Marcuse's Phenomenology: Reading Chapter Six of *One-Dimensional Man*[1]

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Introduction

In a critique of my views on Marcuse's relation to phenomenology, John Abromeit claims that Marcuse's borrowings from Heidegger and Husserl are limited to the notion that modern science and technology are not neutral but are biased toward the domination of nature.[2] Abromeit thinks I exaggerate the importance of phenomenology for Marcuse in claiming more than this. Rather than replying to the details of his critique, I will present an analysis of the key text the interpretation of which is in dispute, the sixth chapter of *One-Dimensional Man,* in which Marcuse refers to both Husserl and Heidegger. A careful engagement with Marcuse's argument there shows the importance of his borrowings from phenomenology. While not disagreeing with Abromeit's claim that Marcuse's most fundamental intellectual commitment is to Marxism, I show that he appropriates the phenomenological concept of experience, with significant implications for his political theory.

The Scientific-Technical A Priori

Chapter six of *One-Dimensional Man* presents a remarkable synthesis of phenomenological and Marxist concepts. Marcuse draws on four main sources: Lukács's concept of reification, Heidegger's concept of technology, Husserl's late discussion of science and the lifeworld, and Horkheimer and Adorno's theory of the impoverishment of experience under capitalism. The problem Marcuse poses is how to explain the connection between science, technology, and capitalism as a system of domination. The chapter begins by explaining the science-technology connection and then turns to the problem of explaining the political role of science and technology under capitalism.

The original problematic was first articulated from within Marxism by Lukács in *History and Class Consciousness.* Lukács signaled the congruence of modern scientific modes of thought and everyday experience under capitalism.

> What is important is to recognize clearly that all human relations (viewed as the objects of social activity) assume increasingly the form of objectivity of the abstract elements of the conceptual systems of natural science and of the abstract substrata of the laws of nature. And also, the subject of this 'action' likewise assumes increasingly the attitude of the pure observer of these—artificially abstract—processes, the attitude of the experimenter.[3]

Lukács is describing the reification of experience through which it loses its human qualities and comes to resemble the kind of "facts" that serve as the object of natural science. The "form of objectivity" to which he refers in this passage is the neo-Kantian version of Kant's "a priori" conditions of experience. Lukács's Marxist account of reification modifies this Kantian notion, deriving it from the commodity structure of capitalism rather than from the structure of consciousness.

Kant introduced the notion of preconditions of experience to explain the shaping power of the mind in the construction of the objective world. He argued, for example, that our

experience of space could never have been built up by abstraction from particular spatial experiences since we would have had no way of locating them relative to each other "in space." Spatial experience presupposes that the mind possesses a pure form of space that precedes and makes possible particular spatial experiences. This pure form is prior to experience, hence the term "a priori." Kant calls such explanations of experience by its preconditions "transcendental."

The notion of the a priori structuring of experience goes through a long history in Hegel, Nietzsche and eventually in anthropology and sociology where it is brought down to earth in the concept of culture. The conditions of experience are no longer in the mind but in society. In Marxist applications, these conditions arise from practices associated with the mode of production.[4] In a vague naturalized form the Kantian concept now belongs to common sense, although the term "a priori" is still relegated to the technical language of philosophers. But we are all aware that we tend to see what we expect to see, and that those expectations are due to social or psychological conditions of some sort. In this form, the idea of a priori preconditions of experience is trivialized but fortunately also completely familiar.

In chapter 6, Marcuse attempts to restore the full force of the idea in his account of the relation of science and technology. The history of rationality culminates in modern science. This form of rationality supersedes and replaces all earlier versions. In those earlier versions reason encountered a world of substantial things, each with a meaning and purpose encompassing and ordering its parts. Today we no longer believe in such teleological substances but instead are presented by scientific reason with mechanical explanations of a purposeless nature. The things of experience are broken up into measurable components and the relations between these components are explained causally, as a kind of natural machinery.

This new concept of reason is the a priori of science, the precondition of its mode of experiencing and understanding the world. This is not the usual psychological account of science as the product of curiosity about the world. Curiosity certainly motivates scientists, but the point is that it is satisfied in very different ways by very different kinds of explanations. Modern science brings a specific prior expectation to experience, the expectation that everything can be understood as a fact and its workings thereby revealed.

What is the nature of this new a priori? It has two essential features, quantification and instrumentalization. Science does not address experience in its immediacy but transforms everything it encounters into quantities. This stance eliminates purpose from the world; quantities are alien to values. This is the basis of the value-neutrality of science, its indifference to the good and the beautiful in the interests of the true. But values do exist and must have a place in the universe. Hence correlated with the quantified reality of science there is an inner world in which everything associated with value takes refuge. This inner world of subjective feelings is excluded from the objective world science explains.

That outer world, now stripped of any valuative features and disaggregated, is exposed to unrestrained instrumental control. Within the framework of scientific research this instrumentalism is innocent enough. Science learns by manipulating its objects in experiments. The prior quantification of these objects makes it possible to draw precise conclusions from these manipulations. But the innocence of science is lost when the possibilities of instrumental control opened by the a priori of science are exploited on a much larger scale by technology. This is the inner connection between science and technology. It reveals the inherently technological nature of science hidden in the cloister of the lab. Thus Marcuse writes, "The science of nature develops under the *technological a priori* which projects nature as potential instrumentality, stuff of control and organization" (153).[5]

In support of this view Marcuse cites several passages from Heidegger's writings on science and technology. Heidegger explains that the "essence of technics"—Marcuse's a priori—is the basis of mechanization. "Modern man takes the entirety of Being as raw material for production and subjects the entirety of the object-world to the sweep and order of production." " . . . The use of machinery and the production of machines is not technics itself but merely an adequate instrument for the realization of the essence of technics in its objective raw materials" (quoted, 153–154).

Thus the unity of science and technology lies in the fact that the quantifiable reality of science is an instrumentalizable reality for society. What for science is a measurable object of experiment and explanation is raw material for production in society. In both cases the a priori concept of the object precedes and makes possible its appropriation by rational theory and practice. The connection between science, technology and society is the a priori form of experience they share.

Phenomenological Marxism

This brings us to the turning point in Marcuse's chapter. From here on Marcuse is engaged in developing the notion that technological rationality is derived from the practices of capitalism. He quotes Horkheimer and Adorno, who make this connection in terms of the capitalist transformation of labor: "By virtue of the rationalization of the modes of labor, the elimination of qualities is transferred from the universe of science to that of daily experience" (quoted, 157). Marcuse then sets out to demonstrate the basis of this parallelism.

He argues that the structure of modern scientific reason is adjusted to the requirements of a "universe of self-propelling, productive control" (158). It is not the goals of science or its particular theories that are so determined but the structure of scientific rationality. "The projection of nature as quantifiable matter . . . would be the horizon of a concrete societal practice which would be *preserved* in the development of the scientific project" (160). How has this come about? Marcuse rejects a causal explanation and turns instead to Husserl's phenomenological analysis of the relation of science to the lifeworld of everyday experience.

According to Husserl, the basic a priori form of the scientific enterprise, its concepts and methods, derive from the lifeworld and are not the autonomous creations of pure reason they appear to be. The concept of "lifeworld" refers to everyday experience. Husserl understands this experience not in terms of the famous sense data of empiricism, but as a system of meanings in consciousness enacted in ordinary practice. In Heidegger a similar concept is called simply "world." For both these phenomenological thinkers, theory derives ultimately from a corresponding lifeworldly reality. Such is the case with science.

Marcuse writes that the lifeworld is a "specific mode of 'seeing' . . . within a purposive practical context" (164). Under capitalism that context is the project of the domination of nature. "Individual, non-quantifiable qualities stand in the way of an organization of men and things in accordance with the measurable power to be extracted from them. But this is a specific, socio-historic project, and the consciousness which undertakes this project is the hidden subject of Galilean science." (164). That subject is the bourgeoisie, or, in another reading of Marx, capital itself.

The concept of "project" that Marcuse introduces in this passage derives from Sartre (xvi), who employed the term to emphasize the freedom of the subject to choose its path in life. A project is not a particular plan of action; it is based on what Heidegger called the "projection" of a world, that is, an ordering of experience around a certain way of being in the world. Particular plans become possible only within a project-projection of this sort.

In Sartre and Heidegger, these terms are metaphysical categories of individual existence; but Marcuse historicizes them as civilizational categories referring to the freedom of whole societies within their world.

Marcuse concludes that the congruence of science, technology and society at the level of the form of experience is ultimately rooted in the social requirements of capitalism and the world it projects. As such science and technology cannot transcend that world. Rather, they are destined to reproduce it by their very nature. They are thus inherently conservative, not because they are ideological in the usual sense of the term, or because their understanding of nature is false—in fact they are far more cognitively successful in their domain than earlier forms of rationality—but because they are intrinsically adjusted to serving a social order which views being as the stuff of domination. Thus, "Technology has become the great vehicle of *reification*" (108).

On this account, capitalism is more than an economic system; it is a *world* in the phenomenological sense of the term. This world is a historical project, that is, it is only one possible world among those that have arisen in the course of time. Its features become clear in their unique specificity in the contrast with another world, the ancient Greek world, which Marcuse explains in chapter 5 as background to his discussion of science in chapter 6. It is noteworthy that these chapters follow the order of Heidegger's famous essay on "The Question Concerning Technology:" first Greek *technē,* followed by modern technology, with the difference that Marcuse emphasizes the historicization of the metaphysical concept of potentiality rather than the "*Frage nach dem Sein*" (136, n. 4).

The a priori form of this Greek world is articulated in the writings of Aristotle. For the Greeks, things are not functional units awaiting transformation and recombination, but rather they are "substances." As such they are more than the sum of their mechanically related parts. They have an inner core, which holds them together in the face of change. This core sustaining them in being combines *logos* and *eros*. They exhibit both rational structure and orientation toward a "desired" end, their *telos*. The notion which signifies this core is "essence," the dynamic center of the thing's being which drives it toward perfection. Here "is" and "ought" are harmonized in the notion of potentiality. As potentiality value belongs to the objective world of things rather than being reduced to an inner fantasy as in the modern projection of being.

In practical terms, this conception is realized in *technē,* the knowledge associated with craft production and artistic creation in ancient Greece. Like natural objects artifacts have an objective essence, but unlike natural objects they cannot realize that essence through an inner dynamic but require the help of a craftsman. *Technē* thus incorporates the ends as well as the means, the final cause as well as the matter, form and skills of the maker.

Marcuse does not envisage a return to the Greek world. That is neither possible nor desirable. The catastrophe of Enlightenment, as he understands it, can only be overcome through the emergence of an alternative rationality based on a different modern mode of "seeing" in the lifeworld. This implies that capitalism is simply one possible form of modern society. Later chapters of *One-Dimensional Man* and especially *An Essay on Liberation* outline an alternative within a modern framework. Both capitalism and this alternative destroy the naturalized form of teleology exemplified by the Greek world. Instead they project being in a historical form, either as the object of domination or in terms of the fulfillment of human needs.

The development of the argument is anticipated in a sort of précis of *One-Dimensional Man* that Marcuse wrote while teaching in France in the late 1950s. This précis contains once again a significant reference to Heidegger, but not to Heidegger the critic of technology.

Instead, Marcuse goes back to *Being and Time* for a conception of technology as intrinsically oriented toward human needs.

> A machine, a technical instrument, can be considered as neutral, as pure matter. But the machine, the instrument, does not exist outside an ensemble, a technological totality; it exists only as an element of technicity. This form of technicity is a "state of the world," a way of existing between man and nature. Heidegger stressed that the "project" of an instrumental world precedes (and should precede) the creation of those technologies which serve as the instrument of this ensemble (technicity) before attempting to act upon it as a technician. In fact, such "transcendental" knowledge possesses a material base in the needs of society and in the incapacity of society to either satisfy or develop them. I would like to insist on the fact that the abolition of anxiety, the pacification of life, and enjoyment are the essential needs. From the beginning, the technical project contains the requirements of these needs . . . .If one considers the existential character of technicity, one can speak of a *final technological cause* and the repression of this cause through the social development of technology.[6]

This is a peculiar passage. It translates Heidegger's transcendental analysis of worldhood as a system of instrumentalities based on a generalized concept of "care" into the historically specific concept of technicity as the system of modern technology. "Care" has become the orientation toward human needs which is intrinsic to instrumental action as such, hence also to modern technology, but which, Marcuse claims, is blocked by capitalism. Thus, what Heidegger thought of as an ontology of instrumental action unifying human being and world in terms of an unspecified end has become, on Marcuse's retelling, a normative account of the failure of technology to realize its quite definite proper end! Marcuse sets up the contrast between a truncated technological a priori aimed exclusively at domination and an alternative a priori that would fulfill the *telos* of technology in the creation of a harmonious society reconciled with nature. Technology is not neutral, but rather it is ambivalent, available for two different developmental paths.

Compressed in these few lines is the move Marcuse made in the early 1930s from Heidegger to Marxism via Hegel and Marx's *Economic and Philosophical Manuscripts* of 1844. In the *Manuscripts* Marx describes the ontological unity of man and nature in terms of need and labor. Translated into Heideggerian terms, this would be equivalent to being-in-the-world as the ontological condition realized in everyday instrumental action. But Marx's notion has a normative character, Heidegger's does not. The fulfillment of rich and complex human needs through the application of human capacities and powers in labor contrasts with the impoverishment and alienation of capitalism. In Heidegger's case there is, to be sure, a "final technological cause," but it is left completely vague, relative to the contingent world of *Dasein*. If Marcuse retained this curious parallel despite the difference, it is no doubt because he needed the concept of transcendental project to ground the opposition of capitalism and socialism in a historicized theory of the preconditions of experience.

The progressive alternative that Marcuse imagines would have a different mode of experience, of "seeing," from the prevailing one. "The leap from the rationality of domination to the realm of freedom demands the concrete transcendence beyond this rationality, it demands new ways of seeing, hearing, feeling, touching things, a new mode of experience corresponding to the needs of men and women who can and must fight for a free society."[7] Marcuse develops this idea in *An Essay on Liberation* with his theory of the "new sensibility," which projects an aesthetic lifeworld oriented toward needs rather than domination. It would be technological but in a different way, respectful of the potentialities of its objects, both human and natural.

Potentiality in this sense harks back to Aristotelian essentialism but refracted through Hegel's historical conception of being. Thus what Marcuse calls potentiality is not a metaphysical attribute but emerges from actual struggles of human beings, from their imaginative capacity to project a better future and their observations of the life enhancing qualities of natural processes. It is a dynamic future oriented principle rather than an "essence" in the Aristotelian sense as that which the thing always already was. But it remains unclear throughout Marcuse's work how the alternative escapes the critique of quantification and instrumentalization so powerfully developed in chapter six of *One-Dimensional Man*.

Marcuse and the Frankfurt School

Marcuse's quasi-phenomenological analysis of technology intersects with Horkheimer and Adorno's analysis in *Dialectic of Enlightenment* at two principal points: the critique of quantification and the *telos* of technology. In each case Marcuse's transcendental argument clarifies the Frankfurt School revision of Marxism without, however, fully resolving its difficulties.

According to *Dialectic of Enlightenment*, universal quantification betrays the real power of thought. "The reduction of thought to a mathematical apparatus condemns the world to be its own measure."[8] The expulsion of essences through the reduction of things to their measurable aspects leaves thought helpless to criticize ("measure") the world. Science is thus complicit with the system of domination that prevails under capitalism. This complicity involves more than supplying capital with the machines it needs; it also corrupts experience itself through the mediation of the quantifying practices of capitalism in everyday life. Abstract labor and the fetishism of commodities become touchstones of experience, stripping it bare of normative qualities. The elimination of a proper measure of society deprives the individuals of a basis on which to resist conformity to its demands. This is what Marcuse describes as "one-dimensionality." His analysis is anticipated in its main lines in *Dialectic of Enlightenment*, but without the explicit elaboration of the concept of the experiential a priori that Marcuse introduces to explain the unity of the various instances of one-dimensionality recognized by the Frankfurt School.

This critique of quantification is difficult to reconcile with the second common point. Like Horkheimer and Adorno, Marcuse believes that technology arose in the struggle for self-preservation. Reason is the instrument of life. Its immanent *telos* is thus fixed at the outset as life affirming, not destructive, and yet under capitalism the final achievement of technical mastery has been perverted into a means of domination. This perversion affects not only the design of machines, but the structure of modern reason itself.

In *Dialectic of Enlightenment*, all this is condensed into a passage in which the authors describe the ambivalence of the machine as both representative of humanity as a whole and an instrument of domination.

> The thing-like quality of the means, which makes the means universally available, its "objective validity" for everyone, itself implies a criticism of the domination from which thought has arisen as its means. On the way from mythology to logistics, thought has lost the element of reflection on itself, and machinery mutilates people today, even if it also feeds them. In the form of machines, however, alienated reason is moving toward a society which reconciles thought, in its solidification as an apparatus both material and intellectual, with a liberating living element, and relates it to society itself as its true subject . . . .Today, with the transformation of the world into industry, the perspective of the universal, the

social realization of thought, is so fully open to view that thought is repudiated by the rulers themselves as mere ideology.[9]

In sum, the machine arose as a product of thought dedicated to survival, i.e. reason. The element of domination implicit in that origin has overtaken the power of reflection that also belongs essentially to thought. But the alienated remainder of reason embodied in machines is an objective reality and as such refers to a universal subject, humanity as a whole, and not simply to its owners. Its objectivity implies that it should be controlled by all in the interests of all. This would be the "universal, the social realization of thought," obstructed by the existing capitalist society. The availability of the apparatus for this purpose is now so obvious to the simplest reflection that the "rulers" must reject thought itself as ideological to maintain their power.

Here we have a slightly different formulation of the *telos* of reason than Marcuse's, but the dilemma they arrive at is similar. According to Horkheimer and Adorno, modern scientific-technical rationality is both committed to domination by its quantifying reduction of the real, and destined to appropriation by humanity as a whole through its objective form as machinery. The mutilated capacity for reflection must be recovered to realize this destiny. Only in reflection can human beings recognize their natural limitations and thereby moderate their struggle to dominate nature, orienting it toward its true goal, the preservation and furtherance of life. According to Marcuse, modern scientific-technical rationality is involved in domination, but can be re-appropriated through the emergence of a new form of experience that would recover its original purpose, the preservation of life. This would be a two dimensional experience responsive to the potentialities of people and things.

Marcuse's transcendental framework leads to a far more radical conclusion than the bare emphasis on reflection in *Dialectic of Enlightenment*. Horkheimer and Adorno neither explain what positive motive could move masses of people to reflect, nor what reflection would reveal to them beyond their own limits. To save Enlightenment from itself, those masses would have to overcome the damage suffered by their experience and reason at the hands of the system. Perhaps the implausibility of such a development explains the growing gap between Horkheimer and Adorno's theory and the real practice of politics, which culminates in their violent rejection of the New Left. The New Left was received very differently by Marcuse.[10] On the basis of his analysis of the movement, he imagined a new a priori of experience in which an orientation toward potentiality would release the critical power of reflection. In effect, he developed a substitute for the original Marxist theory of class consciousness and on that basis conceived a unity of theory and practice once again. This is the significance of Marcuse's appropriation of phenomenology for Marxism.

However, neither Horkheimer and Adorno nor Marcuse has a clear explanation for how a quantifying science would be appropriated in the context of the socialist reform of reason they project. This is a fatal inconsistency in the Marxist critique of modern rationality. It is already visible in Lukács's theory of reification, which is the source of all such critiques. Lukács too criticizes the quantification of being under capitalism. All the phenomena of scientific and technical progress, economic markets, the transformation of the labor process, bureaucratization of the economy and the state, are tied together by a reifying logic stemming ultimately from the fetishism of commodities. But Lukács is forced to admit that the quantification of nature contributes to scientific progress, whereas the same method applied to society is a reactionary tool of capitalism. Properly understood, society is subject to a qualitative historical account. He never explains how the two contradictory sides of *this* equation might come together in a socialist technology, both scientific and social, both

quantitative and qualitative. The lacuna is critical for the Frankfurt School. If technological domination is conceived as the simple realization of the quantifying procedures of science, then the quasi-transcendental argument would seem to exclude the socialist alternative.

Science and Technology Transformed

Recall the structure of the Frankfurt School analysis: the social practices of capitalism shape a lifeworld to which corresponds the basic quantifying and instrumentalizing practices of modern science. Realized in social institutions and technology, those capitalist practices also determine the lifeworld of all members of society. The circle of theory and practice is closed. The same a priori reigns over scientific-technical rationality and experience. The hope of the first generation of the Frankfurt School is that a different a priori of experience may emerge, one that is compatible with modern science and technology but that does not blind human beings to other dimensions of reality. That alternative a priori would have to enable scientific research and technological design without identifying being itself with the fungible, measurable stuff they project. How does this square with the notion of a radical revolutionary break with capitalism? Wouldn't such a break immediately cancel the a priori preconditions of science and technology, perhaps leading to regression behind the achieved level of understanding and control of nature?

The Frankfurt School, like Heidegger, assumes that science and technology have the same social meaning and impact since they share the same a priori precondition. Since technology is implicated in domination, so must be science. Fearing the regressive implications of this position, Habermas argues that science and technology are neutral in themselves, anthropologically general realizations of human capacities. He suggests that the term "domination" is inappropriate as a description of the scientific-technical a priori; "control" would be a better description of the motive behind scientific-technical rationality, with "domination" reserved for human relations. But here too science and technology are identified without distinction and both are neutralized just as before both were implicated in domination.

In reality, science and technology relate differently to society despite sharing the same precondition. The link between capitalism and science is fundamentally methodological, i.e. quantification, as exemplified by commodity fetishism and measurement. The concept of domination seems inappropriate as a description of this link. To get from the cognitive method to the social fact of domination, an essential mediation is required, the design process in which quantification is realized concretely in technology in the interests of a dominating power.

It may be objected that the distinction between science and technology that this implies has been outdated by the new "technoscience."[11] Like Heidegger, Marcuse seems to have adopted something like that notion even before it was formulated in science and technology studies by constructivist sociology. There are certainly domains in which the distinction is difficult to make, such as pharmaceutical research, but these domains are still fairly marginal to the main productive activities of modern societies. It would be a mistake to confound science and technology while we can still make a meaningful distinction between research in fields such as computer science and engineering and the production that goes on in computer and construction companies. The all important qualification of the working population for self-rule would simply be overlooked if workers were inappropriately subject to criteria of scientific competence irrelevant on an assembly line or a construction site. The reverse confusion is even worse: the denial of the value of specialized knowledge, opening the door to political interference not just with general research objectives, but with the details of the research process itself.

What must be recognized is the distinction between what Foucault called "subjugated knowledges," based on the experience of ordinary people with the human sciences and technologies, and natural scientific disciplines with which ordinary people have little or no experience. Most natural scientific research is fairly remote from the everyday social world, protected by layers of administration and presumptions of epistemic autonomy. For this reason Foucault restricted what he called the "genealogical" critique to the sciences that deal directly with humanity, such as medicine and criminology.[12] While it is possible to show that natural scientific objects are socially constructed, and thus dependent at a deep cultural level on a specific hegemony, they are not directly implicated in the exercise of power as are the human sciences and technology.

Marcuse too is guilty on occasion of confounding science and technology. He does not clearly distinguish between the spontaneous emergence of new scientific concepts and methods under socialism and a politicized process leading to new technological designs. This leaves the impression that socialism awaits an unimaginable cognitive advance — a new science — rather than much simpler technical changes well within our reach today.

Despite the possibility of confusion seized on by his many critics, Marcuse certainly was aware of the difference between scientific and technological advance. He rejects regression to a qualitative physics, even as he argues that science and technology can again incorporate an objective final cause. Rational teleology returns, but it is unclear how this affects natural science as opposed to technology (166).[13] Citing the French philosopher of technology, Gilbert Simondon, he writes, "the technical mastery of final causes *is* the construction, development, and utilization of resources (material and intellectual) *freed* from all *particular* interests, which impede the satisfaction of human needs and the evolution of human faculties. In other words, it is the rational enterprise of man as man, of mankind" (234). Here the original *telos* of rationality is restored. Marcuse's earlier Marxified reading of Heidegger echoes loudly in this passage.

It is not easy to work out all the implications of Marcuse's position. One way of understanding the revolutionary transformation of technoscience would be to distinguish the technological a priori as a mental or spiritual disposition from actual technology and to argue that changing the one leaves the other intact, available for different and more humane applications. On this account, the technological a priori would be biased toward domination while actual machines would be neutral. This is an all too Heideggerian solution. It is hard to believe that Marcuse sought a "free relation" to technology through a mere change in its meaning. For Marcuse the ontological level of the a priori meaning of technology and the ontic level of actual technologies are inextricably linked.

But how are they linked and are they linked in the same way in the case of science and technology? Marcuse argues that the technological a priori underlying both science and technology contains an inherent *potential* for domination. The link between capitalism and natural science is primarily methodological, not substantive as it would be if science were an ideological expression of capitalism or a mechanism of domination comparable to Foucault's human sciences. Science is neutral with respect to the ideologies and values circulating in society in the sense that it does not serve *directly* in the class struggle. It is nevertheless conservative in its social implications to the extent that its applications in the prevailing technological designs do serve class interests and ignore the potentialities of human beings and things.

Science is predisposed to such applications by the very nature of its a priori foundation, which does not recognize potentialities. But this predisposition is not a destiny. Science can be applied in a social context based on the recognition of potentialities, as it is in medicine

and environmental regulation. Technology is capable of responding to a variety of demands. Unlike research, design is directly controlled by interests and responds directly to those interests. The important link between technology and capitalism is not pure method but a particular application of the method in the service of the interests of capitalism. But by the same token, a different ruling interest might find different ways of incorporating scientific knowledge into its technological project.

Counter-acting the tendency toward domination implicit in the technological a priori requires what Marcuse calls the "materialization of values." He writes, "The critique of technology aims neither at a romantic regression nor at a spiritual restoration of 'values.' 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."[14] Designs answering to such materialized values are routinely found in pre-capitalist societies. This is the work of craft. But craft belongs to societies of scarcity in which class domination is based not on technology but on myth and force.

Under capitalism, craft traditions are abandoned and the underlying population has no access to the design process. Capitalism revolutionizes production and subordinates the whole society to technological power, which becomes the new source of legitimacy. Thus capitalist technology fully unfolds its potential for domination not only at the level of its particular objects but generally, socially. This situation can be reversed by a design process that takes into account the human and natural potentialities projected by a socialist a priori.

In sum, technological domination is neither extrinsic to technology, nor inevitable wherever technology is employed. Using machinery to increase productivity, for example, reflects a modern spirit, but it only serves capitalism where it is part of a strategy aimed at increasing private profits. Unchecked by other considerations, such a strategy may determine designs harmful to workers and the environment. Different machine designs respectful of the potentialities of workers and the environment are possible.

Design is the mediation through which the potential for domination contained in scientific-technical rationality enters the social world as a civilizational project. Capitalism realizes that potential by extending it without limit to every aspect of nature and human beings: "When technics becomes the universal form of material production, it circumscribes an entire culture; it projects a historical totality–a world" (154). The break with that world does not immediately transform science, although in the long run it may have consequences for the scientific conception of reality. However, the break does require an immediate engagement with technology in the interests of human beings and nature.

Here is how Marcuse summarized his concept of a technological revolution at the UNESCO conference on Marx in the midst of the May Events of 1968:

> This is the notion of the rupture with the continuum of domination, the qualitative difference of socialism as a new form and way of life, not only rational development of the productive forces, but also the redirection of progress toward the ending of the competitive struggle for existence, not only abolition of poverty and toil, but also reconstruction of the social and natural environment as a peaceful, beautiful universe: total transvaluation of values, transformation of needs and goals. This implies still another change in the concept of revolution, a break with the continuity of the technical apparatus of productivity which, for Marx, would extend (freed from capitalist abuse) to the socialist society. Such "technological" continuity would constitute a fateful link between capitalism and socialism, because this apparatus has, in its very structure and scope, become an apparatus of control

and domination. Cutting this link would mean, not to regress in the technical progress, but to reconstruct the technical apparatus in accordance with the needs of free men.[15]

The socialist a priori is an *Aufhebung* of technological rationality that truly cancels and preserves the reified objectivity of the world.

NOTES

1. This article is drawn from Andrew Feenberg, *The Philosophy of Praxis: Marx, Lukács and the Frankfurt School,* (London: Verso Press, 2014).

2. John Abromeit, "Left Heideggerianism or Phenomenological Marxism? Reconsidering Herbert Marcuse's Critical Theory of Technology," in *Constellations,* vol. 17, no. 1, 2010.

3. Georg Lukács, *History and Class Consciousness.* trans. R. Livingstone. (Cambridge, Mass.: MIT Press, 1971), p. 131.

4. For a discussion of this history see Gillian Rose, *Hegel Contra Sociology.* (London: Athlone Press, 1981), chap. 1.

5. References in parentheses are to Herbert Marcuse, *One-Dimensional Man.* (Boston: Beacon Press, 1964.)

6. Herbert Marcuse, "From Ontology to Technology: Fundamental Tendencies of Industrial Society." D. Kellner and C. Pierce, eds., *Herbert Marcuse: Philosophy, Psychoanalysis and Emancipation.* (New York: Routledge, 2011), pp. 136–137. For more on the relation of Heidegger to Marcuse, see Andrew Feenberg, *Heidegger and Marcuse: The Catastrophe and Redemption of History.* (New York: Routledge, 2005). See also Andrew Feenberg, *Between Reason and Experience.* (Cambridge, Mass.: MIT Press, 2010), chap. 9.

7. Herbert Marcuse, "Beyond One-Dimensional Man," *Herbert Marcuse: Towards a Critical theory of Society,* D. Kellner, ed. (London and New York: Routledge, 2001), pp. 117–118.

8. Max Horkheimer and Theodor Adorno, *Dialectic of Enlightenment.* G. S. Noerr, ed., E Jephcott, trans., (Stanford, Stanford University Press, 2002), p. 20.

9. *Ibid.,* 29–30. I have developed a similar analysis of the ambivalence of technological means in terms of the concept of "formal bias." See Andrew Feenberg, *The Philosophy of Praxis: Marx, Lukács and the Frankfurt School.* (London: Verso Press, 2014), chap. 7.

10. For their differences, see "Correspondence on the German Student Movement," E. Leslie, trans. *New Left Review*, I/233, Jan.-Feb. 1999, pp. 123–136.

11. For a review of many positions on this contentious issue, see Alfred Nordmann, Hans Radder and Gregor Schiemann, eds., *Science Transformed: Debating Claims of an Epochal Break.* (Pittsburgh: Pittsburgh University Press, 2011). I am most persuaded by Mieke Boon and Tarja Knuuttila who write, "We suggest that the supposed break in scientific goals, methodology, and epistemic standards is due to what are taken as exemplary examples of research rather than to actual changes in how research is done" (p. 73).

12. Foucault, Michel, "Truth and Power," in C. Gordon, ed. and trans. *Power/Knowledge.* (New York: Pantheon, 1072) p. 109. See also p. 133 for Foucault's conclusion.

13. For a discussion of the ambiguities of Marcuse's concept of a "liberation of nature, see Andrew Feenberg, "From Psychology to Ontology," in *Radical Philosophy Review,* vol. 16, no. 1, 2013, pp. 81–89.

14. Herbert Marcuse, "The Problem of Social Change in the Technological Society," *Herbert Marcuse: Towards a Critical theory of Society,* D. Kellner, ed. (London and New York: Routledge, 2001), p. 57.

15. Herbert Marcuse, "Re-Examination of the Concept of Revolution" *All We Are Saying*, A. Lothstein, ed. (New York: Capricorn Books), 1970, p. 280.

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