in more detail. It will be argued that these theories have problems which suggest that Marcuse's "ambivalence theory" of technology – "the notion that technologies are neither neutral nor inherently deterministic but, rather, politically and socially inscribed and entangled within webs of social struggles"[14] continues to be relevant to modern philosophers of technology and the environment.

A Confusion of Theories: Autonomous Technology and Technological Determinism

Despite the theory of autonomous technology arguably informing the background of a variety of academic research projects, politico-economic policies and aspirations, as well as various "common sense" attitudes toward technology, sub-divisions of the theory are often passed over or subject to over-simplification. For the most part, the theory of "autonomous technology"[15] is often (and arguably mistakenly) considered synonymous with technological determinism. For this reason, the discussion will briefly depart from Marcuse in order to delineate technological determinism and its own sub-groups, before moving on to critically attend to a more recent version of the autonomous theory; the evolutionary theory of technology.

13 Marcuse, *op.cit.* (1965c), p. 84.
14 M. Vieta, 'Hope for Our Technological Inheritance? From Substantive Critiques of Technology to Marcuse's Post-Technological Rationality', in *Strategies of Critique,* vol.1, no.2, (2010), abstract.
15 The term is owed to Winner, *op.cit.* (1977).

According to Langdon Winner, theories of autonomous technology include all "...conceptions and observations to the effect that technology is somehow out of control by human agency", and that it "governs its own course, speed and destination (...) independent of human direction."[16] The theory of technological determinism in its stronger formulations arguably comprises the most extreme example of the autonomous theory of technology, as it implies that technoscientific development is not only isolated from human control and is an independent historical actor, but that it plays the most influential and significant causal role in determining the lives of individuals and society at large.[17] As D.B. Sicilia writes, technological determinism is closely related to its metaphysical counterpart, 'hard' or metaphysical determinism:

> Like its close cousins – ethical, logical, theological, physical, psychological, and historical determinism – technological determinism is antithetical to human freedom. Just as the doctrine of theological determinism asserts the ineluctable, inevitable character of God, technological determinism holds that technology possesses a logic – the logic of efficiency – that acts independently of and determinatively upon human affairs.[18]

Just as hard determinists claim that whatever one does is the result of prior causes, entailing that any sense or feeling of free will is illusory,[19] technological determinists reproduce this view in a social context, presenting an image of the technical phenomenon which appears to have much in common with a natural force that must simply be abided with, and that human agents have no choice at all but to be swept up under its causal sway.[20] However, rather than the this bluntly referring to the view that agents are simply determined by technology, or that "machinery and allied subhuman powers somehow function as the independent agencies in history",[21] the theory of technological

16 Winner, *ibid.* (1977), pp. 13-16.

17 See for example M. McLuhan, (1964), *Understanding Media: The Extensions of Man,* (London: Routledge, 2007); Kurzweil, *The Singularity is Near: When Humans Transcend Biology,* (New York: Penguin, 2005); T. Friedman, *The World is Flat,* (New York: Picador, 2005); R. Heilbroner, (1967), 'Do Machines Make History?' in Scharff and Dusek, (eds.), *Philosophy of Technology: The Technological Condition,* (Oxford: Blackwell, 2007), pp. 398-404; 'Technological Determinism Revisited' in *Does Technology Drive History? The Enigma of Technological Determinism,* edited by M.R. Smith and L. Marx, (Cambridge, MASS: The MIT Press, 1994), pp. 67-78. For a discussion of technological determinism in a Marxian context, see B. Bimber, 'Three Faces of Technological Determinism', in Smith and Marx, *ibid.* (eds, 1994), pp.79-100.

18 D.B. Sicilia, 'Technological Determinism and the Firm', in *Business and Economic History,* 22, (Autumn, 1993), p. 69.

19 See for example the classical statement of hard determinism from P. d'Holbach, (1770), 'The Illusion of Free Will', in *Reason and Responsibility: Readings in the Basic Problems of Philosophy,* 9th ed., edited by J. Feinberg, (Belmont: Wadsworth, 1996), pp. 418-422.

20 See M. Goldhaber, 'Is Technology Autonomous?', in *Controlling Technology: Contemporary Issues,* edited by W.B. Thompson, *et al,* (New York: Prometheus Books, 1991), p. 195.

21 G.A. Cohen, quoted in Bimber, *op.cit.* (1994), p. 83.

determinism is rather more variegated.[22] For example, technological determinism (and autonomous theories in general) can take on both positive or negative, dystopian or utopian forms. Jacques Ellul tended not only to view technology as autonomous, but also intrusive, dehumanising and destructive,[23] whereas optimists see human or social progress as both contingent upon and embodied within technical progress. The particular version of the autonomous theory of technics to be discussed below exemplifies this latter class of views. Moreover, one version of the view appears concerned with the nature of the development of technology; another aims to show how technology impacts upon and determines the social as well as the individual, and yet another can be applied as a methodological approach to history and society in general.

The first approach claims that the course of technical development plays out in a deterministic fashion, with one innovation causing or opening up the grounds for the next. In the modern world, given that the vast majority of artifacts are increasingly produced by other artifacts and production machinery, future devices and systems are considered by the technological determinist to form parts of a closed, causal system which resembles ancestral inheritance. For example, it might be argued that the innovation of the steam engine determined the innovation of railway transport which in turn led to the requirement of time-tables, stations, more powerful engines, etc., each triggering the emergence of the next. Transport, communication – even the economy itself – is therefore considered to have arisen "...from its technologies. It arose from the productive methods and legal and organizational arrangements that we use to satisfy our needs. It therefore issued forth from all these capturings of phenomena and subsequent transformations".[24] In a similar vein, Karl Marx's comment regarding the societies "given" by the hand mill and the steam mill has also been cited as evidence of the latter's supposed technological determinism.[25] Simply stated, the second claim grants technics the status of the major determinant of civilisation as a whole, and that "...social progress is driven by technological innovation, which in turn follows an 'inevitable' course."[26] This approach is arguably the strongest form of technological determinism, but it is also remarkably common. Easily wedded to ideas of 'progress' and 'development', it lies latent in most levels of government policy, features as a background of many histories of technology and science, and

22 Bimber, *op.cit.* (1994) discusses three forms of technological determinism which he calls "Norm-Based Accounts," "Unintended Consequences Accounts", and "Logical Sequence Accounts". Bimber argues that only the third account can be understood as genuinely deterministic.

23 See J. Ellul, *The Technological Society,* (New York: Vintage, 1964).

24 W. B. Arthur, *The Nature of Technology: What it is and How it Evolves,* (New York: The Free Press, 2009), p. 3.

25 See Heilbroner, *op.cit.* (1967) for a discussion of this passage from Marx, and Bimber, *op.cit.* (1994) for a refutation of the claim that Marx was a technological determinist.

26 M.R. Smith, 'Recourse of Empire: Landscapes of Progress in Technological America', in Smith and Marx, *op.cit.* (eds., 1994), p. 38.

drives business to pursue innovation. Thirdly, as a methodological approach, technological determinism is also regularly, tacitly presupposed in works which aim to address its impacts on society, individuals, or particular cultural groups, thereby tending to reduce each to the status of its effects. As Raymond Williams has noted, technological determinism and what he calls "symptomatic technology", (the former view posits technology as the key cause of social changes, whereas the latter is a "symptom" of social change "that is otherwise determined"), are concepts that are deeply integrated into various forms of social thought:

> Each view can then be seen to depend on the isolation of technology. It 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. These positions are so deeply established in modern social thought that it is very difficult to think beyond them. Most histories of technology, like most histories of scientific discovery, are written from their assumptions.[27]

Furthermore, as Winner has noted, the sociological approach inspired by Emile Durkheim appears to be built on the premise that, in the words of the latter, "Society is not a mere sum of individuals. Rather, the system formed by their association represents a specific reality which has its own characteristics".[28] What enables certain societies to persist over time is referred to as their "mechanical solidarity", an approach which arguably has strong affinities with technological determinism.[29] Some versions of the functionalist approach utilised by certain prominent anthropologists in the early to mid-twentieth century also appeared to adopt a similar analogy between the apparently functional operations of society and mechanical apparatus. The individual's place in a culture or social group was to be gauged in terms of how they are were allocated to play functional roles (or deviate from them) in terms of a structural whole.[30] In either view, the sum of the parts appears to take on a dynamism and scale which appears to transcend its individual constituent's powers to alter or shape it.

Whilst it may be granted that autonomous theories of technology have a certain appeal given the developed world's level of technological saturation, their central claim – the isolation of the technical phenomenon from human control – remains somewhat counter-intuitive. Of course, this hardly constitutes grounds for their invalidation, but the very oddness of the claim can easily be lent

27 R. Williams, (1975), *Television,* 2nd ed., (London: Routledge, 1990), p. 6.
28 Emile Durkheim, quoted in Winner, *op.cit.* (1977), p. 62.
29 J.J. Macionis, *Sociology,* (Toronto: Pearson, 2011), p. 97.
30 See for example R. Benedict, 'A Defence of Moral Relativism', from 'Anthropology and the Abnormal', in *The Journal of General Psychology,* 10, (1934), pp. 59-82.

to sensational effect. For example, Marshall McLuhan appeared to take delight in belittling those who held to variations of the instrumental view. As he wrote in his most famous essay:

> I am in the position of Louis Pasteur telling doctors that their greatest enemy was quite invisible, and quite unrecognised by them. Our conventional response to all media, namely that it is how they are used that counts, is the numb stance of the technological idiot.[31]

McLuhan may have had the literary dexterity and prominence to make such phrases as "an Indian is merely the servo-mechanism of his canoe, as the cowboy of his horse or the executive of his clock"[32] sound like rational prospects to a population dazzled by technoscientific advances, however like advocates of the designer fallacy, arguably his examples give undue priority to one side of the story at the expense of another. To expand: in the previous chapter it was argued that in placing excessive emphasis on the end-user, the designer fallacy and constructivist accounts of technological mediation tend to undermine the intentions, interests and incentives motivating design and production as a whole. Technological determinists such as McLuhan and Ellul are apparently committed to the exact *opposite* claim; as technology and 'technique' are considered autonomous, individual agents and their interests are removed from the scheme almost completely. Consider the following passage from Ellul:

> No technique is possible when men are free. When technique enters into the realm of social life, it collides ceaselessly with the human being to the degree that the combination of man and technique is unavoidable, and that technical action necessarily results in a determined result. (…) Technique must reduce man to a technical animal, the king of the slaves of technique. Human caprice crumbles before this necessity; there can be no human autonomy in the face of technical autonomy. The individual must be fashioned by techniques, either negatively (by the techniques of understanding man) or positively (by the adaptation of man to the technical framework), in order to wipe out the blots his personal determination introduces into the perfect design of the organization.[33]

Ellul's position is therefore unambiguous; like the hard metaphysical determinist's rejection of free will as illusory, the instrumental view of technics is similarly deceptive. For Ellul, technical artifacts

31 M. McLuhan, (1964), 'The Medium is the Message', in McLuhan, *op.cit.* (2007), p. 19.
32 See McLuhan, *op.cit.* (1964), p. 51
33 J. Ellul, *The Technological Society,* (New York: Vintage, 1964), p. 138.

are not our servants – on the contrary – the individual "is the servant of technique."[34] Although Ellul's theory is not ontological but sociological and historical, there may remain pockets of freedom, but when these come into contact with technique, they tend to evaporate into prescribed, pre-determined outcomes in which the individual is once again cast as the mere effect of technological causes.

Summarising technological determinism, Winner notes that it "stands or falls on two hypotheses: 1. that the technical base of a society is the fundamental condition affecting all patterns of social existence; and 2. that changes in technology are the single most important sources of change in society."[35] If either view is correct in its description of advanced industrial society (or any other for that matter), then it would appear the possibility of the sort of redirection of production Marcuse was calling for is out of the question, as calls for more responsibility or less invasive or destructive forms of technics would presumably be superfluous due to their epiphenomenal status. Each claim relies upon the autonomy of technical development and its independence from the social. If true, humanity is – so to speak – merely along for the ride.

Prior to critically engaging the autonomous theory further, the concept of technological *evolution* view will now be addressed, as certain versions of it arguably represent another path to the autonomous theory of technology.

Evolutionary Theories of Technology

Theories of technological evolution are not altogether new, but appear to have made something of a resurgence in recent times with the growing interest in transhumanism and the singularity hypothesis. Early intimations of the view can arguably be found in Mary Shelley's *Frankenstein,*[36] as well as Samuel Butler's 1863 article, 'Darwin Among the Machines' which contained the speculation that technical artifacts were a form of "mechanical life" undergoing constant evolution.[37] The specific term "technological evolution" appears to have been coined by the Czech

34 Ellul, *ibid.* (1964).
35 Winner, *op.cit.* (1977), p. 76.
36 M. Shelley, (1818), *Frankenstein; or, The Modern Prometheus,* (London: Penguin Classics, 1992).
37 It may be arguable that – instead of applying a biological frame of reference to machine development – Butler was actually doing the opposite. See S. Butler, *Erewhon,* (1872), chapters 23, 24 and 25, (London: Penguin Classics,

philosopher, Radovan Richta in his work *Člověk a technika v revoluci našich dnů* ('Man and Technology in the Revolution of Our Day') published in 1963.[38] More recent thinkers such as Bernard Stiegler, Belinda Barnet[39] W. Brian Arthur,[40] George Basalla,[41] J.M. Ziman,[42] and most prominently, Ray Kurzweil, have also used the term 'evolution' as their primary descriptor of technological development.[43] Others have taken an alternative route, instead of deploying more traditional Darwinian principles to technical development have utilised theories with recourse to hypothesised units of cultural selection or 'memes'.[44] Yet it would appear that any problems that apply to the latter theory would apply *ipso facto* to memetic theories of technology.[45]

Rather than casting human society or individuals as the mere effects of technological causes, theories of technological evolution tend to reduce human agents to the status of the vessels of its transmission, playing a role loosely analogous to a selection mechanism. Winner summarises the view as follows:

> Since the theory focuses upon the evolving forms of technics in themselves, human beings come to be seen as the mere carriers of technology. Each generation bears and extends the technical ensemble and passes it on to the next generation. The mortality of human beings matters little, for technology is itself the immortal, and, therefore, the more significant part of the process (…) Mankind serves a function similar to that of natural selection in Darwinian theory. Existing structures in nature and the technical ensemble are the equivalent of a gene pool of a biological species. Human beings act not so much as participants as a selective

1985), pp. 198-226

38 As yet there is no English translation. For a discussion of Richta's work on technology and its Marxian influence, see L Nový, J. Gabriel and J. Hroch, (eds.), *Czech Philosophy in the XXth Century,* chapter 13, (Washington D.C.: Paideia Press, 1994).

39 B. Stiegler, *Technics and Time V1: The Fault of Epimetheus,* translated by R. Beardsworth and G. Collins, (Stanford: Stanford University Press, 1994); B. Barnet, 'Do Technical Artefacts Evolve?' in *Technicity*, edited by A. Bradley and L. Armand, (Prague: Litteraria Pragensia, 2006), pp. 103-114 and see also B. Barnet, 'Engelbart's Theory of Technical Evolution', *Continuum Journal,* vol.20, issue 4, (December, 2006), pp. 509-521.

40 Arthur, *op.cit.* (2009). It should be noted that, although the term 'evolution' features prominently in Arthur's book, he specifically distinguishes his approach from the Darwinian use of the term. See Arthur, *ibid.* (2009), p. 107

41 See G. Basalla, *The Evolution of Technology,* (Cambridge: Cambridge University Press, 1988).

42 J.M. Ziman, *Technological Innovation as an Evolutionary Process,* (Cambridge: Cambridge University Press, 2003).

43 Kurzweil, *op.cit.* (2005).

44 See for example S. Blackmore, 'Evolution's 3rd Replicator: Memes, Genes, and Now What?', *New Scientist* 2719, (July 2009); A. Álvarez, 'Three Memetic Theories of Technology', *Techné* vol.9, no.2, (Winter, 2005). The 'meme meme' originally emerged in R. Dawkins, (1982), *The Extended Phenotype: The Long Reach of the Gene,* (Oxford: Oxford University Press, 1999), pp. 97-117.

45 Critiques of memetic theory include K. Sterelny and P.E. Griffiths, *Sex and Death: an Introduction to the Philosophy of Biology,* (Chicago: Chicago University Press, 1999), p. 333; J. Gray, 'The Atheist Delusion', in *The Guardian,* (15 March, 2008); and J.T. Burman, 'The Misunderstanding of Memes: Biography of an Unscientific Object, 1976-1999', in *Perspectives on Science,* vol. 20, no. 1, (2012), pp. 75-104.

environment which combines and recombines these structures to produce new mutations, which are then adapted to a particular niche in that environment.[46]

Although it will not be the aim here to completely dismiss the general claim that technology 'evolves', put simply, the major problem with the claim is that the latter has long been considered amongst the paradigmatic examples of human agency, invention, planning and creativity, not the products of a blind selection process. To take a famous example, William Paley used the watch as a seemingly self-evident indication of agential design-work in order to draw an analogy with what appeared to the Natural Theologists as the equally methodically planned, teleological, and functional arrangements of natural organisms.[47] It appears that on this basis, taking theories of technological evolution to their logical extent would have the side-effect of placing the relatively well-attested evidence of the distinction between Darwinian natural selection and technical development into question, as after the publication of *The Origin of Species,*[48] it can be understood that human producers and users of technics are precisely *not* "blind watchmakers" but the very opposite.[49] As this would also have the somewhat ironic side-effect devaluing Darwinian theory, it seems strange to call upon it as a description of technological development. However, as it will be explained in more detail below, this is not to say that there are not means by which the technical may be permitted to 'evolve'. To explain this further, a simple distinction will be required.

Firstly, the term 'evolution' is used in both broad and narrow senses which are characterised by the presence, or lack of presence, of human agents in technical mediation. In regard to the former, it serves as a wide description of any process of development or change which appears to follow a specific direction, a definition which descends from the Latin *ēvolūtiōn* ("unrolling" or "opening"). On this definition, one can speak of the 'evolution' of the modern visual arts, computer games, battlefield strategies, marketplace competition, agricultural techniques, etc. In other words, this sense of the term classes evolution as fairly much synonymous with the concept of *development*. In its stricter or narrow sense, the term is used to describe the biological processes of development gathered under the New Synthesis, or Charles Darwin and Alfred Russel Wallace's theory of natural

46 Winner, *op.cit.* (1977), pp. 57-58. (Emphasis added).

47 See W. Paley, (1802), *Natural Theology,* (London: Deward Publishing, 2010). Modern (biological as opposed to cosmological) design arguments arguably continue to proceed on the basis originally set down by Paley. See for example W.A. Dembski, *Intelligent Design: The Bridge Between Science and Theology,* (Downer's Grove, ILL: Intervarsity Press, 1999), and M. Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution,* (New York: The Free Press, 2006). For a recent collection of essays on the design argument, see *Debating Design: From Darwin to DNA,* edited by W.A. Dembski and M. Ruse, (Cambridge: Cambridge University Press, 2004).

48 C. Darwin, (1859), *On the Origin of Species by Means of Natural Selection,* (Chicago: University of Chicago Press, 1992).

49 The term is owed to Richard Dawkins' *The Blind Watchmaker,* (London: Penguin, 1986).

selection in combination with the Mendelian theory of genetics. This amalgamated view remains the current paradigm of evolutionary biology.[50] As an explanation of the development of biological processes, natural selection has proven its superiority to traditional teleological theories precisely because it represents an explanation of apparent design without the need to call on a designer, thereby explaining the various defects, suffering, or other content which pose significant explanatory problems in reference to an omnicompetent and maximally good designer.[51] As natural selection is a non-agential phenomenon requiring neither planning, foresight, nor agency in the sense usually ascribed to human agents, its application to technical development appears to open up immediate and profound problems. In other words, for almost precisely the reason why Jean-Baptiste Lamarck's theory of the inheritance of acquired characteristics was mistaken as a description of biological evolution, it would appear to be acceptable as a theory of technological evolution.[52]

To borrow a useful classification from Andrew Feenberg, narrow evolutionary theories of technical development would arguably also count as "substantivist" in that they attribute "... a more than instrumental, a substantive, content to technological mediation".[53] By "substantive content", Feenberg is specifically targeting the technological determinists, as well as the views of technology outlined by Martin Heidegger, Ellul and to some extent, Marcuse himself, whose theory of technology Feenberg claims – whilst certainly not deterministic – was "strongly influenced by substantivism."[54] He goes on to note that substantivist theories tend to render technology autonomous (or largely autonomous) from human choice, and from this isolated position causally shape, alter and determine human life. Hence, the charges of substantivism and autonomy arguably apply to both technological determinism as well as narrow evolutionary theories of technological development.

To summarise, significant difficulties appear to emerge from the application of narrow views of evolution to technical development for the reason that they appear to undermine or ignore the role of human agency in its production and use which rationalises their allocation into the third division noted in the previous chapter. The theory of natural selection entails that an organism's success or

50 See E. Mayr, *What Evolution Is,* (London: Weidenfeld and Nicolson, 2002), p. 270.
51 See F.J. Ayala, 'Design Without a Designer: Darwin's Greatest Discovery', in Dembski and Ruse, *op.cit.* (2004), pp. 55-80.
52 See J. Lamarck, (1809), *Philosophic Zoologique: ou Exposition des Considérations Relative à l'histoire Naturelle des Animaux,* vol.1, (Paris: Nabu Press, 2010).
53 See Feenberg, *Questioning Technology,* (London and New York: Routledge, 1999), p. 2.
54 Feenberg, *ibid.* (1999), p. 6.

failure is contingent upon the chances that beneficial mutations are selected for in its local environment; if so, they contribute to the prospect of the species' reproduction and flourishing, and if not they are deleterious to its survival.[55] Whilst it may be the case that the sensory and physiological capacities of biological organisms are approached scientifically in the language of functionality or "design talk", it is well understood that such "designs" did not come about with recourse to pre-given intentions or plans.[56] Over the great passages of evolutionary time, and to the extent that agency can be conferred to non-humans, although evident, it is of minor significance in the overall process. Applying narrow views of evolution to technical development then not only appears to muddy the waters between agency and natural 'design', but also the Aristotelian distinction between organisms and artifacts,[57] as well as the folk-epistemological distinction between the artificial and the natural, all of which are strongly contingent on the presence of human agency. Nevertheless, whilst there appear to be reasons to be sceptical of the claim that technology "evolves", arguably the contention cannot be dispensed with entirely, but requires further qualification. It will now be useful to examine a specific version of the theory of technical evolution which has gained a significant following over the last decade in an attempt to show where narrow versions of the theory go wrong, and descend into a somewhat blunt and reductive determinism.

Combining Evolution and Determinism: the Singularity Hypothesis

What follows aims to expand the initial criticisms of theories of technical evolution and determinism above by drawing focus to the theory of the technological "Singularity", a theoretical point at which the rate of various forms of technoscientific advance are speculated to become so rapid as to equal, and potentially surpass human intellectual capacities. The particular version of the singularity hypothesis to be critically attended to here belongs to one of its most prominent advocates, the inventor and futurist, Ray Kurzweil, who, despite its fantastic sounding implications, has arguably offered the most sophisticated, elaborate and detailed version of the theory thus far.

55 See for example S. Olsen, *Mapping Human History: Genes, Race and Our Common Origins,* (Boston: Mariner, 2003), p. 23.
56 On the biologist's preponderance for "design talk", see T. Lewens, *Organisms and Artifacts: Design in Nature and Elsewhere,* (Cambridge, MASS: The MIT Press, 2005).
57 See the previous chapter of this thesis.

As Kurzweil contends, the singularity represents the culmination of a progressive historical process he refers to as the "Law of Accelerating Returns". This law aims to describe "the inherent acceleration of the rate of evolution, with technological evolution as a continuation of biological evolution."[58] The Law of Accelerating Returns is founded in an apparently teleological tendency for information to improve its own dissemination with recourse to a narrow (i.e. non-agential) evolutionary process, and the singularity represents a point at which this process becomes too rapid to comprehend or predict. The literature on the singularity offers various interpretations of the concept: it may be set to occur soon – i.e. within decades – centuries, or not at all.[59] It may promote radically positive qualitative changes, or it may be a mistake that could potentially severely disrupt or even end civilisation as a whole. No doubt, aside from questions of its credibility or probability, its eschatalogical implications, and even its parallels with myth and folklore, it seems natural that an idea with such potentially wide implications for theory and practise has often been greeted with dismissal and even derision, making it understandable that the academy has been slow to address the subject.[60] Although philosophers have recently begun to investigate the implications of various forms of human enhancement,[61] as David Chalmers recently wrote of the resistance of the academic philosophical community to the idea of the singularity: "I think this resistance is a shame, as the singularity idea is clearly an important one. The argument for a singularity is one that we should take seriously. And the questions surrounding the singularity are of enormous practical and philosophical concern."[62]

In most presentations of the singularity hypothesis,[63] the term (if not the idea)[64] is said to have arisen in a comment from the mathematician and information theorist, John von Neumann, who was quoted by Stanislaw Ulam as mentioning

58 Kurzweil, *op.cit.* (2005), p. 7.

59 For three variations of the idea see E. Yudkowski, 'Three Major Singularity Schools', originally appearing on the website of the Singularity Institute for Artificial Intelligence (SIAI), (September, 2007).

60 There are some notable exceptions. See for example D. Chalmers, 'The Singularity: A Philosophical Analysis', in *The Journal of Consciousness Studies,* vol.17, no.7, (2010), pp. 1-56; N. Bostrom, 'How long before Superintelligence?' in the *International Journal of Future Studies,* 2; H. Moravec, *Robot: Mere Machine to Transcendent Mind,* (Oxford: Oxford University Press, 1998), and D.R. Hofstadter, 'Moore's Law, Artificial Evolution, and the Fate of Humanity', in *Perspectives on Adaptation in Natural and Artificial Systems,* edited by L. Booker, S. Forrest, M. Mitchell and R. Riolo, (Oxford: Oxford University Press, 2005), pp. 163-196, and F. Fukuyama, *Our Posthuman Future: Consequences of the Biotechnology Revolution,* (New York: Picador, 2003).

61 See for example The Royal Society and the Royal Academy of Engineering, 'Nanoscience and Nanotechnology', (July 2004), chapter 6, pp. 51-57; 'Making Perfect Life: Bio-Engineering (in) the 21st Century – Monitoring Report – Phase II, (09.2011), and 'Human Enhancement – Ethical Issues', European Parliament Science and Technology Options Assessment, (04.2012).

62 Chalmers, *op.cit.* (2010), pp. 3-4.

63 See for example, J. Lanier, *You Are Not a Gadget: A Manifesto,* (London: Penguin-Allen Lane, 2010), p. 24.

64 As Bostrom points out, J.W. Goethe had already explored the implications of exponential replication – albeit in a magical, rather than technological context – in his 1797 poem, *Der Zauberlehrling,* (Berlin: Kindermann Verlag, 2008).

> The ever-accelerating progress of technology (…) gives the appearance of approaching some essential singularity in the history of the race beyond which human affairs, as we know them, could not continue.[65]

The specific term "Technological Singularity" was coined by Vernor Vinge in 1993,[66] and has since been described in detail and expanded on by a variety of futurologists, philosophers, transhumanist thinkers and others, with the most ardent devotees believing it will arise sometime in the early to mid-part of the current century.[67] According to Kurzweil, the event represents the asymptote of supposedly "exponential" rates of technical development and replication which he contends can be seen to have been progressively unfolding since the very beginning of the universe. Specifically, he emphasises the recently rapid growth of computational power, our increasing understanding of genetics and nanotechnology,[68] which he claims are approaching a 'singular' point of convergence.[69] Although various thinkers have provided warnings concerning the potentially disastrous implications of the singularity,[70] Kurzweil himself does not accept that the concept is either utopian or dystopian.[71] Nevertheless, more optimistic accounts of the future are very difficult to find, with

65 Quoted in Kurzweil, *op.cit.* (2005), p. 10.

66 V. Vinge, 'The Coming Technological Singularity: How to Survive in the Posthuman Era', in *Vision-21: Interdisciplinary Science and Engineering in the Era of Cyberspace,* edited by G.A. Landis, (NASA Publication CP-101290, March, 1993), pp. 115-126.

67 Kurzweil has predicted the occurrence of the singularity in 2045. See J. Martin, *The Meaning of the 21st Century: A Vital Blueprint for Ensuring Our Future,* (London: Eden Project Books, 2006), p. 192. See also L. Grossman, '2045: The Year Man Becomes Immortal', in *Time Magazine,* (February 10, 2011). It should be noted that various theorists who believe in the possibility of a singularity place the possible date much later.

68 J. Garreau refers to them as the "GRIN" technologies; genetics, robotics, information and nanotechnologies. See his *Radical Evolution: The Promise and Peril of Enhancing Our Minds, Our Bodies – and What it Means to be Human,* (New York: Broadway Press, 2005), pp. 4-8.

69 Convergence and "synergies" have featured heavily in explanations of technoscientific progress, innovation, as well as bases for futurist speculation. On the former, see W.S. Bainbridge and M.C. Roco (eds.), *Managing Nano-Bio-Info-Cogno Innovations,* (Dordrecht: Springer, 2010). On the latter see Kurzweil, *op.cit.* (2005), Garreau, *ibid.* (2005), and for a slightly more sober analysis, M. Kaku, *Visions: How Science Will Revolutionize the 21st Century,* (New York: Anchor Books, 1998); *Physics of the Future: How Science Will Shape Human Destiny and Our Lives by the Year 2100,* (New York: Anchor Books, 2012).

70 See for example, H. de Garis, *The Artilect War: Cosmists vs. Terrans: A Bitter Controversy Concerning Whether Humanity should Build Godlike Massively Intelligent Machines,* (Palm Springs: ETC Publications, 2005); Garreau, *op.cit.* (2005), pp. 133-185 and B. Joy, 'Why the Future Doesn't Need Us', in *Wired,* issue 8.04, (April, 2000). For a discussion of the positive and negative themes emanating from the singularity and transhumanist literature, see R.M. Geraci, *Apocalyptic AI: Visions of Heaven and Hell in Robotics, Artificial Intelligence, and Virtual Reality,* (Oxford: Oxford University Press, 2010); N. Bostrom and M.M. Ćirković, *Global Catastrophic Risks*, (Oxford: Oxford University Press, 2008); M. Rees, *Our Final Century?* (London: Arrow Books, 2004), R. Posner, *Catastrophe: Risk and Response,* (Oxford, Oxford University Press, 2004) and J. Leslie, *The End of the World: The Science and Ethics of Human Extinction,* (London: Routledge, 1996). In *The Doubter's Companion,* J.R. Saul makes the following comment, apparently directly aimed at those who hold to the autonomous theory of technology: "Individuals who treat technology as an animated force capable of deciding the direction of society are engaged in the destruction of civilization." See J.R. Saul, *The Doubter's Companion: A Dictionary of Aggressive Common Sense,* (London: Penguin, 1995), p. 281.

71 Kurzweil, *op.cit.* (2005), p. 7.

Kurzweil's outlook making even Marcuse's vision of qualitative change and the end of labour under necessity seem quite meagre in comparison. The former writes of a near future in which exponentially increasing rates of technoscientific advance will not only spell the end of end of tiresome or repetitive labour, but vanquish poverty and disease entirely, even potentially leading to the possibility of immortality.[72] It will allow humanity to end all environmental and pollution problems and consign current concerns over diminishing energy reserves to a quaint memory, and it will not just have a transformative effect on social relations but on the physiological and intellectual constitution of the human species itself. In short, the event of the singularity signals the advent of directed or volitional evolution in which human and machine will become ever-more unified.[73] In Kurzweil's opinion, as the benefits of the singularity will be tantamount to irresistible, any reservations individuals may have about this "merger of biological and nonbiological intelligence" will be swept away in favour of living as "immortal software-based humans", enjoying (presumably) "ultra-high levels of intelligence" which will then "...expand outward in the universe at the speed of light."[74] One of his most prominent critics, Bill Joy, writes of the appeal of the singularity hypothesis:

> Each of these technologies offers untold promise: The vision of near immortality that Kurzweil sees in his robot dreams drives us forward; genetic engineering may soon provide treatments, if not outright cures, for most diseases; and nanotechnology and nanomedicine can address yet more ills. Together they could significantly extend our average life span and improve the quality of our lives. Yet, with each of these technologies, a sequence of small, individually sensible advances leads to an accumulation of great power and, concomitantly, great danger.[75]

Despite the high-tech nature of the idea, searching for alternative sources that parallel its speculations inevitably lead to themes found in myth, religion, romantic folklore and most specifically science fiction,[76] and Kurzweil himself appears quite happy to countenance the comparisons.[77] The connection of technics and magic has been noted by a number of thinkers, but in

72 Kurzweil, *ibid.* (2005), p. 371.
73 The concept of volitional evolution is owed to E.O. Wilson, *Consilience: The Unity of Knowledge,* (London: Abacus Science Greats, 1995), pp. 305-310.
74 Kurzweil, 'The Law of Accelerating Returns', (2001), p. 1.
75 Joy, *op.cit.* (2000), p. 5.
76 See N. Bostrom, 'A History of Transhumanist Thought', in *The Journal of Evolution and Technology,* v.14, (April, 2005), pp. 6-10.
77 See Kurzweil, *op.cit.* (2005), pp. 370-374, and see also Geraci, *op.cit.* (2010), pp. 139-145.

the idea of the singularity, the exit of the latter appears to be complete.[78] For example, Arthur C. Clarke's third law of prediction claims – not without some irony – that "any sufficiently advanced technology is indistinguishable from magic".[79] In other words, in an era when the recourse to salvation in the supernatural seems less and less tenable, the singularity hypothesis appears to offer a potential form of redemption in tune with modern science, materialism, functionalism, and methodological naturalism. Nevertheless, it may bear reminding that a casual perusal of examples from mythological and religious sources reveals a number of prominent warnings of the hubris of extending instrumental capacities to inordinate proportions, or for their own sake.

For example, the motif of humans being *forced* to learn or subjected to divine punishment – whether through their accidents or mistakes, or on the basis of the impulsive, desirous excess supposedly typical of mortal beings – is very old indeed, as is the idea that some avenues of power are off-limits *per se* and ought not be tampered with either technically or magically other than by an adept or by divine entities. The gods and natural forces appear to serve as continual checks to mortal arrogance and the sin of envy; Icarus flew too close to the Sun on waxen wings created by his father, the master craftsman Daedalus, despite the latter's warnings;[80] in the Old Testament, the Israelite's construction of a Golden Calf during Moses' prolonged sojourn on Mount Sinai was doubly wrong, not simply because the Israelites involved themselves in the worship of other gods, but through their "fashioning of the idol with a tool" the sin of idolatry was made practically manifest.[81] Prometheus' theft of fire from Mount Olympus so as to confer its instrumental value on human civilisation was overshadowed by the cruelty and severity of his punishment, an insight into one of the potential disadvantages of immortality not often noted by those already looking forward to "engineered negligible senescence", immortality's technoscientific equivalent.[82] Of course, not all of the mythological sources constitute warnings. Pygmalion's devotion to his craft was divinely rewarded by the sympathy and ingenuity of Aphrodite who magically animated the statue of his ideal partner he had lovingly sculpted into a real human female.[83] And in an interesting parallel with modern threats of genetically engineered organisms and viruses, the Chimaera, "all lion in front, all

78 For a discussion of the historical links between technics and magic, see Ellul, *op.cit.* (1964), pp. 24-32.
79 See A.C. Clarke, (1973), *Profiles of the Future: An Enquiry into the Limits of the Possible,* (New York: Indigo, 2000). Michael Shermer has offered a revision of Clarke's third law: "any sufficiently advanced extra-terrestrial intelligence is indistinguishable from God". See M. Shermer, 'Shermer's Last Law', in *Scientific American,* (January 15, 2002).
80 Ovid, (2-8 AD), *Metamorphoses,* book VIII:183, 'Daedalus and Icarus', translated by S. Garth, J. Dryden, A. Pope, J. Addison and W. Congreve, (London: Forgotten Books, 2007), pp. 219-223.
81 *The Holy Bible*, (New International Version), Exodus 32:4.
82 See for example, A. de Grey and M. Rae, *Ending Aging: The Rejuvenation Breakthroughs that Could Reverse Human Aging in Our Lifetime,* (New York: St Martin's Press, 2007).
83 Ovid, *op.cit.* (2-8 AD), book X, 'The Story of Pygmalion', pp. 287-289.

snake behind, all goat between", the mere vision of which was an omen of shipwrecks and natural disasters, ended up being dispatched by Bellerophon not just because he was astride the winged horse Pegasus, but due to his (technical) innovation of applying a leaden spear tip that would melt in the throat of the fire-breathing monster.[84] In effect then, the singularity can be more or less understood as a means of filling the transcendental gap left by the rise of the modern sciences by deploying science and technology toward outcomes that were hitherto viewed as only attainable through magical or divine means. For this reason, some commentators have noted the potential of the concept to become even more influential than religion:

> It has the potential to transform human experience more powerfully than any prior ideology, religion, or political system ever has, partly because it can be so pleasing to the mind, at least initially, but mostly because it gets a free ride on the overwhelmingly powerful technologies that happen to be created by people who are, to a large degree, true believers.[85]

It was mentioned previously that the singularity consists in a prognosis – or in some cases, a series of prognoses – regarding the impacts of certain forms of technoscientific advance, and that these advances are claimed by Kurzweil to follow "exponential" rates of development. The latter is often combined with the technical tendency of replication, and together, the two principles can be highly seductive when applied to various forms of technical mediation. For example, although not necessarily resulting in exponential growth, the advent of Gutenberg's printing press serves as an early instance of the possibility of not only printing, but copying and replicating text, and as the historical and social import of this capacity are well attested, it need not be entered into here. However, a possible implication could be that the singularity may not be so singular after all. To explain, similar 'singularities' can be argued to have emerged recently with the advent of audio and visual technics such as analogue and digital recording devices, photography, and more recently still, computers and the internet, which have made it possible to copy, record, upload or download any image or sound capable of being rendered into data. That the consequences – both intended and unintended – of such capacities has been profound is a tremendous understatement; hence, if they can be applied to the expansion of intelligence itself, the scope and promise of the singularity hypothesis appears doubly profound. Take the example of the so-called "intelligence explosion" which may result from the creation of a genuinely "ultraintelligent machine", one which

84 Homer, *The Iliad,* 6.212, (London: Viking-Penguin, 1990), p. 201.
85 J. Lanier, 'One Half of a Manifesto', in 'The Third Culture', *Edge Magazine*, (2000).

> ...can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultraintelligent machine could design even better machines; there would then unquestionably be an 'intelligence explosion,' and the intelligence of man would be left far behind. Thus the first ultraintelligent machine is the last invention that man need ever make.[86]

Without going into rival definitions of intelligence, the nature of consciousness and related issues concerning qualia, phenomenal content, or other topics in the philosophy of mind, for the current purposes it will be sufficient to grant that the pursuit of artificial intelligence is hardly quackery that can be simply ruled out.[87] In any case, depending upon how one defines 'intelligence', (a significant problem in itself), machines have long appended and augmented human capacities. For example, what is a notebook (whether in its traditional paper or more recent computational incarnations) if not a form of memory prosthesis? Automated or "intelligent systems" have not only been used in assembly lines, but in the running of hospitals, mass-transit systems on land, sea and air, in controlling missile arrays and in an increasing number of other deployments. Such systems are used for reasons that are well understood; because they are not only capable of monitoring and processing far larger amounts of information more reliably and efficiently than any single individual or group. Other than the odd software upgrade and general maintenance, such systems do not suffer stress, nor do they require rest, weekends, or occupational health and safety standards. Hence, it would seem conceivable that – barring arbitrarily imposed constraints that could (somehow) be known to be *a priori* effective – an ultraintelligent machine could use its capabilities to either improve itself or design another, superior 'device', thus representing a potentially exponential rate of replication until certain physical, or again, arbitrarily assigned constraints were reached. If permitted, such an entity could theoretically come up with its own operational goals and – potentially – have its own agendas, which, theoretically at least, may be out of the reach of the non-augmented human intellect.

Philosophically and scientifically, Kurzweil's account of the singularity arguably derives from a thoroughly materialist (or in his words, "patternist")[88] metaphysical foundation in which order is

86 I.J. Good, 'Speculations Concerning the First Ultraintelligent Machine', *Advances in Computers,* vol.6, (1965), p. 33. See Chalmers, *op.cit.* (2010) for an in-depth philosophical discussion of this contention.

87 On AI, see S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, 2nd ed., (Englewood Cliffs, NJ: Prentice Hall, 2003). For a historical account of the pursuit of AI, see M. Davis, 'Mathematical Logic and the Origin of Modern Computers', in *The Universal Turing Machine: A Half-Century Survey*, edited by R. Herkin, (Oxford: Oxford University Press, 1988), pp. 149-174.

88 Kurzweil, *op.cit.* (2005), p.5; pp. 385-388.

generated in a coherent and progressive manner across the entire gamut of material reality. This gradual (and now rapid) process arguably leads to a historicist account of the passage of time, from the very beginning of physics, chemistry, then life itself into the near and far future, propelled by a transhistorical evolutionary mechanism, The Law of Accelerating Returns, which aims to describe an over-arching process of continually increasing order, intelligence and (usually) complexity,[89] including, but not limited to the biological. The singularity therefore involves extrapolation from a number of hypotheses generally accepted across a number of modern scientific practises (for example, that some version of materialism is true, that the brain is exhaustive of the mind and that its functional operations appear to work in a computational fashion which can be simulated or reproduced, etc.). In brief, some other philosophical / ontological premises that most singularitarians would arguably agree with would also include the following:

1. methodological naturalism;
2. substrate neutrality;
3. an “algorithmic” interpretation of biological evolution;[90]
4. technological development understood in 'narrow' evolutionary terms.

As discussion of the first three of these premises in any detail here would take us well beyond the scope of this thesis, their general validity or otherwise will not be attended to, except to note that singularitarians appear to invest a significant amount in the validity of each. This is not simply for the reason that each view is generally in continuance with the modern biological, chemical, cognitive and physical sciences, but because each view is arguably receptive to quantitative reduction to continually improving patterns of information, and that anything that tends toward its more efficient dissemination counts as progress or 'evolution'.

Kurzweil's account of the singularity is highly contingent on The Law of Accelerating Returns, and this amounts to the ever-more efficient spread and constructive uptake of information.[91] For Kurzweil, the totality of history is *just* the history of information, and he charts its growth through six distinct epochs of development:

89 See Kurzweil, *ibid.* (2005), pp. 36-40.
90 Daniel C. Dennett emphasises this view in his *Darwins's Dangerous Idea: Evolution and the Meanings of Life,* (London: Penguin, 1995), pp. 48-51.
91 See Kurzweil, *op.cit.* (2005), pp. 35-110.

1. Physics and chemistry: (information in atomic structures);
2. Biology: (information in DNA);
3. Brains: (information in neural patterns);
4. Technology: (information in hardware and software designs);
5. Merger of technology and human intelligence: (the methods of biology [including human intelligence] are integrated into the [exponentially expanding] human technology base);
6. The universe wakes up: (patterns of matter and energy in the universe become saturated with intelligent processes and knowledge).[92]

Kurzweil's argument begins with a detailed description of his "historical exponential" view, which he contrasts with what he refers to as the "intuitive linear" view of history. In his opinion, the disadvantage of the latter approach is that it only countenances steady, arithmetical rates of development. However, as Kurzweil attempts to show, information has arguably exploded *exponentially* during the course of history, hence the intuitive linear view does not do justice to the rapid rate of technoscientific advance and expansion.[93] The Law of Accelerating Returns does not merely claim that technoscience advances exponentially, but that the rate of growth itself is subject to the exponential function. This allows Kurzweil to countenance such contentions that the current century will see not one hundred years of steady progression in technoscientific capacities, (in the context of the intuitive-linear view), but twenty thousand year's worth. On such a basis, a singularity scenario becomes virtually inevitable, assuming constant rates of inclining technoscientific advance without significant interruptions. To borrow from the Darwinian jargon, the Law of Accelerating Returns denotes a steady rate of advance more akin to phyletic gradualism as opposed to punctuated equilibrium,[94] hence, in general, it implies that evolution (both biological and technoscientific) are "positive feedback processes", in which previous innovations are built on and improved in subsequent iterations.[95]

The Law of Accelerating Returns arguably involves an extension and generalisation from the basis of "Moore's Law", originally proposed by Gordon E. Moore, a cofounder of the Intel corporation, who is said to have observed that in a period of approximately twelve months (he later extended it to twenty four); twice as many transistors could be placed onto an integrated circuit, thus doubling

92 Kurzweil, *ibid.* (2005), p. 15.
93 See 'The Intuitive Linear View versus the Historical Exponential View', in Kurzweil, *op.cit.* (2001), pp. 1-2.
94 The theory of "punctuated equilibrium" is owed to S.J. Gould and N. Eldredge, 'Punctuated Equilibria: an Alternative to Phyletic Gradualism', in *Models in Palaeobiology,* edited by T.J.M. Schopf, (San Francisco: Freeman Cooper, 1972), pp. 82-115.
95 See Kurzweil, *op.cit.* (2001), p. 2.

processor power every couple of years relative to cost.[96] This particular paradigm is expected to conclude roughly in the early 2020s, by which time the limitations of matter itself will arguably put a halt to "cramming" any more transistors onto the silicon substrate as lithographically drawn transistors approach the atomic level of detail.[97] Of course, this does not necessarily entail an end to the rate of the advance of computing power, as Kurzweil notes that paradigm shifts in computation have already occurred on numerous occasions.[98] To back up his position, he cites such events as electromechanical systems being replaced by relays and then by vacuum tubes, moving on to transistors and now integrated circuits, which, when reaching the limits of their capacity, he expects will be supplanted and replaced by new and superior techniques, some of which are already in the testing stage.[99] The limitations of particular technics and techniques represent no barrier to the believer in technoscientific progress, and therefore especially no barrier to the ardent singularitarian. Evolution by natural selection, the emergence of humanity, language and tool-use enables faster and faster rates of growth and advance in the dissemination of information in the form of computation, and as such capacities progress and proliferate into other fields, these too are claimed to become subject to the overarching, seemingly inexorable process of the Law of Accelerating Returns.

Kurzweil's view of the development of technology is therefore situated in the context of a meta-evolutionary process which both precedes and transcends human agency, which entails his view belongs to the narrow understanding of evolution mentioned above. The Law of Accelerating Returns rests on extrapolating from the supposedly exponential rates of computational development recently evident forward *and* backward in space-time to a position which recognises information processes in general as the cardinal telos of the universe. Human agency, or more specifically, the evolution of human intelligence, is merely another rung in a wider, non-agential evolutionary process, and on the surface, is apparently of significance only insofar as it serves as an intermediary vehicle by which information is made manifest in an ever more efficient and speedy manner. Humans therefore become merely the mechanisms of a selection process, lubricating the path to a supposedly inevitable singularity. In Marcusean terms, the singularity hypothesis can be read as the

96 G. Moore, 'Cramming more Components onto Integrated Circuits', in *Electronics*, vol.38, no.8, (April, 1965). Incidentally, in a 2003 interview, Moore noted that the idea was initially owed to his Intel colleague, David House. See M. Kanellos, 'Moore's Law to Roll on for Another Decade', on *Cnet,* (February 10, 2003). As well as Kurzweil, the roboticist, Hans Morovec draws on Moore's law in a similar manner in his *Mind Children: The Future of Robot and Human Intelligence,* (Cambridge, MASS: Harvard University Press, 1988) and *op.cit.* (1998).

97 See Kurzweil, *op.cit.* (2005), p. 434.

98 Although he does not reference T.S. Kuhn specifically, it is clear Kurzweil (2005) ascribes at least loosely to the notion of paradigmatic shift the former outlined in *The Structure of Scientific Revolutions,* (Chicago: University of Chicago Press, 1962).

99 See Kurzweil, *op.cit.* (2005), p. 67.

ultimate extrapolation of technological rationality, not merely to the political condition of society and the regimentation of the individual, but to the physical and intellectual constitution of individuals themselves. In short, through its invocation of the combination of not merely a narrow evolutionary process, but a teleological meta-evolutionary process of which the former is a constituent, the singularity hypothesis ranks as one of the most elaborate, far-reaching formulations of the autonomous theory of technology.

In summary, Kurzweil's theory appears to closely correspond with all three aforementioned applications of technological determinism and adds a Darwinian element. Technical development unfolds deterministically as it is part of a wider evolutionary process; it is the chief determining influence on the social and individual and stands to become even more closely integrated within them; and the entire view does not merely tacitly implicate technological determinism as a research methodology, it offers it as a complete explanatory account of the history and progress of the universe.

A Critique of the Singularity Hypothesis

Kurzweil's thesis and prognostications combine a vast edifice of philosophical, metaphysical, scientific and historical contentions which are open to a large number of counter arguments and criticisms. Although they cannot all be addressed here, some of the more prominent environmental and economic implications of his theory, as well as its apparent presentation of the evolution of technics as an autonomous phenomenon will now be contrasted with Marcuse's "compatibilist" position.

Kurzweil's theory entails that a central principle of order is destined to progressively unfold as the universe becomes increasingly saturated with information. If it is the case that "the belief in historical destiny is sheer superstition",[100] and a mistake that "it is the task of the social sciences to lay bare the law of evolution of society in order to foretell its future", then it appears Kurzweil's view is thoroughly historicist.[101] Secondly, as the Law of Accelerating Returns tends to interpret

100 K. Popper, (1957), 'Historical Note', in *The Poverty of Historicism*, (London: Routledge, 2004), p. ix.
101 As Popper continues: "...the idea that society, like a physical body, can move *as a whole* along a certain path and in a certain direction – is merely a holistic confusion." See Popper, *ibid.* (1957), p. 105.

"...a historically specific phenomenon in terms of a transhistorical conceptual construction", it is also fits well into the essentialist approach criticised by Feenberg, amongst others.[102] Nevertheless, it is likely that Kurzweil would be satisfied with both criticisms. In his defence, he could simply appeal to the numerous graphs and charts he includes within his works which appear to depict a progressive inclination toward increasingly powerful forms of information processing, from rocks, to DNA, to brains. In formulating these graphs, Kurzweil utilised the work of, among others, Theodore Modis, who "attempted to develop a precise mathematical law that governs the evolution of change and complexity in the universe."[103] Unfortunately however, Modis himself has argued on various grounds that Kurzweil has either misrepresented his findings or extrapolated on them.[104] This is partly based on his opinion that Kurzweil is "possessed by the exponential function" and adds that "nothing in nature follows a pure exponential."[105] While this may be debatable, as may the somewhat ambiguous use of the word "nature" in this context, Modis' point appears to stand in relation to some technologies and the impacts that the revolutions in genetics, nanotechnology and information technology may have on them. For example, whilst it may be granted that certain information technologies such as Random Access Memory and harddrive storage capacities advance at exponential rates, this does not entail that the activities computers may become integrated within will then be drawn in to the Law of Accelerating Returns.[106] For example, consider the domains of small and large business, retail, manufacturing, etc. Despite continuing to grow at relatively steady paces on a global scale, the coupling of such industries with computers has not resulted in *exponential* growth in profits or productivity, nor in rates of efficiency.[107] This is of course not to say that computers have *not* greatly improved rates of growth or efficiency – as obviously – they have. It does imply however, that the rates are nowhere near "exponential".

Kurzweil's view of the nature of technical development remains strongly deterministic for the reason that it assumes information – in whatever form – evolves in a progressive manner. Various examples from the history of technology appear to speak strongly against this idea, and is instead prone to dead-ends, accidents, fits and starts. Marcuse's contention that technology (and the social

102 See Feenberg, *op.cit.* (1999), p. 15. For a reply to Feenberg's account of technological essentialism, see I. Thomson, 'What's Wrong with being a Technological Essentialist? A Response to Feenberg', in *Inquiry,* vol.43, issue 4, (December, 2000), pp. 429-444.

103 T. Modis, 'Forecasting the Growth of Complexity and Change', in *Technological Forecasting and Social Change*, vol. 69, no. 4, (2002).

104 See T. Modis, 'The Singularity Myth', in *Technological Forecasting and Social Change,* vol.73, no.2, (2006).

105 Modis, *ibid.* section 3., (2006).

106 This presumption has been labelled as the "ideology of technological determinism" by Paul Edwards in a discussion of "manager's frequent belief that productivity gains and social transformation will be automatic results of computerization." Quoted in Wyatt, *op.cit.* (2008), p. 174.

107 Interestingly, in the case of manufacturing, this situation could well alter in the near-future if the introduction of small-scale rapid prototyping takes off. This topic will be briefly noted below.

realm) are historically contingent entities can accommodate such a view, but Kurzweil's historically generic mechanism of the Law of Accelerating Returns does not fare as well in this context. Take for example the Ancient Greek innovations of the aeolipile and the earliest known predecessors of railway tracks.[108] Far from determining certain advances in propulsion or railway transport, it appears neither led even indirectly to such applications. Without arguing that these particular technical instantiations are reducible to "information" (which, by Kurzweil's own standards, they appear to be), the latter invention could have led to at least rudimentary forms of railway travel far earlier than it did (excluding the variants which emerged in the dark ages, the modern railway did not arrive in Europe until two thousand years after the Greeks had used it as a means to transport boats across the Isthmus of Corinth).[109] The innovation of railway tracks do not automatically beget innovations in steam-engines or other forms of motor-force which could then be used to power trains, despite the invention of the aeolipile apparently being testament to the contention that the basic principles of the steam power were already beginning to be worked out. Despite it being seemingly obvious to moderns where this technological potential could have gone, the aeolipile's use is generally considered to have been restricted to entertainment purposes only; specifically, as a "temple wonder", and is not known to have ever been exploited as an engine used to provide motor power. Indeed, the rails mentioned previously are also said to have been used for entertainment, specifically in rolling sets and props on and off the stages of Greek theatre. In other words, despite two of the more crucial functional innovations of railway transport existing over two thousand years ago, they did not follow anything resembling a discernibly exponential rate of advance inevitably leading to Newcomen's steam engine and then on to bullet trains. Clearly, such innovations had to await improvements in many other trajectories of technoscientific endeavour, not least those that led to the production of sufficient amounts of iron for the construction of tracks durable enough to contain the pressures involved in the workings of larger steam engines. In short, a myriad of other innovations or "connections" were required, and were – for whatever reason – interrupted for nearly two thousand years.[110] At least in the context of such artifacts, there appeared to be no inexorable – let alone exponential – paths of technical development that their innovation opened up or called for.

108 The invention of the aeolipile is commonly attributed to Hero of Alexandria in the first century AD, but was also described by Vitruvius (80 BC – 15 AD) who mentions and describes 'Æolipylæ' by name in his *Der Architectura.* See Vitruvius, (first century BC), *Ten Books on Architecture,* edited by I.D. Rowland and T.N. Howe, (Cambridge: Cambridge University Press, 2001), chapter vi, paragraph 2. It should be noted that both figures may be drawing upon a much earlier work on pneumatics by Ctesibius [285-222 BC], however, it is unclear as to whether the latter was the inventor of the device either.

109 See R.M. Cook, 'Archaic Greek Trade: Three Conjectures 1. The Diolkos', in *The Journal of Hellenic Studies,* vol. 99 (1979), pp. 152-155.

110 This term is owed to J. Burke's, *Connections* series, (London: BBC, 1978).

The singularitarian may reply to these criticisms that theories such as Kurzweil's specifically focus on information-based innovations, those that involve the storage, presentation and transmission of data, which modern computers exemplify. As neither the aeolipile nor the railway track are classifiable as such, they are irrelevant as counter-examples. However, so broad is Kurzweil's view of what constitutes information and innovation that even language itself is regarded as merely a "slow" but nevertheless "very beneficial" example which assists in information transfer, a claim that sounds very much like the usual fusion of organisms and artifacts favoured by theorists of technological evolution and subscribers to the theory that nature is a social construct.[111] Yet furthermore, the criticism above seems to apply to information-based technologies as well. Consider another example from Ancient Greece, the Antikythera Mechanism, now understood to have been constructed between 150 and 100 BC.[112] Although for nearly a century after its recovery in 1900-1901 its function was not known, recent analyses have shown that the device appears to have been used as a means to calculate astronomical movements on the basis of the Olympic calendar and the geocentric model. The earliest known example of a mechanical calculator (or 'computer'), the design and construction of the mechanism shows a degree of sophistication and accuracy that has been compared to that of nineteenth century Swiss clockwork.[113] Needless to say, not even the Antikythera mechanism led inexorably, let alone exponentially to the advent of clockwork, calculating devices, nor computers in any form recognisable today. There is no link between it and (say) Charles Babbage's "Difference engine", proposed (but not constructed) nearly two thousand years afterwards, for the Antikythera mechanism was unknown at the time. Even due to the ubiquity of modern computers, there seems to be little reason to conclude that they are completely resistant to the sort of events that halted any instrumental paths which may have led from the Antikythra mechanism. Indeed, a sufficiently large solar flare would be more than sufficient to render the vast majority of modern computers inoperable.[114] In other words, to the extent that the Antikythera mechanism can be referred to as a computer, once again, its potential functional implications were interrupted not by solar flares, but by equally external, socio-historical, political events such as the decline of the influence of the Greeks, the burning of the Library of Alexandria, the rise of Roman and then Christian influences in Europe, etc. etc. In short, technical and scientific development does not appear to proceed in a causally deterministic manner, nor is it isolated from social factors which

111 Kurzweil, *op.cit.* (2005), p. 260. On nature as a social construct, see the fifth chapter of this thesis.
112 See M. Allen, 'Why is it so Important?', *The Antikythera Mechanism Research Project,* (June 17, 2008).
113 See B. Keim, 'World's First Computer Displayed Olympic Calender', *Wired,* (July 30, 2008).
114 One expert has noted that such an event would entail potentially disastrous effects: "...without computers, the modern world would simply cease to function. Life as we know it would grind to a halt". The comment is owed to Jonathan Eastwood, a research fellow in space and atmospheric physics at Imperial College, London, from an interview with A. Jha, 'Solar Storms Could Crash Computer Systems This Year, says Space Expert', *The Guardian,* (March 8, 2012).

shape it, and which it shapes. Indeed; that the rate of progress in the modern sciences over the last half a millennium has been so rapid appears to hinge upon their social organisation.

> Technologies – such as gunpowder, the printing press, the railroad, the telegraph and the Internet – can shape society in profound ways. But on the other hand, social systems – in the form of governments, the courts, formal and informal organisations, social movements, professional networks, local communities, market institutions and so forth – shape, moderate and redirect the raw power of technologies.[115]

In conformance with Marcuse's 'compatibilist' approach, to the extent that technics play causal roles in history and society, the reverse is also true. Humanity and technology appear inextricably linked in a novel form of "co-evolution", each playing mutually beneficial – or detrimental – roles within the ensemble. One innovation may *happen* to trigger the potential for many others, but it appears such a causal link is merely sufficient rather than necessary, as any number of factors outside 'technology proper' may intervene, distract, delimit or delay its progress.

In a biological context, Kurzweil's view of 'evolution' obviously goes beyond Darwinism, indeed, it more closely resembles Teilhard de Chardin's widely criticised concept of the "Omega Point" more than natural selection.[116] The biological is an integral facet of both thinker's views, and in both it is treated as an orthogenetic system; one propelled by "the mysterious inner force" that directs the entire scheme progressively toward ever more positive outcomes.[117] Continuing with the biological analogy, this arguably implies Kurzweil's scheme constitutes a version of the theory of "directed variation" (sometimes referred to as "directed mutation"), a highly controversial idea which is largely ruled out as an explanation of variation amongst the large majority of modern evolutionary thinkers for the reason that – once again – 'direction' is something that agents alone are capable of, or capable of countenancing.[118] As Daniel Dennett put it, the "fundamental idea" of (biological) evolution is that it is a "mindless, purposeless, algorithmic process"; any sense of agential direction in such a scheme is simply mistaken.[119] Furthermore, although Darwinian thinkers have conceded that it could be possible in the short-term that evolution may be progressive, (with "short" here

115 J.S. Brown and P. Duguid quoted in Garreau, *op.cit.* (2005), pp. 181-182.
116 See P.T. de Chardin, (1955), *The Phenomenon of Man,* (London: Fountain Books, 1977).
117 See G.G. Simpson, *Life of the Past: An Introduction to Palaeontology,* (New Haven: Yale University Press, 1953), p. 125.
118 See for example M. Ridley, 'Variation Created by Recombination and Mutation is Random with Respect to the Direction of Adaptation', in *Evolution,* 3rd ed., chapter 4.8, (London: John Wiley and Sons, 2009), pp.88-89. See also Dennett, *op.cit.* (1995), pp. 320-324.
119 Dennett, *ibid.* (1995), p. 320.

referring to fifty million years), over longer periods of five hundred million years or more, this is far less likely, and in any case, would be extremely difficult to decide.[120] Other evolutionary theorists such as Mark Ridley go further, arguing that theories of directed variation should be dispensed with altogether:

> Various theories of evolution by "directed variation" have been proposed, but we must rule them out. There is no evidence for directed variation in mutation, in recombination, or in the process of Mendelian inheritance. Whatever the internal plausibility of these theories, they are in fact wrong.[121]

Given that the earliest archaeological evidence of anatomically modern humans is not much older than two hundred thousand years, Kurzweil's implicit contention that our species constitutes a "progression" in an evolutionary context appears to be a rather premature claim, if indeed it is coherent at all. In any case, it could be ventured that – to the extent that 'success' can be attributed to particular species in an evolutionary context – it equates to the *endurance* of the species in question rather than its intellectual capacities, which – if humans are anything to go by – may well turn out to be a detriment if their primary means of dealing with practical expediencies such as biospheric destabilisation are left up to the direction of deferred profit motives. Furthermore, although ultimately the technical is a product of the biological insofar as it would appear to require the emergence of agents prior to it, technology – as it has been defined here in accord with Marcuse's approach – is a social, cultural, agential phenomenon, not the product of a self-governing, historically abstracted principle of order. Indeed, there are strong *dis*analogies between the nature of technical mediation and biological processes...

> The basic topologies of biological and cultural change are completely different. Biological evolution is a system of constant divergence without subsequent joining of branches. Lineages, once distinct, are separate forever. In human history, transmission across lineages is, perhaps, the major source of cultural change.[122]

Whilst it would be a mistake to consider that Kurzweil's view is merely an extrapolation of Natural Selection to a cosmic context, the Law of Accelerating Returns remains a blind process which nevertheless progressively tends toward a singular destiny. A similar emphasis has been placed upon

120 'Of Mind and Matter: David Attenborough meets Richard Dawkins', *The Guardian,* (September 11, 2010).
121 M. Ridley, quoted in Dennett, *op.cit.* (1995), p .323.
122 S.J. Gould, quoted in Dennett, *ibid.* (1995), p. 355.

the sense of historical inevitability in the works of many Marxist thinkers, however, it should be said that in comparison to Kurzweil's theory – even Marcuse's revisionary Marxism does not place anywhere near as much emphasis on the contention that history unfolds in an inexorable manner, determined by technics. Indeed, unlike a great many Marxian thinkers, Marcuse specifically resisted placing emphasis on a deterministic view of history or technology:

> Marxism as a theory is an *analysis* – political, sociological and economic – of capitalism, which comes to the conclusion that the capitalist system can preserve itself and develop only through increasing conflicts, waste of resources, destruction of resources, wars, and so on, and that the transition to socialism is the only solution in his philosophy.[123]

Marcuse's revisionary take on the Marxian theory was receptive to updates in light of changing historical circumstances which allows for a significant degree of flexibility.[124] In Kurzweil's view, and that of other thinkers who subscribe to various forms of 'hard' technological determinism, "history" itself appears as a *self*-improving, *self*-governing mechanism requiring no agential influences, and in which progress is defined with recourse to improvements in the efficiency of the distribution of various forms of technical systems and information, and as virtually everything can be broadly understood in terms of its informational content, it can therefore be included in the wider "historical-exponential" view. It is but a short step to reduce politics, economics, so-called "black-swan events", human relationships, desires and needs to the informational *sine qua non,* and then to argue that increases in intelligence will benefit them all.[125] Hence, the improvement of intelligence by any technoscientific means possible is especially important to the singularitarian.

> Our sole responsibility is to produce something smarter than we are; any problems beyond that are not *ours* to solve ... There are no hard problems, only problems that are hard to a certain level of intelligence. Move the smallest bit upwards (in level of intelligence), and some problems will suddenly move from "impossible" to "obvious." Move a substantial degree upwards, and all of them will become obvious.[126]

The array of possible criticisms of this passage would appear to be so voluminous that they can only be briefly attended to here. Suffice to say, even in the possibility that such an intelligence was

123 Marcuse, (1969c), 'Interview with Dr. Herbert Marcuse by Harold Keen', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse* vol.3, edited by D. Kellner, (New York: Routledge, 2005), pp. 128.
124 See for example, Kellner, *op.cit.* (1984), p. 297.
125 See N. Taleb, *The Black Swan: The Impact of the Highly Improbable,* (New York: Random House, 2007).
126 E. Yudkowski, quoted in Kurzweil, *op.cit.* (2005), p. 35.

created, one may well wonder why it would not be "vast and cool and unsympathetic", even if it was an amplified version of our own.[127] Of course, any comments on such issues can only be more or less informed speculation, however, like their tendency to pass over the historical interruptions of scientific and technical progress in silence, devotees of the singularity hypothesis arguably have a habit of ignoring or glossing over the significance of various peculiarities of human agency and intelligence that – whilst generally perceived as shortcomings, nonetheless may play a significant role in stimulating and motivating great works. For example – as was noted in the passage from Ellul above – in either a general or individual context, humans are precisely *not* machine-like in their rationality but prone to emotions, mood-swings, seemingly irrational addictions, mistaken impressions, distractions, flights of fancy, varying degrees of psychological malady – in short, that which singularitarians largely class as *imperfections*.[128] But ought they be given up entirely? As various transhumanist philosophers have argued, there may well be compelling reasons for certain types of enhancements such as those that may help to improve our ethical conduct in a time in which technoscientific capacities can enable a few to carry out great harms.[129] Yet despite the predictable criticisms that arise from any whiff of eugenics, it should be recalled that humans have always been extending themselves technically and improving their capacities, and recently this has extended to pharmacological means of augmenting cognition, memory retention, alertness, etc. through the use of "nootropics".[130] Nevertheless, it is arguably just from such physical and intellectual 'shortcomings' or deficiencies and the idiosyncratically human preponderance to cognitive abstraction that may have played such a formative role in spurring on the emergence of technics itself.[131] To be sure: it is hardly the intention here to claim that such deficiencies are somehow sacred and should be left as they are – on the contrary – it is in easing or alleviating many of them that ties in both with Marcuse's conception of the "end of technological rationality", as well

127 H.G. Wells, (1898), *The War of the Worlds,* book 1, chapter 1, (Racine, WISC: Golden Press, 1978), p. 11.

128 As Ellen Ullman put it, "we're beings who are suffused with error, dripping with imperfection, drenched in inefficiency (…) Ray Kurzweil would improve us. I don't know about you, but it always makes me nervous when someone wants to improve the human race". Quoted in Garreau, *op.cit.* (2005), p. 178.

129 See for example, J Savulescu, 'Unfit for Life: Genetically Enhance Humanity or Face Extinction', transcript of a lecture presented at the Festival of Dangerous Ideas, Sydney, (October 4, 2009).

130 See M.S. Gazzaniga, *The Ethical Brain: The Science of Our Moral Dilemmas,* (New York: Harper Perennial, 2006), p. 184.

131 For early accounts of technology as "organic projection" inspired by our physiological and sensory deficiencies, see E. Kapp, (1877), *Grundlinien einer philosophie der technik: Zur entstehungsgeschichte der cultur aus neuen gesichtspunkten,* (Ann Arbor: University of Michigan Library); A. Gehlen, (1965), 'A Philosophical-Anthropological Perspective on Technology', in R.C. Scharff and V. Dusek, (eds.), *Philosophy of Technology: The Technological Condition,* (Oxford: Blackwell, 2005), pp. 213-220, and J. Ortega y Gasset, (1939), 'Thoughts on Technology', in C. Mitcham and R. Mackey, (eds.), *Philosophy and Technology: Readings in the Philosophical Problems of Technology,* (Cambridge, MASS: The MIT Press, 1983), pp. 290-313. For a more recent version of the thesis, T. Taylor, *The Artificial Ape: How Technology Changed the Course of Human Evolution,* (London: Palgrave-Macmillan, 2010).

as the goals of such well-established practises as modern medicine.[132] It may well be an integral aspect of the "human condition" to turn our weaknesses into strengths, yet if human intelligence was markedly improved and combined with greatly extended life-spans, it seems the discussion of the singularity goes well beyond "human enhancement" and ventures into speculation concerning entities that are godlike compared with ourselves. In the current context, the unbridled enthusiasm for technological determinism inherent in the quote from Yudkowski cited above appears to ensure that all entities which are determined to assist in the development of the informational *sine qua non* are mere super-structural processes which can only accommodate and adjust themselves to the burgeoning base of opportunities opened up by technoscientific advance. The import Kurzweil and other singularitarians invest into this first principle therefore arguably tends to render whatever comes afterward or during – political, economic, ethical, personal – not merely a determined status, but an apolitical one; all entities theoretically or methodologically reducible to information processes are merely adrift in the wind of evolutionary progress of increasingly sophisticated patterns of information.

There are few views that distance technics from human influence and responsibility as overtly as the singularity hypothesis, and, despite its other problems, it is arguably just this distancing that – were it to gain a significant foothold in the public mind – could lead to various practical problems such as a compounding and extension of the current uncritical apathy toward technical development that may arise from a 'faith' that it is following a determined, progressive, narrow evolutionary course, or that it shapes human agents but not the opposite: "...in technological aggression and destruction, the satisfying act is transformed from the human agent to the mechanical, electronic, or nuclear agent (…) consequence: the weakening of individual responsibility – the apparatus did it, or the machine did it. The instrument did it and not the person."[133] Hence, the major problem with theories of autonomous technology is not merely that they may be epistemologically incorrect in their description of technoscientific development, but that they appear potentially deleterious to the prospect of exercising responsibility and control over technical decisions at a time when such responsibility has emerged as a crucial concern. As it has been argued throughout this discussion, the environmental implications and limits to the growth of the dominant mode of production are now visible in a manner Marcuse could only have begun (and, to his lasting credit, did begin) to envision.[134] The destabilisation of the biosphere which is the result of seemingly hypertrophic levels

132 Marcuse, (1964), *One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society,* (New York: Routledge, 2002), p. 5.
133 Marcuse, *op.cit.* (1965c), p. 91.
134 See for example, Marcuse, 'Ecology and the Critique of Modern Society', in *Capitalism, Nature, Socialism,* vol.3, number 3, (1979), pp. 29-48; *Counterrevolution and Revolt,* (Boston: Beacon Press, 1972a), chapter 2, pp. 59-78;

of industrial and technical production is a fundamentally concrete problem which carries profound implications both for individuals and societies and even the future of civilisation itself. It has not been the aim here to argue which particular threat will prove most decisive, nor to calculate the likelihood of their occurrence, but to highlight that element of Marcuse's thought which can be read as a radical caution in regard to the current direction of the technological mode of production which is not permitted in the scope of autonomous views of technology.

Before concluding this chapter, another recent technical tendency – itself arguably a form of 'singularity' due to its feature of utilising exponential replication – will be briefly noted. It was mentioned previously that Marcuse's search for potential liberatory groups which could play a role in initiating his great hope of qualitative social change ended in failure. As Marcuse himself admitted, there were no contemporary groups that could have carried out this goal, despite his positive acknowledgment of the efforts of the leftist student movements of the 1960s and the growth of feminism, amongst other groups and causes. In the second decade of the twenty first century, despite the growth of the anti-globalisation and environmental movements, and more recently highly technologically-savvy subversive organisations such as Wikileaks and Anonymous, there arguably remain no obvious agents of change that could lead the sort of "Great Refusal" Marcuse repeatedly advocated. However, these latter two groups, embodying as they do certain crucial technical tendencies, arguably reveal signs that technoscientific *advancement* – heavily encouraged under consumer capitalism – may contain radically democratising implications that Marcuse likely would have approved of.

In his 1941 essay, 'Some Social Implications of Modern Technology', Marcuse made the following claim:

> It has been frequently stressed that scientific discoveries and inventions are shelved as soon as they seem to interfere with the requirements of profitable marketing. The necessity which is the mother of invention is to a great extent the necessity of maintaining and expanding the apparatus.[135]

Although this may well be the case in some situations, recent innovations – specifically the spread of computation and the internet – arguably cast some doubts on Marcuse's point, for they are now so

and (1972b) 'Ecology and Revolution', in *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* vol.3, edited by D. Kellner, (New York: Routledge, 2005), pp. 173-176.

135 Marcuse, *op.cit.* (1941), p. 46.

firmly integrated into so many aspects of society – especially, but not exclusively the affluent societies – that the proverbial horse appears to have bolted. I will briefly suggest that the search for liberatory forces may now be more profitably directed toward the tools rather than the particular groups and individuals using them.

Up until recently, ratios of productive output have proceeded arithmetically. No matter how voluminous, modern mass-production does not attain exponential rates of material output except in certain circumstances, when certain functional trajectories such as computation emerge. With the advent of cheap, accessible printing and later photography, recording devices, and still later, with the proliferation of digitisation and the internet, whenever the capacity of exponential replication was opened up by particular technical innovations it brought transformative social effects with it. To reiterate an example used in the previous chapter, the modern world is almost unimaginable without the influence of printed text, and in a century from now, it is at least conceivable that something similar may be said of contemporary forms of information technology. Yet, as with any transformative innovations, their instantiation brings with them both intended and unintended consequences. To acknowledge as much is trivial; however, a certain class of technoscientific tendencies remain of particular interest in the context of qualitative social change: those that are harmful only insofar as they pose problems to traditional exchange relations.

A final conceptual distinction will be required: call a desk or lap-top computer, media player, or any other similar computational device capable of storing, downloading or reproducing data or information a 'material' replicator of 'immaterial' substances.[136] Note that 'immaterial' is not intended here in the strictly Cartesian sense of the term, but as a purely conceptual means to separate the types of media contained / replicated by a 'material' medium. The parts which go together to form a modern desk-top, lap-top, tablet, 'smart-phone' or other computer devices would therefore constitute the material (hardware) medium in which the immaterial (software) would be produced, reproduced, played, executed, etc. Such forms of innovation incorporate the feature of potentially exponential replication. For example, as is widely practiced today, one person may copy or create a file, upload it to the internet, and allow many others to do the same thing, hence rapidly creating a large number of copies which are aptly referred to as *viral* in their spread. Yet as mass-produced artifacts, the material media carrying out these functions are currently produced at arithmetic rates

136 Note that devices capable only of 'playing' or 'executing' the given input – such as cassette players without the record function – are not applicable in this context. Secondly, although they are capable of reproducing ('dubbing') data from one cassette to another, to do so still requires the (material) cassette. For this reason also then, they are not directly analogous to modern digital computers which decreasingly rely on discs / CDs, etc., but larger and larger forms of hardware storage and more recently, cloud-based servers.

only.

As any theorist concerned to define technology would be unlikely to deny its augmentional role in extending and externally embodying human sensory, physiological, and other capacities, it is unsurprising to note that the advent of the internet and the penetration of computers has been no exception to this rule, particularly in regard to the capacity for sharing. Today, with a fraction of time and know-how, sharing and duplicating immaterial media is remarkably quick and simple, as well as being increasingly widely accessible and affordable. However, this still historically new and novel capacity tends to be greeted with hostility on the part of the status quo, for the reason that savvy users are not only beginning to disturb, but bypass traditional exchange relations altogether. Many industries, particularly those which draw profits from producing books, music, film and television programs – indeed, any industry whose products can be digitised – have begun to be disrupted, and in response, aspects of the new augmentation of sharing opened up by modern information technology has been labelled "piratical".[137] As such, the traditional music and entertainment industries have opted for a broadside of lawsuits and efforts to strengthen law and government policy in such domains such as copyright, intellectual property and digital rights management, the actual impacts of which appears to have been to frighten the unwary rather than solve the problem of piracy if, indeed, it is ultimately solvable at all.[138]

Here is a clear example of how the Marcusean “end of technological rationality” is being subverted on the basis of the lost profits of traditional industries: the profit motive can be seen to not merely accompany, but *override* the newfound capacity for sharing opened up by recent technical advances, hence, all efforts are deployed to deny or limit sharing to the public. Yet the sharing of 'immaterial' media is one thing, quite another is the capacity to download and produce *material* goods. When one considers the potential implications of affordable three dimensional printing, especially devices which are capable of manufacturing copies of themselves,[139] the tendencies

137 To be sure: this is not to say that *all* file-sharing has been condemned as piratical, but those forms which evade copyright regulations and other forms of intellectual property rights. For an introduction to the topic, see J. Clough, *Principles of Cybercrime,* (Cambridge: Cambridge University Press, 2010).

138 For example, Digital Rights Management (DRM) has been widely criticised from a number of perspectives, not least because it does not appear to work. As one expert commentator put it: trying to make digital files uncopyable was like "trying to make water not wet." See B. Schneier, 'Quickest Patch Ever', in *Wired,* (9 July, 2006).

139 Such devices, known as "universal constructors" were initially conceived by John von Neumann. See his *Theory of Self-Reproducing Automata,* edited and completed by A.W. Burks, (Urbana and London: University of Illinois Press, 1966). On more recent – and successful deployments of such devices, see U. Pesavento, 'An Implementation of von Neumann's Self-Reproducing Machine', in *Artificial Life Journal,* vol.2, issue 4, (1995), pp. 337-354; W.R. Buckley, 'Signal Crossing Solutions in von Neumann Self-replicating Cellular Automata', in *Automata-2008: Theory and Applications of Cellular Automata,* edited by A. Adamatzky, *et al,*(Frome: Luniver Press, 2008), pp. 453-502 and D. Mange, A. Stauffer, L. Peparaolo, and G. Tempesti, 'A Macroscopic View of Self-replication', in *Proceedings of the IEEE,* vol.92, issue:12, (December, 2004), pp. 1929-1945.

discussed above in relation to immaterial software piracy may move to at least some aspects of the material realm of 'traditional' manufacturing and production.[140] The potential implications of this topic are extensive, yet despite promising recent signs, any commentary upon them can only be speculative, so I will not attend to them in detail here, suffice to say that change from within technoscience itself – the very potential offered by its advance in such forms as the internet – are now thoroughly entrenched in modern society and highly unlikely to be removed. Although they have opened up opportunities for the sort of increased surveillance, monitoring, and control Marcuse had long criticised, in conformance with his multidimensional view of technology, they have also opened up means by which these very processes may be exposed to the scrutiny of the public. Again, Marcuse's point is a conservative one, and in tune with the conventional wisdom which acknowledges that available technology will be used for good and ill, but it contains the added caveat that "the more we seek to control, the more contingencies and treacheries proliferate within the very mechanisms of control".[141] Furthermore, these innovations are practical as they are available now – we do not need to pin our hopes either to the creation of greater-than-human intelligences, nor place all our faith in the market mechanism for radical social changes to occur.

Aside from leveling various criticisms at the singularity hypothesis, it has been the aim of this chapter to show that the major problem with the view is its application of a non-agential, narrow form of evolutionary development to technoscientific mediation. This 'one-dimensional' strategy arguably fails because it neglects to account for the second human dimension in technical mediation which Marcuse's view – despite its pessimistic elements, and despite many accounts to the contrary – did not fail to countenance.

140 Home fabricators, "3D printers", and assemblers are a relatively recent and novel form of "desktop manufacturing" device which can construct or "print" a variety of objects by selecting a design from an online catalogue or database (or designing them manually in various Computer Aided Design programs (CAD), where they can then be added to the database if the user chooses). The end goal of some of these devices is artificially selected self-replication. It appears that the first 3D printer to have carried out this feat (with some assistance on the part of its user to assemble the device, which remains in conformance with its 'artificially selected' evolution) was the "Replicating Rapid Prototyper" (or "RepRap"), originally designed by a team led by Dr. Adrian Bowyer, formerly of the University of Bath.

141 S.R.L. Clark, 'From Biosphere to Technosphere', in *Ends and Means,* vol.5, no.2, (2001), p. 8.

Chapter 8

Marcuse and Beyond

It has been argued in this thesis that the key to understanding the contemporary importance of Marcuse's philosophy of technology lies in its focus on the chief incentives which prevail in technological mediation.[1] Overall, the thesis has aimed to articulate, augment, and reevaluate Marcuse's philosophy of technology with the goal of assisting in promoting its relevance as a critical approach to technical mediation in the modern period. Against those that have dismissed his view as either deterministic, overly pessimistic, or utopian, by tracing the origins of his critical theory of advanced industrial society and illustrating the Marxian influence in his thought, I have attempted to present Marcuse as a concrete philosophical utopian thinker who offered a cautionary warning in regard to the direction of modern technology, and as such, should not be summarily dismissed.

The discussion was inspired in part by the often cited neglect of technology as a philosophical concern, but also by Marcuse's own conviction that, as well as being a theoretical endeavour, it must not be forgotten that philosophy has played, and ought still play a practical role in the critique of society as well as a means to speculate upon and envision avenues of positive, qualitative social change if the possibility emerges to seize it.[2] As technology is surely amongst the most formative, novel and influential features of the human condition, philosophy must not only attempt to keep pace with the implications of its development, but understand its inextricable causal involvement in the course of current events as well as into the future. With this in mind, it has been argued that Marcuse's distinction between the technical and the technological remains useful when applied to the grounds shared by philosophers of technology and philosophers of the environment, and does not fail to take into consideration the dominant economic incentives driving its development. As Marcuse and other thinkers have understood in their own ways, a philosophy of technology – as well as accounts which aim to trace its social implications – must not mistake technology for mere

1 Again, by "mediation" I mean the actual production of technical artifacts and the uses they are put to.
2 See for example, Marcuse, (1929), 'On Concrete Philosophy', in *Heideggerian Marxism,* edited by J. Abromeit and R. Wolin, (Lincoln: University of Nebraska Press, 2005), pp. 34-52.

technics;[3] technology is not simply the gamut of instruments, but a social force which must be viewed in a way which acknowledges its ensemble status; its inextricable connection to the environment, its anthropological foundations, as well as the changing incentives which have driven it to its current global proportions. Despite specific reservations about elements of his politics, as well as his perhaps excessive optimism in regard to the role art and nature could play in fostering a new technology, it has been the aim to show that Marcuse's philosophy of technology remains diverse and flexible enough to retain its usefulness, whilst avoiding the many stark dichotomies which continue to feature in discussions of technology – philosophical and otherwise.[4]

In an effort to redeem the conceptual shortfalls in Marcuse's approach, emphasis was placed on the growth imperative and nature was considered in terms of its preconditional status, a position Marcuse appears to have briefly entertained, but which then took a turn toward an overly optimistic, not to mention confusing teleological account. Nevertheless, one need have no specific sympathies for the psychology of Freud, nor the politics of Marx to see that the question of technology is not merely one of appropriate designs, of "greening up the market", nor of so-called "sustainable development", but concerns the deeper attitudes and incentives that guide production overall, and decisions about the sort of world to pass on to our descendants. As Marcuse contended to the end, the social changes he believed were required would not be achievable with Popperian adjustments, but through radically revising the direction of technological development and deployment, away from the plunder of the natural world and the one-dimensional regeneration of the status quo of perpetual growth, to an arrangement more suited to an authentically liberated and sustainable future society.

As Marcuse himself understood and deployed the Marxian theory as a basis for the critique of capitalism, it was the aim of this thesis to provide an account of his own approach in a similar spirit; offering criticisms where they were deemed necessary, and submitting refinements and suggestions which may extend it applicability to the context of the affluent societies which have seen four decades of development and proliferation since Marcuse's death. Although he correctly recognised that a philosophy of technology must also include an account of nature, this problematic aspect of Marcuse's view does not necessarily undermine his overall critique of the one-dimensional society and technological rationality, which can be read as a cautionary warning concerning our current and

3 Aside from Heidegger's more famous ontic-ontological distinction between technics and technology, prior to this, Oswald Spengler had argued that "*technics is not to be understood in terms of the implement."* See his short 1931 book, *Man and Technics,* (London: A.A. Knopf, 1932), p. 9.

4 See chapter five of this thesis.

future use of the environment. In the final chapters I attempted to show that Marcuse offered a view of technology compatible with both instrumental and autonomous accounts of the topic. Marcuse's view implies that – to a certain extent – both instrumental and autonomous theories of technology are correct, yet accepting either in isolation is one sided and misleading. As was described with reference to the concept of the "designer fallacy",[5] as well as in the discussions of the singularity hypothesis and autonomous theories of technological development,[6] much contemporary thought on technology 'proper' appears either to treat the incentives behind its development as either only worthy of minor attention, or as self-governing, in which case its incentives would appear to be its own. As such, not only does each approach either over-emphasise or under-emphasise the role of agents in technical mediation, each also over-estimates the value of certain concepts of *use*: the designer fallacy approaches artifacts on the basis of how they come to be appropriated by end users as if the incentives and intentions of their producers was unworthy of concern, and in the context of deterministic views, it becomes more a question of how technology uses human agents. Both approaches therefore tend to neglect the historically novel extension of the modern growth imperative which propels and guides technical design and production in late twentieth early twenty-first century advanced industrial societies. Yet as it was claimed, neither approach is entirely inaccurate: ultimately it is ourselves who will decide what to produce and how much, and we will decide how things will come to be used, even if this is not in conformance with a particular artifact's intended technical functions. Yet the majority of technical forays play out within the modern market mechanism, a 'device' or more specifically, a concatenation of devices which serve as an adjudicational means of deciding the success of a particular technical foray in competition with others. Under the sway of the market mechanism, a broadly evolutionary 'environment' determines which technical forays succeed and fail. Furthermore, this arguably rigidifies the contention made earlier that – in order to achieve success – products must perform their primary functions, but in the final analysis, they must also function as generators of profits.[7] That technics can be permitted to 'evolve', whilst still being ultimately under human control entails the usefulness of a view which can accommodate both contentions. It is for this reason that Marcuse's perspective remains a viable and

5 See chapter six.

6 See chapter seven.

7 So it is that strategies such as built in obsolescence can be deemed rational under a mode of production which has become thoroughly economicised. The question then arguably becomes: to what extent can the modern market mechanism be viewed as an evolutionary environment in which technical forays rise and fall? Pursuing this topic in sufficient detail is beyond the scope of this thesis, however, as the market has not only been likened to an evolutionary system by a number of theorists, and that many of the system's defenders contend it functions optimally when free of agential intervention, to what extent can it be said that production, no longer largely governed by use-values, can be said to 'evolve'? On the topic, see R.R. Nelson and S.G. Winter, *An Evolutionary Theory of Economic Change,* (Cambridge, MASS: Harvard University Press, 1984), and P.P. Saviotti, *Technological Evolution, Variety, and the Economy,* (Cheltanham: Edward Elgar Publishing, 1996).

consistent means by which to approach contemporary questions concerning technology and the environment.

The scope of this thesis has been modest; I have not aimed to provide a complete account of Marcuse's thought, and nor have I uncritically assumed the validity of every element of his oeuvre. Accordingly, certain issues which emerge in his work, specifically his prominent critique of the "false needs" produced and reproduced in order to sustain the status quo have only been noted in passing here as – despite their considerable interest for future research – the foundational issues which emerge from this topic are beyond the scope of this thesis. For similar reasons, I avoided discussion of Marcuse's revisionary take on Freud in order that my primary focus could remain on his view of technology. Overall, it has not been my intention to argue that Marcuse was 'right', but to show that the themes which emerged in his work deserve further attention from philosophers of technology and philosophers of the environment.

As Marcuse well understood, technological development and economic growth are increasingly closely integrated and this implies that the rationality of technical development and use can no longer be viewed in isolation from the secondary profitable gains each artifact is produced to attain. The incentives behind the production and use of technical artifacts, systems and procedures are not merely *technical* in the Marcusean sense of the term, but in order to be viable must also serve an ulterior economic purpose; their functionality is determined by their success or failure as commodities in a commodity market, which is to say, the wants and needs satisfied by the results of productive activity serve a dual function. As Marcuse notes early in his discussions of technology, it is the "profit incentive" which "keeps the apparatus moving".[8] This point may strike one as obvious, yet as various commentators have noted, the idea that the profit motive is an eternal, 'natural' state of affairs is actually a very recent phenomenon:

> The idea of gain, the idea that each man not only may, but should, constantly strive to better his material lot, is an idea that was quite foreign to the great lower and middle strata of Egyptian, Greek, Roman, and medieval cultures, only scattered throughout Renaissance and Reformation times, and largely absent in the majority of Eastern civilizations ... Not only is the idea of gain by no means as universal as we sometimes suppose, but the social sanction of gain is an even more modern and restricted development.[9]

8 Marcuse, (1941), 'Some Social Implications of Modern Technology', in *Technology, War and Fascism: The Collected Papers of Herbert Marcuse,* vol.1., edited by D. Kellner, (London and New York: Routledge, 1998), p. 44.

9 R. Heilbroner, (1953), *The Worldly Philosophers,* (London: Pelican, 1980), p. 20. The same point is made by W.C.

This historical shift in the chief incentives motivating the majority of technical mediation arrives at a crucial moment: when a large proportion of scientific experts are claiming that the growing human impact on the biosphere is now sufficiently perceptible that it poses a danger to eco-systems, countless species, crucial biospheric cycles, and thereby to the continual flourishing of civilisation itself. Yet as was noted in chapter four of this thesis, the major solution to this and other problems which have arguably resulted just from growth-motivated technological and industrial expansion is more growth-motivated technological expansion, or as Marcuse understood it, the perpetual reproduction of the consumer-capitalist mode of production. Modern technical mediation appears to be configured in such a manner as to *defer* immediate practicality in favour of pursuing inexhaustible profit gains.

The modern epoch appears marked by growing knowledge of the side-effects of our technological success. As this knowledge increases, the time in which the consequences of our often predatory technological forays can be called "unintended" diminishes. The expectation that the consumer-capitalist society's vision of the Good Life can increase into perpetuity not only undercuts means of political and social change, in the roughly four decades since Marcuse's death, it now also appears to defy the laws of entropy.[10] Whilst continuing to rationalise seemingly ever-increasing material appetites, whilst tolerating a small number of individuals whose material affluence is comparable to the annual revenues of some nation states, whilst enlarging waste, exterminating unprecedented numbers of non-human life, placing all faith in the capacity of "business as usual" to now actively address such issues appears highly incautious. In contrast, from the perspective of Marcuse's concrete philosophical utopianism, there are existing means of social change available *now.* Although they cannot escape the system entirely, individuals retain the capacity to affect certain forms of change, and this involves one of the most difficult attitudes for affluent societies to put into action, namely; a refusal to continue to participate in ever-escalating materialism, waste and

---

Neale: "There are today very few places indeed where there is no money, where people do not regard money as important. However, in the tribal and peasant societies of Africa and Asia, some or even most of the food people eat, the houses they live in, and the clothing they wear is not bought but produced and used within a small group, often a kin or village group, or by the members of peasant families. In medieval Europe little of the staple foodstuffs was sold in markets before the tenth and eleventh centuries, and even thereafter most of the food consumed in the countryside was consumed by the producing peasant families. In the ancient Near East the produce of farmers and artisans was contributed to the city temple and distributed from the temple to the members of the temple community, by rules of duty and of right rather than by sale and purchase. Even in the United States much of the food of small-farm families was supplied directly from their own produce well into the twentieth century." See W.C. Neale, *Monies in Societies,* (San Francisco: Chandler and Sharp, 1976), p. 23.

10 On this topic specifically, see N. Georgescu-Roegen, (1971), *The Entropy Law and the Economic Process,* (Lincoln: Iuniverse, 1999). For a definition of the 'false needs' generated by consumer-capitalism in order to perpetuate itself, see Marcuse, *ibid.* (1964), p. 7.

environmental destruction. However, as Marcuse repeatedly argued, such an attitude of refusal, an attitude which questions the rationality of a growth imperative which appears to admit of no limits, constitutes exactly that which the status quo militates to contain, and it has become highly proficient in doing so.[11]

Coupled with its arguably entropy-defying features and its lack of caution in regard to the environmental base on which it depends, a certain pessimism regarding the capacity of modern affluent societies to arrange technology in a way to deal with looming biospheric problems appears warranted. When increasingly bound to the convention of profit making, the former technical or practical orientation of the means of production appears to diminish; the incentives behind production and labour alter and shift. In Marcusean terms, the end of technological rationality becomes stymied and stalled, and despite the undeniable success of this arrangement in the twentieth century, from lifting individuals out of poverty, spreading education, health and communication and making a comparative few very wealthy indeed, there are increasing signs technical mediation has also taken on *irrational* forms.[12] Marcuse focussed specifically on the encroach of this incarnation of technological rationality in its control and regimentation of individuals as opposed to their liberation, yet it appears that the very same rationality also leads to the treatment of the environment as a peripheral concern, second to economic growth rather than its precondition. In a complete inversion of the recommendations of Aristotle and Epicurus, to name but two ancient examples, monetary acquisition appears to have become the *end* of the technological means.[13] Yet money appears to be an end without an end; a situation implied in the silence of the vested interests regarding the possible end of the system they administer and promote, which, it appears, functions merely to 'move forward'.

Hence, if Marcuse's recommendations to allow technics to be restored to its appropriate ends appears utopian, it must be noted that a continuation of 'business-as-usual' into perpetuity appears at least equally so. In light of this contention, it has been argued that Marcuse shows that the technological mode of production – the fusion of technological rationality and consumer-capitalism – calls for radical caution and a level of responsibility which attempts to match its greatly increased

11 See Marcuse, *ibid.* (1964), esp. chapters 2 and 3.

12 Arguably the chief example of this irrational rationality is the reversal of the contingency relation between economics and the environment.

13 See Aristotle, *Politics,* book 1.9., translated by B. Jowett, (Chicago: University of Chicago Press, 1992), p. 452. Epicurus noted that, as money is a human convention which admits of no intrinsic maximum, one can never have to much, despite "nature's wealth being limited and easily won." See Epicurus, 'Leading Doctrines' 15, in *The Philosophy of Epicurus,* translated by G.K. Strodach, (Evanston, ILL: Northwestern University Press, 1963), p. 54.

powers, a level of responsibility which will not likely emanate from views of technical mediation which remain mired in rigid dichotomies between 'artificial' and 'natural'; 'instrumental', or 'autonomous', or that fail to give sufficient consideration to its dominant incentives. As Marcuse's view continues to be dismissed as pessimistic by some, "ideological",[14] and hopelessly utopian by others, the aim of this thesis has been to correct the record in certain limited respects.

14 For example, in a popular sociological textbook, M. Haralambos and M. Holborn accuse Marcuse of merely having a personal "distaste" of the given society, before dismissively laying the charge that his critique is "ideological". See their *Sociology: Themes and Perspectives,* 3rd ed., (London: Collins Educational, 1991), pp. 403-404.

Bibliography

J. Abromeit and R. Wolin (eds., 2005), *Heideggerian Marxism,* (Lincoln and London: University of Nebraska Press).

A. Adamatzky, R. Alonso-Sanz, A. Lawniczak, G.J. Matinez, K. Morita, and T. Worsch, (eds., 2008), *Automata-2008: Theory and Applications of Cellular Automata,* (Frome: Luniver Press), pp. 453-502

T.W. Adorno, (1966), *Negative Dialectics,* (London: Routledge, 2006).

- with M. Horkheimer, (1944), *Dialectic of Enlightenment,* (London and New York: Verso, 1997).

M. Allen, (2008), 'Why is it so Important?', *The Antikythera Mechanism Research Project,* (June 17).

L. Althusser, (1965), *For Marx,* translated by Ben Brewster, (London: Allen Lane, 1969).

A. Álvarez, (2005), 'Three Memetic Theories of Technology', *Techné,* vol.9, no.2, (Winter, 2005).

A. Arato, and E. Gebhardt, (eds., 1978), *The Essential Frankfurt School Reader,* (New York: Urizen).

Aristotle, *Nichomachean Ethics,* translated by J.A.K. Thomson, (London: Penguin Classics, 1976).

- *Metaphysics,* translated by W.D. Ross, (Chicago: University of Chicago Press, 1992), pp. 499-626.
- *Politics,* translated by B. Jowett, (Chicago: University of Chicago Press, 1992), pp. 445-548

W. B. Arthur, (2009), *The Nature of Technology: What it is and How it Evolves,* (New York: The Free Press).

F.J. Ayala, 'Design Without a Designer: Darwin's Greatest Discovery', in Dembski and Ruse, (eds., 2004), pp. 55-80.

F. Bacon, (1627), 'On the Idols and on the Scientific Study of Nature', excerpt from his *New Atlantis; Or, Voyage to the Land of the Rosicrucians,* in Scharf and Dusek, (eds., 2005), pp. 31-34.

P. Bairoch, (1982), 'International industrialization levels from 1750 to 1980' in *The Journal of European Economic History,* vol.11, nos. 1 and 2, (Fall, 1982).

J. Bakan, (2004), *The Corporation: The Pathological Pursuit of Profit and Power,* (London: Constable and Robinson LTD).

J. Balcombe, (2007), *Pleasurable Kingdom: Animals and the Nature of Feeling Good,* (London: Palgrave Macmillan).

B. Barnet, 'Do Technical Artefacts Evolve?' in Bradley and Armand, (eds., 2006), pp.103-114.

– (2006), 'Engelbart's Theory of Technical Evolution', *Continuum Journal,* vol.20, issue 4, pp. 509-521.

R. Barthes, (1977), 'The Death of the Author', in *Image, Music, Text,* (New York: Noonday Press, 1989), pp. 142-148.

G. Basalla, (1988), *The Evolution of Technology,* (Cambridge: Cambridge University Press).

J. Baudrillard, 'Simulacra and Simulation' in *Selected Writings*, edited by M. Poster, (Stanford: Stanford University Press, 1988), pp. 166-184.

S. Beder, (2006), *Global Spin: The Corporate Assault on Environmentalism,* revised ed., (Melbourne: Scribe Publications).

M. Behe, (2006), *Darwin's Black Box: The Biochemical Challenge to Evolution,* (New York: The Free Press).

D. Bell, (1958), *Automation and Major Technological Change: Impact on Union Size, Structure, and Function,* (Industrial Union Dept. AFL-CIO, Washington, 1958).

R. Benedict, (1934), 'A Defence of Moral Relativism', from 'Anthropology and the Abnormal', in *The Journal of General Psychology,* 10, pp. 59-82.

J. Bennett and W. Chaloupka (eds., 1993), *In the Nature of Things: Language, Politics, and the Environment,* (Minneapolis: University of Minnesota Press).

B. Bensaude-Vincent and W.R. Newman, (eds.), *The Artificial and the Natural: An Evolving Polarity,* (Boston MASS: The MIT Press, 2007).

J. Berg Olsen, S.A. Pederson and V.F. Hendricks, (eds., 2009), *A Companion to the Philosophy of Technology,* (Oxford: Blackwell).

W. Bijker and T. Pinch, (1984), 'The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other', in *Social Studies of Science,* vol. 14, no. 3, pp. 399-441.

B. Bimber, (1994), 'Three Faces of Technological Determinism' in Smith and Marx, (eds., 1994), pp. 79-100.

E.A.R. Bird, (1987), 'The Social Construction of Nature: Theoretical Approaches to the History of Environmental Problems', in *Environmental Review,* 11, pp. 255-64.

S. Blackmore, 'Evolution's 3rd Replicator: Memes, Genes, and Now What?', *New Scientist* 2719, (July 2009).

J. Bokina and T.J. Lukes, (eds., 1994), *Marcuse: From the New Left to the Next Left,* (Lawrence: University of Kansas Press).

L. Booker, S. Forrest, M. Mitchell and R. Riolo, (eds., 2005), *Perspectives on Adaptation in Natural and Artificial Systems,* (Oxford: Oxford University Press).

A. Borgmann, *Technology and the Character of Contemporary Life,* (Chicago: Chicago University Press, 1984).

N. Bostrom, (2002), 'Existential Risks: Analysing Human Extinction Scenarios and Related Hazards', in *The Journal of Evolution and Technology,* vol. 9, no.1.

- (2005), 'A History of Transhumanist Thought', in *The Journal of Evolution and Technology,* vol.14, no.1, pp. 1-25.
- (2006), 'How Long before Superintelligence?' in *Linguistic and Philosophical Investigations,* vol.5, no.1, pp. 11-30.
- with M.M. Ćirković (eds., 2008), *Global Catastrophic Risks*, (Oxford: Oxford University Press).

A. Bradley and L. Armand, (eds., 2006), *Technicity*, (Prague: Litteraria Pragensia).

P. Brickman and D.T. Campbell, (1971), 'Hedonic Relativism and Planning the Good Society', in *Adaptation Level Theory: A Symposium,* edited by M.H. Apley, (New York: Academic Press, 1971), pp. 287-302

W.R. Buckley, 'Signal Crossing Solutions in von Neumann Self-replicating Cellular Automata', in Adamatzky, *et al,* (eds., 2008), pp. 453-502

S. Bundschuh, (2004), 'The Theoretical Place of Utopia: Some Remarks on Marcuse's Dual Anthropology', in Abromeit and Cobb, (eds., 2004), pp. 152-162.

M. Bunge, 'The Philosophical Richness of Technology', in *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association,* vol. 2, (1976).

J.T. Burman, 'The Misunderstanding of Memes: Biography of an Unscientific Object, 1976-1999', in *Perspectives on Science,* vol. 20, no. 1, (2012), pp. 75-104.

V. Burr, (1995), *An Introduction to Social Constructionism,* (London: Routledge).

S. Butler, (1872), *Erewhon,* (London: Penguin Classics, 1985).

W.R. Catton Jr., *Overshoot: The Ecological Basis of Revolutionary Change,* (Chicago: University of Illinois Press, 1982).

D. Chalmers, 'The Singularity: A Philosophical Analysis', in *The Journal of Consciousness Studies,* vol.17, no.7, (2010), pp. 1-56

W. Chaloupka and R. McGreggor Cawley, 'The Great Wild Hope: Nature, Environmentalism, and the Open Secret', in Bennett and Chaloupka (eds., 1993), pp. 3-23

N. Chomsky, *Propaganda and Control of the Public Mind,* (Boston, MASS: AK Press, 1998).

A.C. Clarke, (1973), *Profiles of the Future: An Enquiry into the Limits of the Possible,* (New York: Indigo, 2000).

S.R.L. Clark, 'From Biosphere to Technosphere', in *Ends and Means,* vol.5, no.2, (2001), pp. 3-21.

J. Clough, (2010), *Principles of Cybercrime,* (Cambridge: Cambridge University Press).

W.M. Cobb and J. Abromeit, (eds., 2004), *Herbert Marcuse: A Critical Reader,* (New York: Routledge).

J. Collier, (2010), *The Plundered Planet,* (London: Allen and Unwin).

B. Commoner, *The Closing Circle,* (New York: Bantam, 1971).

- *Making Peace with the Planet*, (New York: Pantheon Press, 1990).

R.M. Cook, (1979), 'Archaic Greek Trade: Three Conjectures 1. The Diolkos', in *The Journal of Hellenic Studies,* vol. 99, pp. 152-155.

P. d'Holbach, (1770), 'The Illusion of Free Will', in Feinberg, (ed., 1996), pp. 418-422

A. de Botton, (2004), *Status Anxiety,* (London: Penguin).

P.T. de Chardin, (1955), *The Phenomenon of Man,* (London: Fountain Books, 1977).

H. de Garis, (2005), *The Artilect War: Cosmists vs. Terrans: A Bitter Controversy Concerning Whether Humanity should Build Godlike Massively Intelligent Machines,* (Palm Springs: ETC Publications).

A. de Grey and M. Rae, *Ending Aging: The Rejuvenation Breakthroughs that Could Reverse Human Aging in Our Lifetime,* (New York: St Martin's Press, 2007).

C. Darwin, (1859), *On the Origin of Species by Means of Natural Selection,* (Chicago: University of Chicago Press, 1992).

B.K. Das, (2005), *Twentieth Century Literary Criticism,* 5th ed., (Delhi: Atlantic).

S. Das, (2011), *Extreme Money: Masters of the Universe and the Cult of Risk,* (Upper Saddle River, NJ: FT Press).

A.Y. Davis, (2005), 'Marcuse's Legacies', in Abromeit and Cobb, (eds., 2005), pp. 43-50.

M. Davis, 'Mathematical Logic and the Origin of Modern Computers', in Herkin, (ed., 1988), pp. 149-174.

R. Dawkins, (1982), *The Extended Phenotype: The Long Reach of the Gene,* (Oxford: Oxford University Press, 1999).

- (1986), *The Blind Watchmaker,* (London: Penguin).

N.W. DeWitt, (1954), *Epicurus and his Philosophy,* (Minneapolis: University of Minnesota Press, 1964).

W.A. Dembski, (1999), *Intelligent Design: The Bridge Between Science and Theology,* (Downer's Grove, ILL: Intervarsity Press).

- with M. Ruse (eds., 2004), *Debating Design: From Darwin to DNA,* (Cambridge: Cambridge University Press).

D.C. Dennett, (1995), *Darwins's Dangerous Idea: Evolution and the Meanings of Life,* (London: Penguin).

A. E. Dessler and E.A. Parson, (2006), *The Science and Politics of Global Climate Change: A Guide to the Debate,* (Cambridge: Cambridge University Press).

G.W. Domhoff, (1990), *The Power Elite and the State: How Policy Is Made in America,* (New York: Aldine de Gruyter).

F. Dostoevsky, (1880), *The Brothers Karamazov,* (London: Penguin, 2003).

V. Dusek and R.C. Scharff, (eds., 2005), *Philosophy of Technology: The Technological Condition,* (Oxford: Blackwell).

J. Eatwell, M. Milgate and P. Newman, (eds., 1990), *Marxian Economics,* (London: Norton and Co.).

M. Elam, (1994), 'Anti Anticonstructivism or Laying the Fears of a Langdon Winner to Rest', in Dusek and Scharff, (eds., 2005), pp. 612-616.

R. Elliot (ed., 1998), *Environmental Ethics,* (Oxford: Oxford University Press).

J. Ellul, (1963), 'The Technological Order', in Mitcham and Mackey, (eds., 1994), pp. 86-105.

- (1964), *The Technological Society,* translated by J. Wilkinson, (New York: A.A. Knopf, Inc).

F. Engels, (1847), 'The Principles of Communism', translated by P. Sweezy, in *Marx and Engels: Selected Works,* vol. 1, (Moscow: Progress Publishers, 1969), pp. 81-97.

Epicurus, (1963), *The Philosophy of Epicurus,* translated by G.K. Strodach, (Evanston, Ill.: Northwestern University Press).

European Parliament, Brussels, (2012), 'Human Enhancement – Ethical Issues', European Parliament Science and Technology Options Assessment (STOA), (April, 2012).

S. Ewen, (1996), *PR! A Social History of Spin,* (New York: Basic Books).

M. Eysenck (1990), *Happiness: Facts and Myths,* (Hove: Psychology Press LTD, 2003).

A. Feenberg, (1995a), *Alternative Modernity: The Technical Turn in Philosophy and Social Theory,* (Los Angeles: University of California Press).

- (1995b), 'Subversive Rationalization: Technology, Power, and Democracy' in Feenberg and Hannay, (eds., 1995), pp. 3-22.

- (1996) 'Marcuse or Habermas: Two Critiques of Technology' in *Inquiry*, vol. 39:1 (Elmont, NY), pp. 45-70.
- (1998), 'Can Technology Incorporate Values? Marcuse's Answer to the Question of the Age', text of a paper for the conference on 'The Legacy of Herbert Marcuse', University of California, Berkeley, November 7).
- (1999), *Questioning Technology,* (London and New York: Routledge).
- (1999b), 'A Fresh Look at Lukács: On Steven Vogel's *Against Nature',* in *Rethinking Marxism,* (Winter, 1999b), pp. 84-92.
- (2000a), 'Do We Need a Critical Theory of Technology?' in *Science, Technology and Human Values,* vol.25, no.2, pp. 238-242.
- (2000b), 'Constructivism and Technology Critique: Replies to Critics', in *Inquiry,* (Summer), pp. 16-29.
- (2005), *Heidegger and Marcuse: The Catastrophe and Redemption of History,* (New York: Routledge).
- (2009), 'The Liberation of Nature?' in Western Humanities Alliance Special Issue, *Nature, Culture, Technology,* edited by A. Feenberg-Dibon and R. McGinnis, vol. LXIII, no. 3, (Fall), pp. 96-107
- with A. Hannay, (eds., 1995), *Technology and the Politics of Knowledge,* (Indiana: Indiana University Press).

N. Fiala, (2009), 'How Meat Contributes to Global Warming', *Scientific American,* (February, 2009).

D. Foreman, (1993), *Confessions of an Eco-Warrior,* (New York: Crown).

M. Franssen, (2009), 'Analytic Philosophy of Technology', in Berg Olsen *et al* (eds), *op.cit.* (2009), pp. 184-188.

T. Friedman, (2005), *The World is Flat: A Brief History of the 21st Century,* (New York: Picador).

E. Fromm, (1961), *Marx's Concept of Man,* (New York: Continuum, 2004).

F. Fukuyama, (2003), *Our Posthuman Future: Consequences of the Biotechnology Revolution,* (New York: Picador).

S. Gandesha, (2004), 'Marcuse, Habermas, and the Critique of Technology', in Abromeit and Cobb, (eds., 2004), pp. 188-208.

J. Garreau, (2005), *Radical Evolution: The Promise and Peril of Enhancing Our Minds, Our Bodies – and What it Means to be Human,* (New York: Broadway Press).

S.J.C. Gaulin and D.H. McBurney, (2003), *Evolutionary Psychology,* 2nd ed., (London: Prentice Hall).

M.S. Gazzaniga, (2006), *The Ethical Brain: The Science of Our Moral Dilemmas,* (New York: Harper Perennial).

A. Gehlen, A. (1965), 'A Philosophical-Anthropological Perspective on Technology', in Scharff and Dusek (eds., 2005), pp. 213-220.

– (1974), *Der Mensch. Seine Natur Und Seine Stellung in Der Welt,* (Düsseldorf: Akademische Verlagsgesellschaft Athenaion).

N. Georgescu-Roegen, (1971), *The Entropy Law and the Economic Process,* (Lincoln: Iuniverse, 1999).

R.M. Geraci, (2010), *Apocalyptic AI: Visions of Heaven and Hell in Robotics, Artificial Intelligence,and Virtual Reality,* (Oxford: Oxford University Press).

J.W. Goethe, (1797), *Der Zauberlehrling,* (Berlin: Kindermann Verlag, 2008).

M. Goldhaber, (1991), 'Is Technology Autonomous?', in Thompson *et al,* (eds., 1991), pp. 195-203.

I.J. Good, (1965), 'Speculations Concerning the First Ultraintelligent Machine', *Advances in Computers,* vol.6.

A. Gorz, (1989), *Critique of Economic Reason,* 2nd ed., (London: Verso).

– (1982), *Farewell to the Working Class,* translated by Mike Sonenscher, (London: Pluto Press).

S.J. Gould and N. Eldredge, 'Punctuated Equilibria: an Alternative to Phyletic Gradualism', in Schopf, (ed., 1972), pp. 82-115.

J. Gray, (2002), *Straw Dogs: Thoughts on Humans and Other Animals,* (London: Granta).

– (2008), 'The Atheist Delusion', in *The Guardian,* (15 March).

L. Grossman, (2011), '2045: The Year Man Becomes Immortal', *Time Magazine,* (February 10).

J. Habermas, (ed., 1968), *Antworten auf Herbert Marcuse,* (Frankfurt am Main: Suhrkamp).

– (1970), 'Technology and Science as Ideology', in *Toward a Rational Society,* (Boston: Beacon Press), pp. 81-122.

– (1983), 'A Reply to My Critics', in *Habermas: Critical Debates*, edited by J. Thompson and D. Held, (London: Macmillan).

– (1984), *The Theory of Communicative Action, vol.1: Reason and the Rationalization of Society,* translated by T. McCarthy, (Boston: Beacon Press).

– (1998), 'Afterword: The Different Rhythms of Philosophy and Politics For Herbert Marcuse on his 100th Birthday', in Kellner, (ed., 2001), pp. 231-238.

E.J. Hackett, O. Amsterdamska, M. Lynch, and J. Wajcman (eds., 2008), *The Handbook of Science and Technology Studies,* third ed., (Cambridge, MAAS: The MIT Press).

C. Hamilton, (2003), *Growth Fetish,* (Sydney: Allen and Unwin).

C. Hanks, (ed., 2010), *Technology and Values: Essential Readings,* (Oxford, Blackwell).

M. Haralambos and M. Holborn, (1991), *Sociology: Themes and Perspectives,* (London: Collins International).

P. Hay, (2005), *Main Currents in Western Environmental Thought,* (Sydney: UNSW Press).

D.R. Headrick, (2009), *Technology: A World History,* (Oxford: Oxford University Press).

G.W.F. Hegel, (1807), *The Phenomenology of Spirit,* translated by A.V. Miller, (Oxford: Oxford University Press, 1977).

M. Heidegger, (1954), 'The Question Concerning Technology', in *Basic Writings,* edited by D.F. Krell, (New York: Harper and Rowe, 1977), pp. 287-317.

R. Heilbroner, (1953), *The Worldly Philosophers,* new ed., (London: Penguin, 1980).

- (1967) 'Do Machines Make History?' in Scharff and Dusek, (eds., 2005), pp. 398-404.
- (1994), 'Technological Determinism Revisited', in Smith and Marx, (eds., 1994), pp. 67-78.

R. Heinberg, (2005), *The Party's Over: Oil, War, and the Fate of Industrial Society,* 2nd ed., (Forest Row: Claireview Books).

- (2011), *The End of Growth: Adapting to our New Economic Reality,* (Gabriola Island: New Society Publishers).

D. Held, (2001), *The Penguin Dictionary of Critical Theory,* (London: Penguin).

- with J. Thompson (eds., 1983), *Habermas: Critical Debates*, (London: Macmillan).

R. Herkin, (ed., 1988), *The Universal Turing Machine: A Half-Century Survey*, (Oxford: Oxford University Press).

D.R. Hofstadter, (2005), 'Moore's Law, Artificial Evolution, and the Fate of Humanity', in Booker *et al* (eds., 2005), pp. 163-196.

R. Hoggart, (2004), *Mass Media in a Mass Society: Myth and Reality,* (London and New York: Continuum).

The Holy Bible, (New International Version).

H.H. Holz, *Utopie und anarchismus. Zur Kritik der kritischen Theorie Herbert Marcuses,* (Cologne: Pahl-Rugenstein, 1968).

Homer, (8th century BC), *The Iliad,* translated by R. Fagles, (London: Viking-Penguin, 1990).

T. Homer-Dixon, (2006), *The Upside of Down: The End of the World as We Know It and Why that May Not be Such a Bad Thing,* (Melbourne: Text).

M. Horkheimer, (1941), 'The End of Reason' in A. Arato, and E. Gebhardt, (eds., 1978), pp. 26-48.

J. Houghton, (2009), *Global Warming: The Complete Briefing,* 4th ed., (Cambridge: Cambridge University Press).

Ihde, (1979), 'Heidegger's Philosophy of Technology', in Scharff and Dusek, (eds., 2005), pp.277-292.

- (2001), *Bodies in Technology,* (Minnesota: University of Minnesota Press).
- (2008), 'The Designer Fallacy and Technological Imagination', in Vermaas, Kroes, Light and Moore, (eds., 2008), pp. 51-59

F. Jameson, (2008), 'The Theory of Marxism: Questions and Answers', *Rethinking Marxism,* vol. 20, no.3., pp. 367-384.

M. Jay, *The Dialectical Imagination,* (Berkeley: University of California Press, 1996).

D. Jensen, (2006), *Endgame vol.1: The Problem of Civilization,* (New York: Seven Stories Press).

A. Jha, (2012), 'Solar Storms Could Crash Computer Systems this Year, says Space Expert', *The Guardian,* (March 8).

B. Joerges, (1999), 'Do Politics Have Artifacts?' in *Social Studies of Science*, vol.29, no.3., pp. 411-431.

B. Joy, (2000), 'Why the Future Doesn't Need Us', in *Wired,* issue 8.04, (April).

M. Kaku, (1998), *Visions: How Science Will Revolutionize the 21st Century,* (New York: Anchor Books).

- (2012), *Physics of the Future: How Science Will Shape Human Destiny and Our Lives by the Year 2100,* (New York: Anchor Books, 2012).

M. Kanellos, (2003), 'Moore's Law to Roll on for Another Decade', *Cnet,* (February 10).

I. Kant, (1991), *Political Writings,* 2nd ed., edited by H.S. Reiss, translated by H.B. Nisbet, (Cambridge: Cambridge University Press).

E. Kapp, (1877), *Grundlinien einer philosophie der technik: Zur entstehungsgeschichte der cultur aus neuen gesichtspunkten,* (Ann Arbor: University of Michigan Library).

B. Keim, (2008), 'World's First Computer Displayed Olympic Calender', *Wired,* (July 30).

D. Kellner, (1982), 'Schoolman on Marcuse,' review of *The Imaginary Witness: The Critical Theory of Herbert Marcuse,* by Morton Schoolman, (1980). *New German Critique* No. 26, "Critical theory and Modernity" (Spring – Summer, 1982), pp. 185-201.

- (1984), *Herbert Marcuse and the Crisis of Marxism,* (Berkeley: University of California Press).
- with S.E. Bronner (eds., 1989), *Critical Theory and Society: A Reader,* (New York: Routledge).

- (1992), 'Marcuse, Liberation and Radical Ecology', in *Capitalism, Nature, Socialism,* vol.3, no.3, (September), pp. 43-46.
- (1994), 'A Marcuse Renaissance?', in Bokina and Lukes, (eds., 1994), pp. 245-267.
- (ed., 1998), *Technology, War, and Fascism: The Collected Papers of Herbert Marcuse,* vol.1, (London and New York, Routledge).
- (2001), 'Herbert Marcuse and the Vicissitudes of Critical Theory', in Kellner, (ed., 2001), pp. 1-33.
- (ed., 2001), *Towards a Critical Theory of Society: The Collected Papers of Herbert Marcuse,* vol.2, (London and New York: Routledge).
- (ed., 2005), *The New Left and the 1960s: The Collected Papers of Herbert Marcuse,* vol.3, (London and New York: Routledge).
- (ed., 2007), *Art and Liberation: The Collected Papers of Herbert Marcuse,* vol.4, (London and New York: Routledge).

T. Kemple, (1995), *Reading Marx Writing: Melodrama, the Market, and the "Grundrisse",* (Stanford University Press).

D.W. Kidner, 'Fabricating Nature: A Critique of the Social Construction of Nature', in *Environmental Ethics,* v.22, (Winter, 2000), pp. 339-357.

A. Kirby, (2004), 'Hungry World "Must Eat Less Meat"', *BBC News*, (August 16, 2004).

S.J. Kline, (1985), 'What is Technology?' in Scharff and Dusek (eds., 2005), pp. 210-212.

R. Kothari, (2010), 'Environment, Technology, and Ethics', in C. Hanks, (ed., 2010), pp. 431-437.

D.F. Krell, (ed., 1977), *Martin Heidegger: Basic Writings*, (New York: Harper Perennial).

T.S. Kuhn, (1962), *The Structure of Scientific Revolutions,* (Chicago: University of Chicago Press).

R. Kurzweil, (1999), *The Age of Spiritual Machines,* (London: Viking).

- (2005), *The Singularity is Near: When Humans Transcend Biology,* (New York: Penguin).
- (2012), *How to Create a Mind: The Secret of Human Thought Revealed,* (New York: Viking).

J. Lamarck, (1809), *Philosophic Zoologique: ou Exposition des Considérations Relative à l'histoire Naturelle des Animaux,* vol.1, (Paris: Nabu Press, 2010).

G.A. Landis, (ed., 1993), *Vision-21: Interdisciplinary Science and Engineering in the Era of Cyberspace,* (NASA Publication CP-101290, March).

J. Lanier, (2000), 'One Half of a Manifesto', in 'The Third Culture', *Edge Magazine*.

- (2010), *You Are Not a Gadget: A Manifesto,* (London: Penguin-Allen Lane).

G.W. Leibniz, (1714), *Monadology,* translated by R. Latter, (Charleston, SC: Forgotten Books, 1898).

A. Leroi-Gourhan, (1945), *Milieu et techniques,* (Paris: Albin Michel).

J. Leslie, (1996), *The End of the World: The Science and Ethics of Human Extinction,* (London: Routledge).

M. Levinson, (2008), *The Box: How the Shipping Container Made the World Small and the World Economy Bigger,* (Princeton: Princeton University Press).

T. Lewens, (2005), *Organisms and Artifacts: Design in Nature and Elsewhere,* (Cambridge, MASS: The MIT Press).

S.R. Lichter, (2008), 'Climate Scientists Agree on Warming, Disagree on Dangers, and Don't Trust the Media's Coverage of Climate Change', *STATS Survey,* (George Mason University).

A. Light, (1999), 'Are All Anthropocentrists Against Nature?' in *Rethinking Marxism,* 11:4, pp. 93-102.

R. Li-Hua, (2009), 'Definitions of Technology', in Olsen, Pedersen and Hendricks, (eds., 2009), pp. 18-22.

Z. Lindong, 'The Intentional Fallacy Reconsidered', in *Canadian Social Science,* vol.8, no 2, (March, 2012), pp. 34-39.

W. Lippmann, (1922), *Public Opinion,* (FQ Classics, 2007).

J.A. Livingston, (1981), 'The Fallacy of Wildlife Conservation', (Toronto: McClelland & Stewart).

- (1994), *Rogue Primate: An Exploration of Human Domestication,* (Ontario: KeyPorter Books).

N. Lobkowicz, (ed., 1967), *Marx and the Western World,* (Notre Dame: Notre Dame Press).

J.F. Love, (1986), *McDonalds: Behind the Arches,* Revised ed., (New York: Bantam Books, 1995).

J. Lovelock, (2006), *The Revenge of Gaia: Why the Earth is Fighting Back – and How We Can Still Save Humanity,* (Santa Barbara: Allen Lane).

- (2009), *The Vanishing Face of Gaia: A Final Warning.* (London, Allen Lane).

G. Lukács, (1923), *History and Class Consciousness: Studies in Marxist Dialectics,* translated by R. Livingstone, (Merlin, 1971).

B. McKibben, (1990), *The End of Nature,* (London: Penguin-Viking).

- (2010), *Eaarth: Making Life on a Tough New Planet,* (Melbourne: Black Inc.).

M. McLuhan, (1964), *Understanding Media: The Extensions of Man,* (London: Routledge, 2007).

R. Mackey and C. Mitcham, (eds., 1983), *Philosophy and Technology: Readings in the Philosophical Problems of Technology,* (Cambridge, MASS: The MIT Press).

J.J. Macionis, (2011), *Sociology,* (Toronto: Pearson).

A. MacIntyre, (1970), *Marcuse,* (London: Fontana, 1973).

J. Malpas, (2006), *Heidegger's Topology: Being, Place and World,* (Boston, MASS: The MIT Press).

E. Mandel, (1990), *Karl Marx,* in Eatwell *et al,* (eds., 1990), pp. 1-38.

D. Mange, A. Stauffer, L. Peparaolo, and G. Tempesti, 'A Macroscopic View of Self-replication', in *Proceedings of the Institute of Electrical and Electronics Engineers ,(IEEE),* vol.92, issue:12, (December, 2004), pp. 1929-1945

D.S. Mannison, M McRobbie and R. Routley, (eds.), *Environmental Philosophy,* (Canberra: ANU Research School of Social Sciences, 1980).

H. Marcuse, (1922), 'The German Artist Novel: Introduction', translated by C. Reitz, in Kellner, (ed., 2007), pp. 71-80

- (1929), 'On Concrete Philosophy' in Abromeit and Wolin (eds., 2005)., pp. 34-52.
- (1932), 'New Sources on the Foundation of Historical Materialism', in Abromeit and Wolin, (eds., 2005), pp. 87-121.
- (1938), 'On Hedonism', in J. Shapiro (ed., 1969), pp. 159-200.
- (1941), 'Some Social Implications of Modern Technology' in *Technology, War, and Fascism: The Collected Papers of Herbert Marcuse,* vol.1, edited by D. Kellner, (New York: Routledge, 1998), pp. 41-65.
- (1945), 'Some Remarks on Aragon: Art and Politics in the Totalitarian Era', in Kellner, (ed., 1998), pp. 201-214.
- (1948), 'Existentialism: Remarks on Jean-Paul Sartre's *L'Être et le Néant,'* in *Philosophy and Phenomenological Research,* vol.3, no.3, (March, 1948), pp. 309-336.
- (1954), *Reason and Revolution: An Introduction to the Dialectical Thinking of Hegel and Marx,* 2nd ed., (New York, Humanities Press, 1954).
- (1955), *Eros and Civilization: A Philosophical Enquiry into Freud,* (London: Allen Lane, 1966).
- (1960), 'De l'ontologie à la technologie: les tendences de la société industrielle' ('From Ontology to Technology: Fundamental Tendencies of Industrial Society'), translated by M. Ishay, in Bronner and Kellner, (eds., 1989), pp. 119-127.
- (1961), 'The Problem of Social Change in the Technological Society', in Kellner, (ed., 2001), pp. 37-57.

- (1964), *One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society,* (New York: Routledge, 2002).
- (1965a), 'On Science and Phenomenology,' in Arato and Gebhardt, (eds., 1978), pp. 466-476.
- (1965b), 'Repressive Tolerance', in Wolff, Moore Jnr. and Marcuse, (eds., 1969), pp. 95-137.
- (1965c), 'The Containment of Change in Industrial Society', in Kellner, (ed, 2001), pp. 82-93.
- (1966), 'The Individual in the Great Society', in Kellner (ed., 2001), pp. 64-65.
- (1967a), 'The End of Utopia', in Marcuse, (1970b), pp. 62-81.
- (1967b), 'Liberation from the Affluent Society', in Kellner (ed., 2005), pp. 76-86.
- (1967c), 'Aggressiveness in Advanced Industrial Society', in *Negations: Essays in Critical Theory,* 2nd ed., (Boston: Beacon Press, 1969), pp. 248-268.
- (1967d), 'The Obsolescence of Marxism?' in *Marx and the Western World,* edited by N. Lobkowicz, (Notre Dame: Notre Dame Press, 1967), pp. 409-417.
- (1968a), 'Industrialization and Capitalism in Max Weber', in Marcuse, (1969a), pp.201-226.
- (1968b), 'Beyond One-Dimensional Man', in Kellner, (ed., 2001), pp. 107-120.
- (1969a), *Negations: Essays in Critical Theory,* translated by J.J. Shapiro, (Boston: Beacon Press).
- (1969b), *An Essay on Liberation,* (Boston: Beacon Press, 1969).
- (1969c), 'Mr. Harold Keen: Interview with Dr. Herbert Marcuse', in Kellner, (ed.), 2005), pp. 128-136.
- (1970a), 'Charles Reich – A Negative View', in Kellner (ed., 2005), pp. 46-48.
- (1970b), *Five Lectures: Psychoanalysis, Politics and Utopia,* translated and edited by J.J. Shapiro and S.M. Weber, (Boston: Beacon Press).
- (1970c), 'The Obsolescence of the Freudian Concept of Man', in Shapiro and Weber, (eds., 1970), pp. 45-61.
- (1972a), *Counterrevolution and Revolt,* (Boston: Beacon Press).
- (1972b), 'Ecology and Revolution', in Kellner, (ed., 2005), pp. 173-176.
- (1975) 'The Failure of the New Left?' in Kellner, (ed., 2005), pp. 181-191.
- (1977), 'Heidegger's Politics: An Interview with Frederick Olafson, in Wolin and Abromeit, (eds, 2005), pp. 165-175.
- (1978), *The Aesthetic Dimension,* (Boston: Beacon Press, 1978).

– (1979), 'Ecology and the Critique of Modern Society' in *Capitalism, Nature, Socialism,* 3:3., (Copyright © 1992 by Peter Marcuse), pp. 29-48.

R. Marks, (1970), *The Meaning of Marcuse,* (New York: Ballantyne).

J. Martin, (2006), *The Meaning of the 21st Century: A Vital Blueprint for Ensuring Our Future,* (London: Eden Project Books).

K. Marx and F. Engels, (1848), *The Communist Manifesto,* (London: Pelican Books, 1967).

– (1859), 'Preface to a Contribution to the Critique of Political Economy', translated by T.P. Bottomore, in Fromm, (1961), pp. 168-169.

– (1867), *Capital,* vol.1., translated by B. Fowkes, (London: Penguin, 1990).

– (1932), *Economic and Philosophical Manuscripts of 1844,* translated by T.B. Bottomore, in Fromm, (1961), pp. 78-150.

– (1939), *Grundrisse: Foundations of the Critique of Political Economy, (rough draft),* translated by M. Nicolaus, (London: Penguin, 1993).

– (1986), *Karl Marx: A Reader,* edited by J. Elster, (Cambridge: University of Cambridge Press).

L. Marx and M.R. Smith, (eds, 1994), *Does Technology Drive History? The Dilemma of Technological Determinism,* (Boston MAS: The MIT Press).

E. Mayr, (2002), *What Evolution Is,* (London: Weidenfeld and Nicolson).

M. Midgley, (1983), 'Duties Concerning Islands', in Elliot, (ed., 1995), pp. 89-103.

T.J. Misa, (1994), 'Retrieving Sociotechnical Change from Technological Determinism', in Smith and Marx (eds., 1994), pp. 115-141.

E. J. Mishan, (1967), *The Costs of Economic Growth,* (London: Staples).

C. Mitcham, (1994), *Thinking Through Technology: The Path Between Engineering and Philosophy.* (Chicago: University of Chicago Press, 1994).

T. Modis, (2002), 'Forecasting the Growth of Complexity and Change', *Technological Forecasting and Social Change*, vol. 69, no. 4, pp. 377-404.

– (2006), 'The Singularity Myth', *Technological Forecasting and Social Change,* vol.73, no.2.

G. Moore, 'Cramming more Components onto Integrated Circuits', *Electronics*, vol.38, no.8, (April, 1965).

H. Moravec, (1988), *Mind Children: The Future of Robot and Human Intelligence,* (Cambridge, MASS: Harvard University Press).

– (1998), *Robot: Mere Machine to Transcendent Mind,* (Oxford: Oxford University Press).

L. Mumford, (1936), *Technics and Civilization,* (New York: Harcourt, Brace and World, 1963).

– (1952), *The Conduct of Life,* (London: Secker and Warburg).

W.C. Neale, (1976), *Monies in Societies,* (San Francisco: Chandler and Sharp).

R.R. Nelson and S.G. Winter, (1984), *An Evolutionary Theory of Economic Change,* (Cambridge, MASS: Harvard University Press).

F. Nietzsche, (1886), *Beyond Good and Evil: Prelude to a Philosophy of the Future,* translated by W. Kaufmann (New York: Vintage Books, 1966).

J. Noonan, (2008), 'Marcuse, Human Nature, and the Foundations of Ethical Norms', in *Philosophy and Social Criticism,* vol. 34, no. 3, (March, 2008), pp. 267-286.

L Nový, J. Gabriel and J. Hroch, (eds., 1994), *Czech Philosophy in the Xxth Century,* chapter 13, (Washington D.C.: Paideia Press, 1994).

J. Ocay, (2010), 'Marcuse's Critique of Advanced Industrial Society', *Kritike* vol.4, no.1, (June, 2010), pp. 54-78.

J.K.B. Olsen, S.A. Pedersen and V.F. Hendricks, (eds., 2009), *A Companion to the Philosophy of Technology,* (Oxford: Blackwell).

S. Olsen, (2003), *Mapping Human History: Genes, Race and Our Common Origins,* (Boston: Mariner, 2003).

N. Oreskes, (2004), 'Beyond the Ivory Tower: The Scientific Consensus on Climate Change', in *Science,* vol. 306: 5702 (December), p. 1686.

J. Ortega y Gasset, (1939), 'Thoughts on Technology' in C. Mitcham and R. Mackey, (eds., 1983), pp. 290-313.

Ovid, (2-8 AD), *Metamorphoses,* translated by S. Garth, J. Dryden, A Pope, J. Addison and W. Congreve, (London: Forgotten Books, 2007).

W. Paley, (1802), *Natural Theology,* (London: Deward Publishing, 2010).

A. Pan, Q. Sun, A.M. Bernstein, M.B. Schulze, J.E. Manson, M.J. Stampfer, W.C. Willett and F.B. Hu, (2012), 'Red Meat Consumption and Mortality', *Archives of Internal Medicine,* American Medical Association, (March, 2012), pp. 555-563.

A. Pannekoek, (1909), 'Darwinism and Marxism', translated by N. Weiser, (Chicago: Copyright Charles H. Kerr & Co., 1912).

U. Pesavento, (1995), 'An Implementation of von Neumann's Self-Reproducing Machine', *Artificial Life Journal,* vol.2, issue 4, pp. 337-354

D. Pimantel, (2003), 'Livestock Production: Energy Inputs and the Environment', *American Journal of Clinical Nutrition*, vol. 78, no.3, (September, 2003), pp.660-663.

S.L. Pimm, G.J. Russell, J.L. Gittleman and T.M. Brooks, (1995), 'The Future of Biodiversity', *Science,* vol.269, no.5222, (July, 1995), pp. 347–350.

V. Plumwood, (1993), *Feminism and the Mastery of Nature,* (London: Routledge).

M. Pollan, (2002), 'An Animal's Place', *The New York Times Sunday Magazine*, (November 10).

– (2006), *The Omnivore's Dilemma: A Natural History of Four Meals,* (New York: Penguin).

K. Popper, (1957), *The Poverty of Historicism*, (London: Routledge, 2004).

J. Porrit, (2007), *Capitalism: As if the World Matters,* (London: Earthscan Publishers).

R. Posner, (2004), *Catastrophe: Risk and Response,* (Oxford, Oxford University Press).

N. Postman, (1993), *Technopoly: The Surrender of Culture to Technology,* (New York: Vintage).

M. Rees, (2004), *Our Final Century?* (London: Vintage).

C. Reich, *The Greening of America,* (New York: Bantam, 1978).

C. Reitz, *Art, Alienation, and the Humanities: A Critical Engagement with Herbert Marcuse,* (Albany: State University of New York Press, 2000)

D. Ricardo, (1817), *Principles of Political Economy and Taxation,* 3rd ed., (London: Barnes and Noble, 2005).

M. Ridley, (2009), 'Variation created by recombination and mutation is random with respect to the direction of adaptation', in *Evolution,* 3rd ed., chapter 4.8, (London: John Wiley and Sons).

R. and V. Routley, (1980), 'Human Chauvinism and Environmental Ethics', in *Environmental Philosophy,* edited by D.S. Mannison, M McRobbie and R. Routley, (Canberra: ANU Research School of Social Sciences, 1980), pp. 96-189.

Royal Society and the Royal Academy of Engineering, (2004), 'Nanoscience and nanotechnology', (July), pp. 51-57

B. Russell, (1935), *In Praise of Idleness,* (London: Routledge, 2006).

S. Russell and P. Norvig, (2003), *Artificial Intelligence: A Modern Approach*, 2nd ed., (Englewood Cliffs, NJ: Prentice Hall).

K. Sale, (1999), 'The Achievements of "General Ludd"', in *The Ecologist,* v.29, no 5, (August / September 1999), pp. 69-78.

M. J. Sandel, (1998), *Democracy's Discontent: America in Search of a Public Philosophy,* (Harvard: Belknap Press of Harvard University Press).

J.P. Sartre, (1943), *Being and Nothingness: An Essay on Phenomenological Ontology,* (London: Routledge, 1998).

J.R. Saul, (1995), *The Doubter's Companion: A Dictionary of Aggressive Common Sense,* (London: Penguin).

P.P. Saviotti, (1996), *Technological Evolution, Variety, and the Economy,* (Cheltanham: Edward Elgar Publishing).

J. Savulescu, (2009), 'Unfit for Life: Genetically Enhance Humanity or Face Extinction', transcript of a lecture presented at the Festival of Dangerous Ideas, Sydney, (October 4).

B. Schneier, (2006), 'Quickest Patch Ever', in *Wired,* (9 July).

M. Schoolman, (1980), *The Imaginary Witness: The Critical Theory of Herbert Marcuse,* (New York: The Free Press).

T.J.M. Schopf, (ed., 1972), *Models in Palaeobiology,* (San Francisco: Freeman Cooper).

A. Schmidt, (1973), *The Concept of Nature in Marx,* (London: Verso).

J. Schummer, (2001), 'Aristotle on Technology and Nature', in *Philosophia Naturalis,* 38, pp. 105-120.

J. Schumpeter, (1942), *Capitalism, Socialism and Democracy,* (New York: Harper and Row, 1950).

R. Scruton, (2006), *Animal Rights and Wrongs,* (New York: Continuum).

M. Scully, (2002), *Dominion: The Power of Man, The Suffering of Animals, and the Call to Mercy,* (New York: St Martin's Press).

G. Sessions, (ed., 1995), *Deep Ecology for the 21st Century: Readings on the Philosophy and Practice of the New Environmentalism,* (Boston: MASS: Shambhala, 1995).

- (1991), 'Ecocentrism and the Anthropocentric Detour', in Sessions, (ed., 1995), pp. 156-183.
- (1996), 'Reinventing Nature...?' A Response to Cronon's *Uncommon Ground',* in *The Trumpeter: Journal of Ecosophy,* vol.13, no.1, pp. 33-38.

J.J. Shapiro, (ed. 1969), *Negations: Essays in Critical Theory,* 2nd ed., (Boston: Beacon Press).

M. Shelley, (1818), *Frankenstein; or, The Modern Prometheus,* (London: Penguin Classics, 1992).

M. Shermer, 'Shermer's Last Law', in *Scientific American,* (January 15, 2002).

D.B. Sicilia, (1993), 'Technological Determinism and the Firm', in *Business and Economic History,* 22, (Autumn), pp. 67-78.

G.G. Simpson, (1953), *Life of the Past: An Introduction to Palaeontology,* (New Haven: Yale University Press).

L.C. Simpson, (2009), 'Technological Rationality', in Olsen *et al,* (eds., 2009), pp. 189-194.

P. Singer, (1975), *Animal Liberation,* 2nd ed., (London: Pimlico, 1995).

- with M. Mason, (1990), *Animal Factories: What Corporate Agribusiness is Doing to the Family Farm,* (New York: Three Rivers Press).
- with M. Mason, (2006), *The Ethics of What we Eat: Why Our Food Choices Matter,* (London: Text).

M.R. Smith and L. Marx, (eds, 1994), *Does Technology Drive History? The Enigma of Technological Determinism,* (Cambridge, MASS: The MIT Press, 1994).

N. Smith, (1990), *Uneven Development: Nature, Capital and the Production of Space,* (Oxford: Blackwell).

W. Sombart, (1913), *Krieg und Kapitalismus,* (Verlag von Duncker & Humblot Mündien und Leipzig).

O. Spengler, (1931), *Man and Technics,* (London: A.A. Knopf, 1932).

R. Stanton, (2010), 'A Plant-Based Diet – Good For Us and For the Planet', in *Medical Journal of Australia Open,* (2010), 1, suppl. 2: pp. 5-6.

R. Steigerwald, (1969), *Herbert Marcuses dritter Weg,* (Cologne: Pahl-Rugenstein).

H. Steinfeld, P. Gerber, T. Wassenaar, V. Castel, M. Rosales, and C. De Haan, (2006), 'Livestock's Long Shadow: Environmental Issues and Options', a report for the United Nations Food and Agriculture Organisation, (Rome).

J.P. Sterba, (ed. 1998), *Ethics: The Big Questions,* (Malden, MASS: Blackwell).

K. Sterelny and P.E. Griffiths, (1999), *Sex and Death: an Introduction to the Philosophy of Biology,* (Chicago: Chicago University Press).

B. Stiegler, (1994), *Technics and Time V1: The Fault of Epimetheus,* translated by R. Beardsworth and G. Collins, (Stanford: Stanford University Press).

D.J. Stump, (2000), 'Socially Constructed Technology: Comments on Andrew Feenberg's *Questioning Technology*', *Inquiry,* vol.43, issue 2, (Summer), pp. 234-240.

N. Taleb, (2007), *The Black Swan: The Impact of the Highly Improbable,* (New York: Random House).

T. Taylor, (2010), *The Artificial Ape: How Technology Changed the Course of Human Evolution,* (London: Palgrave-Macmillan).

P. Tertzakian, (2007), *A Thousand Barrels a Second: The Coming Oil Break Point and the Challenges Facing an Energy Dependent World,* (New York: McGraw-Hill).

L. Thomassen, (ed., 2006), *The Derrida-Habermas Reader,* (Chicago: University of Chicago Press).

J. Thompson and D. Held, (eds., 1982), *Habermas: Critical Debates*, (London: Macmillan).

W.B. Thompson, A. Light, and E. Katz, (eds., 1991), *Controlling Technology: Contemporary Issues*, (New York: Prometheus Books).

I. Thomson, (2000a), 'From the Question Concerning Technology to the Quest for a Democratic Technology: Heidegger, Marcuse, Feenberg', *Inquiry,* vol.43, issue 2, (Summer), pp. 225-234.

- (2000b), 'What's Wrong with being a Technological Essentialist? A Response to Feenberg', in *Inquiry,* vol.43, issue 4, (December).

A. Toffler, (1972), *Future Shock,* (London: Pan).

T. Veak, (2000), 'Whose Technology? Whose Modernity? Questioning Feenberg's *Questioning Technology',* in *Science, Technology, and Human Values,* (Spring), pp. 238-242.

P.E. Vermaas, P. Kroes, A. Light and S.A. Moore, (eds., 2008), *Philosophy and Design: From Engineering to Architecture,* (Amsterdam: Springer).

M. Vieta, (2010), 'Hope for Our Technological Inheritance? From Substantive Critiques of Technology to Marcuse's Post-Technological Rationality', in *Strategies of Critique,* vol.1, no.2, pp. 1-20.

V. Vinge, (1993), 'The Coming Technological Singularity: How to Survive in the Posthuman Era', in Landis, (ed., 1993), pp. 115-126.

Vitruvius, (first century BC), *Ten Books on Architecture,* edited and translated by I.D. Rowland and T.N. Howe, (Cambridge: Cambridge University Press, 2001)

E. Vivas, (1972), *Contra Marcuse,* (New York: Delta).

S. Vogel, (1996), *Against Nature: The Concept of Nature in Critical Theory,* (Albany: State University of New York Press).

- (2004), 'Marcuse and the New Science', in Abromeit and Cobb, (eds., 2004), pp. 240-245.
- (2000), 'Environmental Philosophy after the End of Nature', in *Environmental Ethics,* vol.24, issue 1, (Spring), pp. 23-39.

J. von Neumann, (1966), *Theory of Self-Reproducing Automata,* edited and completed by A.W. Burks, (Urbana and London: University of Illinois Press).

B. Walsh, (2012), 'Feeding the Planet Without Destroying It', in *Time Magazine*.

K. Warren, (1998), 'The Power and Promise of Ecofeminism', in Sterba (ed., 1998), pp. 413-416.

D. Watson, (2004), *Watson's Dictionary of Weasel Words: Contemporary Cliches, Cant and Management Jargon,* (Sydney: Knopf).

- (2009), *Bendable Learnings: The Wisdom of Modern Management,* (Sydney: Knopf).

M. Weber, (1904), *The Protestant Ethic and the Spirit of Capitalism,* translated by T. Parsons, (London: Routledge, 2004).

H.G. Wells, (1898), *The War of the Worlds,* (Racine, WISC: Golden Press, 1978).

F. Wheen, *Karl Marx,* (London: Fourth Estate, 1999).

L. White Jnr., (1962), *Medieval Technology and Social Change*, (Oxford: Oxford University Press).

R. Wiggershaus, (1995), *The Frankfurt School*, (Cambridge: Polity Press).

R. Williams, (1975), *Television,* 2nd ed., (London: Routledge, 1990).

E.O. Wilson, (1995), *Consilience: The Unity of Knowledge,* (London: Abacus Science Greats).

W.K. Wimsatt and M. Beardsley, (1946), 'The Intentional Fallacy', reprinted in Wimsat, *The Verbal Icon: Studies in the Meaning of Poetry,* (Lexington, The University of Kentucky Press, 1954), pp. 3-18.

L. Winner, (1977), *Autonomous Technology: Technics Out of Control as a Theme in Political Thought,* (Cambridge, MASS: The MIT Press).

- (1986a), *The Whale and the Reactor,* (Chicago: University of Chicago Press, 1986).
- (1986c) 'Do Artifacts have Politics?', in Winner, (1986a), pp. 19-39.
- (1991), 'Techné and Politeia: The Technical Constitution of Society', in Thompson, Light and Katz, (eds., 1991), pp. 291-303.
- (1993), 'Social Constructivism: Opening the Black Box and Finding it Empty' in Dusek and Scharff, (eds., 2005), pp. 233-242.

E.N. Wolff, (2010), 'Recent trends in household wealth in the United States: Rising debt and the middle class squeeze – an update', *Working Paper* No. 589. (Annandale-on-Hudson, New York: The Levy Economics Institute of Bard College).

J. Wolff, (2010), 'Karl Marx', from the *Stanford Encyclopedia of Philosophy.*

R.P. Wolff, B. Moore Jnr. and H. Marcuse, (eds., 1969), *A Critique of Pure Tolerance,* (Boston: Beacon Press).

M. Wreen, 'Three Arguments against Intentionalism in Interpretation', in *The Proceedings of the XXII World Congress in Philosophy,* vol.1, (2008), pp. 283-287.

S. Wyatt, 'Technological Determinism is Dead; Long Live Technological Determinism', in E.J. Hackett, *et al,* (eds., 2008), *The Handbook of Science and Technology Studies,* third ed., (Cambridge, MA: The MIT Press, 2008), pp. 165-180.

C.D.L. Wynne, (2002), *Animal Cognition: The Mental Lives of Animals,* (London: Palgrave Macmillan).

M. Yeomans, (2005), *Oil,* (New York: The Free Press).

E. Yudkowski, (2007), 'Three Major Singularity Schools', originally appearing on the website of the Singularity Institute for Artificial Intelligence (SIAI), (September).

J. Zerzan, (2002), *Running on Emptiness: The Pathology of Civilization,* (Port Townsend, WA: Feral House, 2002).

- (ed., 2005), *Against Civilization: Readings and Reflections,* (Port Townsend, WA: Feral House).

J.M. Ziman, (2003), *Technological Innovation as an Evolutionary Process,* (Cambridge: Cambridge University Press).