Macalester International

Volume 13 *Prometheus's Bequest: Technology and Change*

Article 7

Summer 2003

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I. The Question of Technology

My objective is to engage critically with what I call the "fetishism of technology." By fetishism I mean the habit humans have of endowing real or imagined objects or entities with self-contained, mysterious, and even magical powers to move and shape the world in distinctive ways. The technological changes that we see all around us are, of course, very real. They are a constitutive feature of how we live our daily lives. We do not imagine them, so in this case, the fetish does not attach to some fantasy like "lady luck" or fate. The fetish arises because we endow technologies—mere things—with powers they do not have (e.g., the ability to solve social problems, to keep the economy vibrant, or to provide us with a superior life). But if technologies cannot do these things, then why do we attach so great an importance to technological innovation? I argue that we do so in part because we are blinded by fetish beliefs.

We face, however, a double bind. All manner of social actors (corporations, entrepreneurs, and various branches of government, most particularly the military) endow technology with causative powers to the point that they will uncritically—and sometimes disastrously—invest in it in the naive belief that it will somehow provide solutions to whatever problems they are encountering.[1] We need, therefore, to study the effects of technological fetishism. But analysts, critics, and commentators often reflect and replicate this fetishism, losing all critical acumen to the point that they, too, believe that there is a technological fix to every problem, that technological progress is both inevitable and a "good" (or "bad") in and of itself, and that technological changes cause

and determine social changes, whether for better or worse. The fetish of technology worms its subtle way into even the most perceptive of critical commentaries as well as into everyday conversations when we say things like, for example, "the automobile has radically changed the shape of our cities." The problem is to unpack the real role of technology while demystifying ourselves of the habit of endowing it with powers it simply does not and cannot have. The automobile is not in itself able to shape anything!

Since the task is formidable, I turn in the first instance to Karl Marx for help. Technology, he writes, "discloses man's mode of dealing with Nature, and the process of production by which he sustains his life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them."[2] Note that this idea of "disclosing" and of "laying bare" does not denote "determine." Marx is not a "technological determinist." Nor, on the other hand, does he indicate that technology is some free-floating *deus ex machina* that haphazardly evolves in the rough-and-tumble of diverse human endeavors or through the singular efforts of mythical figures, be they Prometheus or the creative entrepreneur.

By placing technology at the nexus between the material reproduction of daily life, our relationship to nature, our social relations, and our mental conceptions of the world, Marx invites us to consider how all of these elements interact with one another in the construction and reproduction of the social order. We cannot understand the development of technology, social relations, our mental conceptions of the world, and our distinctive modes of dealing with nature and sustaining material life without seeing them all as dialectically intertwined, as "internal relations," each of the other. The study of technology should reveal these relations.

The appeal to a language of dialectics and of internal relations is offputting to some, so I hasten to explain by illustration. Consider, for example, how our mental conceptions depend upon our ability to see, to measure, to calibrate. Then think of telescopes and microscopes, of x-rays and cat scanners, of measures of DNA and of microchips that can measure in nanoseconds and nanometers and even smaller designations, and how all of this technological capacity has changed our understanding of (and the identity to be attributed to) the human body in relation to its environment, the cosmos. From this perspective, we see and understand the world and relate to our natural and social environments in quite different ways because of the availability of these

technologies. But then look back through the other end of the telescope. Consider why it was that someone in a certain time and place had the mental conception that there was something important that could be seen this way, and who also found a material and social situation with lens grinders and metal workers as well as patrons and supporters willing to appreciate and enable the development of a new way of seeing, often in the face of antagonism and opposition. As the poet William Blake once put it: "what now is proved was once only imagin'd." So someone somewhere had to have a different mental conception of the world before a telescope or a microscope could be designed. We encounter a chicken-and-egg problem. This is how it should be, because what matters is the connections and relations between technologies, social relations, material practices, mental conceptions, and our relation to nature. This is what is signaled by talk of dialectics and of internal relations.

How should we situate technology within this schema of internal relations? How, for example, do mental conceptions of the world get embodied and embedded in specific technologies? Consider the case of nuclear power. This form of technology depends upon deep scientific understandings, and its application depends upon the belief of key decision makers that such a form of power generation is a good idea. But this technology has obvious implications for social relations. It requires strong, centralized, and hierarchical forms of expert decision-making and thereby rules out participatory democracy in its managerial form. It has immense implications for our relation to nature, with the long-term problem of nuclear waste disposal particularly prominent. But the electricity generated has implications for the material reproduction of daily life, while the daily lives of many at work and home are dependent upon the decisions of a highly centralized authority. Obviously, there are many feedback effects within such a system of relations, but we can in principle track what they are about by asking the question: What is it that gets embedded and embodied in particular technologies?

There is a second introductory point to be made. All too often talk of technology focuses on the hardware, the material objects such as computers and microscopes. Recently, we have begun to recognize the importance of the cognate software, the evolution of which has been a necessary condition for the organized impact of the hardware upon our lives. But it has always been so. Furthermore, the evolution of organizational forms (such as the modern capitalist corporation) has

been just as important as the development of the hardware (the engineered assembly line, for example) or the software (programmed design). While the hardware/software/organizational form distinctions are useful and important, we must learn to elide them and also to recognize each as an internal relation of the other. It is possible to write about the evolution of automobile design in itself, of course. Yet to do so as if Henry Ford's organizational innovations played no role in the subsequent evolution of the hardware — or in the evolution of our social relations and our mental conceptions of the world—is plainly to lose something vital to the story. It would be like the history of the computer without mention of Microsoft and the social consequences of the Internet.

But if organizational forms and modalities of operation are just as important as the hardware and software, and if the embedding of social relations and of *mentalités* in hardware forms is ineluctable, then the whole issue of the meaning and impact of technology upon social life and our relation to nature becomes immensely more complicated and diffuse. This, it seems to me, is the full import of Marx's commentary. Ruling out the certitudes that attach to a narrow reductionism (technological in the hardware sense, in this case) has the disadvantage, however, of confronting a world in which everything relates to everything else to the point that it is hard to maintain track of anything.

II. The Material Origins of Technological Fetishism

Marx gives a very simple material explanation of how individual capitalists might come to fetishize technology. Imagine a perfect market in which many individual capitalists are locked in competitive struggle such that no one can effectively influence market price. The average price of the commodity depends upon average productivity, and the profit to be had is not a technological relation but depends upon the social relation between capital and labor, and is affected by a wide variety of factors including class struggle. But the individual capitalist can sell at the average market value (fixed by average productivity) and produce at a higher individual level of productivity. In this way, capitalists with superior technologies can expect to gain excess profits relative to the social average. This excess profit is likely to be ephemeral since other capitalists are free to adopt a similar technology. The general effect is to drive the average productivity in the industry

up, and the average value of the commodity produced down. This corresponds with the experience that new commodities (DVD players, watches, etc.) typically become relatively cheaper over time as productivity improves. Capitalists correctly infer that superior technology can be a source of excess profits to them individually, if only for a while. But they would be wrong to infer that superior technologies of any sort (hardware, software, or organizational form) are themselves a source of profit. Profit always arises out of the social relation between capital and labor. The idea that machines are a source of value is, therefore, the fetishistic extension of the very real effect of superior machinery in generating temporary excess profits. What Marx calls "the coercive laws of competition" typically produce leapfrogging innovations by individual capitalists seeking temporary technological advantages that yield them temporary excess profits. This is one explanation for the technological dynamism of capitalism vis-à-vis other social systems. It has the interesting property of being entirely endogenous to the competitive social relations of capitalism and therefore in no sense a *deus ex machina*. Capitalist entrepreneurs and corporations innovate not because they want to but because they have to in order to either acquire (like Bill Gates or Steve Jobs) or retain (like General Motors) their status as capitalists.

There is, however, another step in Marx's argument. If the standard of living of labor (the bundle of commodities they need to live) is fixed and the average productivity in the industries producing these goods increases (diminishing the value of shirts, shoes, and bread), then the value of labor power can fall without diminishing the material standard of living. This makes the gap between what labor creates and what it receives ever greater, meaning a higher rate of profit overall. Rising profits can even accompany a rising physical standard of living of labor. It all depends on the strength of productivity gains and how the benefits are distributed between capital and labor. The productivity gains are real, tangible, and therefore in no way fetishized, but the way the gains are distributed depends on the social (power) relation between capital and labor. Again, the fetishism arises when it is inferred that productivity is a (or even *the*) source of profit as opposed to recognizing that profit arises out of a social relation between labor and capital.

Marx provides an obvious political example of this argument. In the 19th century, British industrial interests saw wage levels tied to the price of bread. In alliance with workers against the agricultural inter-

ests of the landed aristocracy, they campaigned to abolish the Corn Laws (tariffs on cheap imported wheat, particularly from the United States) in order to bring down the price of bread. Their aim, however, was not to raise the standard of living of labor but to reduce wages and increase their profits. They preached the gospel of free trade as long as it was advantageous. The contemporary situation in the United States can be looked at in the same way. If the value of labor power is fixed by the price of, say, Nike shoes and Gap shirts, then free trade in these items is a convenient gospel to espouse for capital in general. The difficulty in this case is that those manufacturing interests within the United States that want to make shirts and shoes (as opposed to organizing their production abroad) lose out to all those other sectors of capital that relish cheaper labor that is clothed, fed, and entertained by cheap imports. Occasionally, these contradictions come home to roost as when the U.S., in flagrant violation of the free trade policies it has sought to impose on everyone else via the WTO, imposes steel tariffs to protect its own manufacturers from free trade.

One does not have to accept Marx's conceptual apparatus to see the cogency of his arguments concerning the origins of technological fetishism. The fetishism is not purely imaginary and has a very real basis. It appears as if productivity is the be-all and end-all of capitalist growth and stability and that the profit rate is crucially determined by it. When Alan Greenspan gives evidence in which productivity gains are central to the dynamics of U.S. capitalism, he is not engaging in fictitious ramblings. The danger, as we now see in the current turmoil in capital markets, is in attributing to productivity gains a role that they simply cannot fulfill. Productivity gains have helped produce the current malaise of instability and volatility. It would be entirely wrong (and fetishistic), therefore, to look for a technological fix to the present dilemmas of economic instability. The answer almost certainly will have to be found in a transformation of social and political relations, such as a new "New Deal" on an international basis.

One can usefully extend Marx's general line of thinking about the origins of technological fetishism in a variety of ways. Consider its role in that other key center of technological innovation in capitalist society, the military. It is obvious to every military planner that superior organization (e.g., the Roman legions or contemporary logistics), superior software (e.g., code-breaking in World War II), and superior hardware (e.g., radar, drones, smart bombs, and guided missiles) yield great competitive advantage in geopolitical struggles. The aim of every

military planner is to combine the organizational form, the software, and the hardware into an implacable military force. Hence, the tremendous emphasis placed on technological innovation, in the broad sense, within the military. Again, the advantages to be gained are real and by no means imaginary. Much of our current technological mix in society at large, for both good and ill, has arisen out of the drive for military superiority since World War II. The fetishism arises when it is presumed that all geopolitical problems have a military solution and that military solutions are guaranteed by superior technologies. Arms races are politically and economically draining, and military solutions can be as destructive as they are constructive. The Vietnam War and recent events surrounding September 11 illustrate the limits to technological advantage. Indeed, overemphasis upon the technologies and organizational forms can sometimes be as much a part of the problem as the solution. A clear example is that the CIA spent far more on satellite monitoring than on learning street Arabic in recent years and paid a serious price. I leave it to others, far better informed and positioned than I, to look more closely at the role of technological fetishism within the military apparatus, but I have the strong suspicion that it functions as a far more powerful influence than many would dare to admit. Innovation for innovation's sake and a constant tendency to break the rule that "if it ain't broke don't fix it" is everywhere in evidence.

This brings me to consider another major reason for the technological dynamism of capitalism. Once it is understood that excess profits can be had from superior technological forms, then individual capitalists will demand new technologies, and a whole new division of labor will spring up to supply them. A machine tool sector, for example, develops whose sole aim is to create new and more efficient machines to deliver higher profits to individual entrepreneurs. This entails the mobilization of science and technology within the machine tool industry so that technological innovation becomes a business in its own right. This specialization of functions extends to software as well as organizational forms (with hosts of consultants with software or new managerial schemes ready to tell everyone how to produce more profitably and efficiently). What we are dealing with now, therefore, is not the individual entrepreneur (typical of the 19th century) who is trying to figure out how to improve productivity by inventing and innovating on his or her own in a particular production establishment, but a vast sector of industry specializing in innovation and dedicated to imposing those innovations on everyone because that is the only way

it can ensure a profit. Our corner grocer or hardware store is cajoled and persuaded to adopt some sophisticated business machine in order to manage inventory and keep track of sales, purchases, and taxes. But the machine may be so expensive and the results so disastrous that the store goes out of business in favor of the supermarkets and large discount centers. When technological innovation becomes a business in its own right, we in effect see the institutionalization of technological fetishism within the very heart of capitalism.

III. The Driving Forces

The fetishisms of organizational form, hardware, and software cannot in and of themselves drive anything anywhere. To hold to such a conception would indeed be fetishistic! However, they do mediate and redirect the actions of various agents in different ways and therefore have real effects on social relations, *mentalités*, and the way we relate to nature and sustain social life. Consequently, something needs to be said about the dominant agents and their motivations, and how and why they take such fetishisms on board so easily as part of their mental, cultural, and managerial apparatus.

Here I resort to gross but not unreasonable simplifications. It is undeniable that those who control and manipulate capital, and particularly large masses of it, occupy one dominant axis of power in the world, and that this axis is all about the preservation of that power through the organization of further capital accumulation, preferably in their own hands. This axis is riven with fragmentations between financial, manufacturing, merchant, landed, rentier, and other divergent interests. It is often geographically divided, both across scales (local, metropolitan, regional, national, transnational, and global) and territorial bases (Asian, Southern African, European, etc.). It is usually competitively organized, divided and fragmented by individualism, particularly in Western versions. It typically utilizes market mechanisms and a variety of institutional supports, most notably state law and police powers, to regulate its actions, to protect its rights, and to preserve the requisite freedoms that allow it to function effectively without undue political or social constraints. Capital of this sort has taken command of whole sectors of the economy that were formerly organized around more humanistic objectives, such as medicine, education, science, and research.

The second major axis of power is that of the political/military institutions of governance within territorial entities, the state being the most important. They must, on the one hand, guarantee minimum conditions for capital accumulation. Yet they must also address some sort of "public" interest (such as security, health, and education), however narrowly conceived, while sustaining and extending particular power bases (usually within the state territory) and privileged access to key resources (like oil reserves and technical knowledge). Again, there are multiple fractions and fragmentations between, for example, the military and civilian branches and between the institutions of civil society and those of government, law, and politics, as well as divergent and competing territorial bases for power.

The relations between these two dominant axes of power in the historical geography of capitalism have always been complicated. They cannot easily be encompassed in any simple theory. The balance of power between the two axes can vary considerably and there is no clear-cut way to predict, let alone explain, the dynamic relations between them or among their often-warring parts and factions. In many arenas, the boundaries between the axes are highly porous (e.g., medicine, which is jointly driven, particularly in its technologies, by corporate and state interests). It reasonable to surmise, however, that the whole political-economic structure of power relations is suffused with a certain level of technological fetishism which can become self-sustaining, if only through the feedback and spillover effects from one sector or power center to another and, through the evolution of that sector, given over to innovation for innovation's sake. The requirements of the military reverberate through the private sector while innovations within the private sector are quickly imported into the political and military sectors, if only because the latter provide very significant captive markets. Pharmaceutical companies, to take another example, have a notorious hold on medical services, even to the point of new classificatory medical diagnoses to match new drugs.

The effect of such widespread fetishization calls into question the idea of some dominant evolutionary rationality to technological change even from the standpoint of capital. Indeed, there is a good deal of evidence as well as some powerful theory to suggest that the paths of technological change are contradictory and more often than not inherently destabilizing, even within the capitalist rules of the game.[3] Technological developments can become relatively autonomous — and even run amuck — in relation to both dominant

social relations and hegemonic *mentalités*. Furthermore, talented interlopers can mobilize technological innovations to undermine dominant social relations and institutions. They can transform hegemonic *mentalités* to their own advantage. In this, they may be aided by the cultural inability of powerful institutions, so well documented by Schoenberger,[4] to adapt to the fresh circumstances that new organizational forms, hardwares, and softwares define. Thus, there is an inner connection between technological dynamism, instability, and crisis formation within capitalism. Technological fetishism has destabilizing effects within the economy as a whole, not because technology operates as a causative agent but because technological forms embody contradictions between, say, *mentalités*, social relations, and our mode of relation to nature.

IV. The Technological Fantasies of the Bourgeoisie

It would be quite wrong to conclude that technological evolutions are arbitrary and directionless. The fetishistic belief in technological fixes supports the naturalistic view that technological progress is both inevitable and good, and that there is no way we can or even should try to collectively control, redirect, or limit it. But it is precisely in the character of fetish constructs to open up social action to pervasive beliefs. While these may have a material grounding, they quickly escape such material constraints only to have, once applied, marked material consequences. We are, of course, surrounded with all manner of cultural signs of such fantasy constructs, with Hollywood in the vanguard of not only articulating them but of erecting them into cultural icons (usually both futuristic and militaristic) to which the whole population is encouraged to subscribe. Here, briefly, are some dominant motifs with which the bourgeoisie and the capitalist class have filled out their technological fetishisms and fantasies into a less than innocent grand design.

A. The Robot

Control of the labor process has always been central to capitalism's ability to sustain capital accumulation in perpetuity. It supposes an ability to control and shape the laborer to the needs of capital and induces the fantasy that the worker can be made over into a mere appendage of the circulation of capital. Many industrial innovators

have had this as their primary goal. A French industrialist renowned for his innovations in the machine tools industry openly proclaimed that his three goals were increasing precision, increasing productivity, and the disempowerment of the worker.[5] The factory system, Taylorism (with its attempted reduction of the laborer to the status of "a trained gorilla"), automation, robotization, and the ultimate displacement of living labor altogether respond to this desire. Robots do not (except in science fiction accounts) complain, answer back, sue, get sick, go slow, lose concentration, go on strike, demand more wages, worry about work conditions, want tea breaks, or simply fail to show up. This fantasy of total control over the laborer via technology has its roots in material circumstances, most particularly in the dynamics of class struggle both within and outside of the production process.[6] Control of the laborer is given by relocating the power into the hands of capitalists over speed, design, and intellectual functions. This is precisely what the engineering of the assembly line does. This fantasy was brilliantly exposed in Charlie Chaplin's film *Modern Times*.

But there is more to the story. In the labor market, technologically induced unemployment weakens the bargaining power of labor in general. "De-skilling" and homogenization of labor processes eliminate the monopoly power that attaches to nonreplicable labor skills. John Stuart Mill considered it, "questionable if all the mechanical inventions yet made have lightened the day's toil of any human being." Marx showed in his chapter on machinery how this might be. In the hands of the capitalist, the purpose of machinery is to extract more profit from laborers and not to lighten their load. From the laborers' standpoint, therefore, it is tempting to adapt an adage ascribed to the Earl of Shaftesbury that, "all technological change is bad even when it is for the better." Occasionally, of course, it is recognized that this fantasy of total control over labor power via technology is seriously wanting, and capitalists turn to organizational forms that rest on cooperation, collaboration, responsible autonomy, quality circles, and the like. But historically, this has been overwhelmed by the fantasy of total labor control. This partially explains why high-tech systems get installed in places where massive labor surpluses make them inappropriate. There is a nether side to this fantasy, the point at which the dream becomes a nightmare: Frankenstein is unleashed; Hal, the computer in *2001: A Space Odyssey*, assumes a volition of his own; the replicants in *Blade Runner* seek power and perpetuation in their own right. The real problem, however, lies elsewhere. If living labor is the source

of value and profit, then replacing it with dead labor or robotic labor makes no sense, either politically or economically. This, in Marx's view, was one of the central contradictions of capitalism and undermined the capacity of capitalism to keep on a balanced growth path.

B. The Domination of Nature

A great deal has been written and debated, particularly since the exertions of the Frankfurt School from the 1930s on, about the fantasy of the total domination of nature through technological forms.[7] Critics frequently attribute this to movements in the realm of thought (the Enlightenment being a particular object of critique, with modern science and engineering also taking their knocks) rather than to distinctively capitalistic fantasies about the conquest and domination of nature through engineering and production processes that treat nature as "one gigantic gasoline station"[8] or as a vast and inexhaustible waste disposal system into which the unwanted byproducts of ever-increasing production and consumption can ceaselessly be poured. We now know enough about the awful consequences of the playing out of such fantasies to act more responsibly. Unintended consequences and environmental degradation and destruction arise out of thoughtless actions taken in a situation in which everything, as in nature, does indeed relate to everything else. But a right royal battle on this point is being fought out in realms of thought, including within science itself, as well as through the dominant institutions in order to transform material practices, social relations, and ways of life along more ecologically sensitive paths. In this, the fantasy of total control of nature does not necessarily give way, for it is perfectly possible to redirect it, as some within the environmental movement do, toward more sophisticated environmental management strategies that still presume total control is possible. Ambivalent attitudes within the environmental movement toward the power and significance of science form a nexus where this contradiction is being fought out. There is a huge question mark over the exact role to be played by science and technology, as opposed to transformations in social relations, in finding solutions to environmental dilemmas and ecological degradations. It should, however, be abundantly clear that there will be no major transformation in our relation to nature without changes in social relations, in *mentalités*, and in ways of sustaining material life, as well as in the hardware, software, and organizational forms of technologies.

C. The Annihilation of Space and Time

The speed of turnover of capital (and therefore the speed of production processes) is an important variable for the individual capitalist. The faster the turnover relative to the social average, the greater the excess profit. Since taking the product to market entails change of location, the friction of distance and the time it takes to get to market has to be confronted as a barrier to capital circulation. The less the friction, the greater the profit (other things being equal). For this reason, capitalism has long evinced a very practical interest in technologies that facilitate speed-up and reduce the friction of distance.[9] There is, therefore, a sound material basis for practices that underlie the fetish quest to annihilate both space and time. At what point a rational urge gets converted into a fetish quest is hard to determine. But that it ultimately does so (as in the parallel cases of labor control or the domination of nature) is undeniable. We do not only encounter the thought in contemporary science fiction and Hollywood constructions. The French novelist Balzac, living in the first half of the 19th century, had an uncanny knack for penetrating the fantasy world of the bourgeoisie and reflecting it in his own mind. He professed an "immense faith" in our capacity to "abolish the laws of space and time." "I am," he declared, "dependent upon neither time, nor space, nor distance." As a consequence, "the world is my servant." He imagined himself "riding across the world, disposing all in it to my liking…I possess the world effortlessly, and the world hasn't the slightest hold upon me."[10] Is this how Kenneth Lay and the CEOs of World Com and Vivendi thought of themselves? It certainly describes how much of the rhetoric about the supposedly spaceless and instantaneous world of the Internet and cyberspace constructs matters. In this realm in particular, we daily encounter not only the fetish quest to annihilate both space and time, but also the fetish conception that such a quest has potentially been realized in the new technologies available to us. All that we need to do is to reconstruct our social relations and our *mentalités* accordingly and we will enter into a brave new world. Yet immigration lines at borders get longer, protective walls increasingly surround whole states as well as gated communities, and the uses of space and time in daily life become ever more subject to the imperatives of capital circulation (speed-up and perpetual time-space compression). All this is backed by legal and police powers, most particularly to protect the core of private property rights in the maelstrom of change. Our movements in

space and time are more and more subject to surveillance (every credit card purchase is on record) and we are more and more tied down by our fixed commitments in specific places.

D. Fictitious Values /Fictitious Capitals

Even the most sophisticated analysts of capitalism have a hard time answering the question that little Paul, in Dickens' novel *Dombey and Son*, asked of Mr. Dombey: "What is money, Papa?" Materially, money is a dominant form of value in our society even if we have a hard time defining exactly what it is. And money is unquestionably a fetish object of desire, while possession of it is a political-economic necessity for capitalists, the state, and anyone and everyone who has to resort to any kind of commodity exchange in order to live. The technological history of money—its hardware, software, and organizational forms—is therefore of the greatest interest. Money functions, as Marx observed, as a measure and store of value, as a standard of price, and as a medium of circulation. Yet in performing these key functions and others, it takes on different guises, not all of which are compatible with each other. It makes a big difference, for example, whether money circulates as a commodity *numeraire* (like gold), as coinage of the realm (in which case, it needs to be assayed and protected against debasement), as notes and paper, as money of account, as electronic transfers, or the like. When it comes to futures markets, derivatives, and hedge funds, the role of money begins to assume fictitious qualities. Once in that realm, as recent accounting scandals have indicated, there is very little to guard against all manner of slippery practices in which surface appearances and measurable realities are deeply at odds. What then can be trusted? In answer to that question, Volcker and then Greenspan acquired the status of Delphic oracles guarding the mysteries of the temple of money, seeking to reassure us that behind the fetish and the fictions there lies something real in which we can trust, along with God, if we can believe the iconography of the dollar bill.[11]

E. The Technologies of Consumption, Spectacle, and Fantasy Production

The effective demand of consumers and, in these times in particular, consumer confidence expressed as a willingness to spend and go into debt, if necessary, constitute very important stabilizing forces in the

growth dynamics of capital accumulation. While the labor process produces the fantasy of the worker as an appendage of the machine (as robot), the consumption side induces the fantasy of the insatiable consumer totally hooked into the circulation of capital and its endless output of products (the cyborg customer). In this, the fetish of technology, the lust for the new, the fashionable, the sophisticated, has its own role to play within populations at large. The production of this fetish is promoted directly through fantasy production, using advertising and other technologies of persuasion, in particular that aspect that reduces the consumer to a passive spectator of spectacle. One does not have to accept all of Debord's propositions in *The Society of the Spectacle* to recognize the cogency of his argument that media and cultural forms and icons, mediated through sophisticated technologies of representation and communication, capture, manipulate, and promote consumer desires and identities in ways conducive to endless capital accumulation.[12] Insofar as everything — nature, social relations, history, geography, culture, the news, current events — gets reduced to and commodified as spectacle, so, too, does the consumer become a passive player in history relative to the drive to accumulate capital and consolidate political-economic power in a few hands. And if that does not work, then technologies of surveillance and control are at hand to monitor and manipulate the behavior of populations that do not conform to social norms established within the frame of the consumer society and the society of the spectacle. Media technologies of fantasy and spectacle production have been of singular importance within the dynamics of capitalism, particularly in recent times. Oriented primarily toward social groups and regions blessed with substantial effective demand, the bourgeoisie must increasingly enfold itself in its own fetishisms and fantasies as to how the world is constructed. The *mentalités* of the bourgeoisie cannot stand outside of its own fetish and fantasy products. As a result, the affluent classes living in privileged territories, such as the United States, largely fail to register, let alone react to, material threats and dangers in a socially and politically cogent way. The contradictions embedded in the fantasy and the fetish are rich with unintended consequences and always pose the danger of steering straight into the path of major material crises without knowing it (or even, as in the case of global warming, being unable to steer out of a problem whose parameters are broadly known and widely accepted). Sadly, the most common response to being physically

caught in the events of September 11 in New York was to say, "It was like being in a bad movie."

V. Technology and Monopoly Power

Let us return to a reconsideration of Marx's account of perfectly functioning markets and fair exchange. Useful though it was in revealing at least one of the ways in which the fetish of technology can take hold, it nevertheless appears most odd that Marx would resort to the same fictions as Adam Smith when he knew full well that this account had very little grounding in the realities of the capitalism of his time. Why Marx would do this has a very simple and obvious explanation. He set out to write a critique of classical political economy, particularly that of Smith and Ricardo, and both held out the utopian ideal that if only the state would back away from interventions in markets and if only monopolies of all sorts could be abolished, then everything would work through the benevolent hidden hand of markets to produce a result that would be beneficial to all. In short, Marx was confronted with the same sort of neo-liberal rhetoric to which we have been exposed these last twenty years: Let the market be free to do its work, and all is well. Even by accepting the fiction of perfectly functioning markets, Marx showed that all would *not* be well. The inevitable outcome would be increasing social inequality and lopsidedness of political-economic power. The rich would grow richer and the poor would grow poorer. This has indeed been the case, particularly in those countries such as the United States and Britain, which have been most emphatic about the adoption of neo-liberal policies. For example, the ratio of CEO remuneration to the average pay of their employees has gone from circa 30-1 in 1970 to well over 400-1 in 2000. Furthermore, Marx predicted, the application of market logic to both labor and the land (which were not true commodities but fictitiously rendered so by legal and social practices with respect to property rights over both) would have the effect of degrading and ultimately destroying both. There is much evidence to support the truth of this proposition, at least with respect to environmental degradation. Marx also showed how productivity gains would be directed competitively towards technologies that would be biased against labor and in favor of capital. What Marx actually bequeathed was a rigorous critique of the utopian ideology of classical political economy in its own terms. By extension, he bequeathed us the tools to make a similarly devastating critique of

neo-liberal ideology in its own terms. (It continues to amaze me that so few have cared to make use of these tools, even now, when neo-liberalism is so plainly falling apart from its own internal contradictions.)

Marx well understood that the end product of any fierce competitive struggle for existence between firms would be the survival of the fittest and the consequent trend toward the centralization of capital and the accumulation of monopoly powers. The stronger the competition, the more forceful these trends. It is interesting to note that the more competitive environment within international capitalism from the mid-1970s onward, backed by all its neo-liberal rhetoric about competitive markets, produced exactly such a result. Think of Microsoft, Murdoch, Bertelsmann, and financial services, and the wave of mergers, takeovers, consolidations and sharing arrangements in airlines, retailing, and even old-line industries like automobiles, petroleum, and energy. This tendency has long been recognized as a troublesome feature of capitalist dynamics, hence the antitrust legislation in the United States and the work of the monopolies and mergers commission in Europe. As the recent case against Microsoft illustrates, these are weak defenses against an overwhelming force. And voices are increasingly heard saying that monopoly powers of the Microsoft sort do not necessarily lead to stagnation nor are they necessarily disadvantageous to the consumer.

This structural dynamic would not have the importance it does were it not for the fact that capitalists do not like competition, and actively cultivate and seek out monopoly powers. They thereby realize far-reaching control over production and marketing, stabilize their business environment to allow rational calculation and long-term planning, secure the reduction of risk and uncertainty, and more generally guarantee themselves a peaceful and untroubled existence. The visible hand of the corporation, as Chandler calls it, has been of far greater importance in the actual historical geography of capitalism than the invisible hand of the market. Most Marxists since Lenin have recognized this by switching their theoretical lenses away from the competitive framework of Marx's *Capital* to the idea of state monopoly capitalism as the proper object of study.[13] But monopoly, it is argued, blunts the competitive stimulus to innovation and therefore leads to stagnation and the lack of productivity growth. This brings us to the heart of a very complicated problem: the relationship between monopoly powers and technological change.

On the face of it, we would indeed expect the monopolist to have little incentive for technological innovation. This would only be true, however, if the monopolist were in no way afflicted with the fetish of technology. But the fetish is as much a cultural value (in Schoenberger's sense) as it is a political-economic phenomenon. From this I deduce that those social situations where it has a deep and pervasive hold will likely experience strong currents of technological innovation even in the midst of monopoly power. To the degree that technological innovation is seen as a good (in the double sense of being both a commodity and something generally beneficial) in and of itself in the United States and in Silicon Valley in particular, so we would expect innovation waves to emanate therefrom, come what may. Metropolitan regions dominated by cultural values that are obsessively concerned with new technologies have often been major innovation centers no matter what the form of political-economic organization. But the argument cannot stop there. As I have argued elsewhere, high transport costs and other barriers to movement, such as tariffs, permitted a profusion of local monopolies to exist in the early years of capitalism.[14] Innovations in transport and communications have steadily reduced such barriers over time and the recent bout of globalization may in part be characterized as the effective final elimination of spatial barriers to competition (including most tariff barriers). Monopoly powers are no longer defined by local or even national market situations. They have to be global if they are to work at all. Recall that it was Japanese imports that challenged the comfortable oligopolistic power of the Big Three Detroit automakers within the U.S. market in the early 1970s. It is also useful to recall that the technological advantage that the Japanese developed was much more focused on software and organizational form (the just-in-time system) than on the hardware.

The upshot is that the conditions determining barriers to entry into competition are effectively transformed. Monopolists and oligopolists face a perpetual threat of entry from anywhere in the world unless they can protect themselves. And, of course, a vital form of protection of their position is control over technology.

This control happens three ways. First, it can be accomplished by the adoption of a technological form that requires such massive amounts of capital that it would prove difficult for any potential competitor to assemble sufficient resources to enter the field. (Boeing, for instance, thrives on this.) Second, it relies on continuous technological innovation, making it almost impossible for any competitor to catch

up. (Microsoft is a good example of this.) Third, control is assured by the protection of technological advantage by patent laws and agreements on intellectual property rights. (The pharmaceutical industry increasingly relies upon this strategy.) This last element has become very important in the recent phase of globalization and was central to the negotiations that transformed GATT into the WTO, with its associated TRIPS agreements on intellectual property rights. The main incentive to bring China into the WTO was to ensure that it obeyed the rules on intellectual property rights (to stop bootlegging CDs, for example). Technology and its legal protections thus become a crucial means to limit competition and protect monopolistic or oligopolistic power structures. Insofar as technologies facilitate pursuit of such goals, their fetish character gets reasserted. In contrast to Marx's original account of the origins of technological fetishism in competition, we now encounter a rather different storyline that locates the fetish in the desire to perpetuate monopoly powers by exclusionary practices.

In a way, this story should not be surprising because it has been central to what innovation within the military apparatus has been about all along. Any hegemonic power has to have or aspire to a monopoly of military violence, as the United States has so plainly achieved in these times. But preservation of that monopoly power depends upon the combination of all three technological strategies outlined above. Necessary to the preservation of military hegemony is the continuous and preferably very costly technological innovation in military hardware, software, and organization that can be protected by an international regime of property rights and other means of protecting military and technological secrets. Monopoly power does not, therefore, necessarily inhibit technological innovation. On the contrary, it enhances it at the same time as it redirects it. But in what directions does it redirect it—and with what social and political consequences?

VI. Consequences

To say that the paths of technological innovation are warped and perverted by fetish beliefs and practices is not necessarily to condemn them automatically as pernicious in their consequences. It is always possible to do the right thing for entirely wrong reasons. We should, therefore, be skeptical of the general truth of John Stuart Mill's observation that machinery has in no way lightened the load of labor. Modern household technologies, for those who can afford them, have been

very effective in this regard and the replacement of back-breaking forms of physical labor by mechanization and power moving equipment (again, only in societies that can afford such technologies) cannot be regarded as wholly negative. The quest to annihilate space and time has certainly made it easier for people, commodities, information, and capital to move around while the equally quixotic quest to dominate nature has brought us a range of medical technologies and hygienic practices that have extended life expectancy for substantial numbers of people (though again, the benefits have been unevenly distributed). A balance sheet of positive and negative effects is almost impossible to construct even presuming that clear criteria exist for their definition. It is, nevertheless, important to seek out dominant biases within the general trajectories of technological change that seem particularly problematic or contradictory, if not dangerous, either to human well-being in the narrow sense or to the survival of other species and their distinctive habitats. These biases arise, I hasten to point out, not out of the inherent material qualities of technologies but through the specific way in which social relations and *mentalités* get embedded in them so as to mediate our relation to nature and the reproduction of social life.

When we look at technological trajectories from this perspective, a number of striking observations can be made. To begin with, science prides itself on a capacity to render much of the world more easily legible, to demystify things and processes, to get behind their surface appearance. Technology is different because it is fundamentally concerned with getting something to work, no matter whether the things and processes are understood or not. If it takes black boxes to make something work, then so be it. Nevertheless, a certain aura of omniscience also surrounds technology. Hence, it is doubly odd to speak of technology as a fetish and as a site of mystification. Indeed, a familiar critique of both science and technology focuses on their objectivity, materiality, and the need for a certain "re-enchantment" of the world in order to appreciate its aesthetic, poetic, and spiritual qualities. While there is something to be said for that position, my critique focuses on how an objective, deeply materialist and instrumental approach to science and technology can be the source of so much mystification and illusion.

My answer derives from the initial definition of technology as an internal relation, as dialectically imbricated in social relations, social processes, and *mentalités*, in such a way as to mediate our relations with nature and with the processes of the reproduction of social life. It

is the failure to recognize the embedding of technology in all of these respects that produces the mystification and illusions. But to treat it as an internal relation is not to see it as passive in relation to all of these other elements. It is an active site of creative and transformative change. In exactly the same way that a new product has no value unless it finds consumers, so new technologies (hardwares, softwares, organizational forms) have no meaning or value without active users. What differentiated early modern Western capitalism from Chinese and Islamic patterns was the particular concatenation of users of the new possibilities that inventions defined. Equally, the Soviet Union saw some remarkable innovations in fields such as programming, robotization, and laser technologies, but the users were of a quite different sort than those who seized upon these possibilities in the United States during the Cold War years.

It is, therefore, perfectly reasonable to argue that new technologies open up all manner of possibilities for, say, democratization via the Internet. It is quite another matter to insist that such an outcome is already defined within the new technology itself. The printing press also opened up possibilities for democratization. Yet in the hands of Murdoch and a few other press barons, it now seems more like a capitalistic tool for political-economic manipulation via commodification and spectacle rather than an instrument of open debate and democratic discussion. In general, the paths of technological innovation and application have had innumerable democratizing possibilities, which have been largely diverted to ensure the perpetuation of existing power centers, both socially and geographically.

It would also be wrong to see technology as merely neutral in relation to its uses and users. The reciprocal relation points to how technology, by embedding certain social relations and *mentalités* within its forms, can play a key role in their perpetuation. Nuclear power, for example, is not a technology conducive to democratic and decentralized decision making nor does it allow any kind of "re-enchantment" of the world in ways that deep ecologists advocate. The long tradition, from Weber to Habermas, of critique of technological rationality is by no means empty of critical force. In fact, it was one of the achievements of critical theory within the Frankfurt School to point out the dangers of presuming that technological forms are neutral regarding social relations (as so many within the Marxist tradition did, both in theory and in practice, as with Lenin's embrace of Fordism and Taylorism). Many technologies depend crucially upon hierarchically organized

expertise and strong centralization of decision making, so that they are antagonistic to democratization as well as to individual autonomy. They depend fundamentally upon the cult of the expert. They foreclose on certain possibilities while they open up others. Nuclear power is broadly incompatible to, say, anarchist and deep ecological visions of social organization, which is why it finds few advocates and not a few fierce enemies within those quarters.

VII. Conclusions

By way of conclusion, I take up some general points on the relations between technological and social change. On the one hand, the way in which social relations and *mentalités* get embodied and embedded in technologies, with serious consequences for the modes of relating to nature and sustaining material life, deserves emphasis along with their dominant uses, fetish beliefs about them, and their uneven social and geographical availability and disposition. On the other hand, the possibilities they open up to reconstruct our social relations and our relations to nature, albeit in limited and often compromised ways, must be acknowledged and explored.

With respect to capital accumulation, the dynamics of technological change take on forms that are both instrumental and fetishized in relation to the objectives of labor control, the domination of nature, the annihilation of space and time, the circulation of value as money and fictitious capitals, and the technologies of consumption and fantasy/spectacle production that assure the perpetual growth of consumer markets. But these objectives get warped by the drive to monopolize or at least establish such a dominant position (in part through command of exclusive and patented technologies) as to be unaffected by competition. The effect is the establishment of hierarchical and very lopsided class relations of political-economic power through differentiated command over technological forms. The geographical effect is the creation of regions rich in costly and highly sophisticated technological innovations and applications, which contrast with whole swathes of the earth's surface that barely get brushed by even the weakest of applications (except for the benefit of passing tourists and local elites). It is to this uneven social and geographical end that multiple contemporary technological possibilities get used and abused.

Neo-liberal rhetoric focuses, of course, on market processes. It assumes the essential fairness and competitive qualities of market exchange, as did Adam Smith and Ricardo. The upshot should, in their view, be convergence toward the equalization of technological states. Monopoly control, as we have seen, points to an entirely opposite result. Much of the bias in technological development and application emanates from the desire to use technological dominance to ensure monopoly control. But Marx also held that in its origins at least, capitalism was characterized by the often-violent expropriation of rights and of assets (in some cases backed by state authority and power, as in the British Enclosure movement) through processes of "primitive" or "original" accumulation. Marx made it sound as if capitalism was born out of thievery, violence, and illegitimate appropriation, but then settled down to accumulation through expanded reproduction orchestrated by the rules of fair market exchange. But capitalism in fact has a continuous history of what I call "accumulation by dispossession." This has played just as important a role in its expansion and development as the exploitation of living labor in expanded reproduction. Tactics of primitive accumulation feature such things as dispossession of agricultural populations from the land, privatization of common property rights, despoliation of the commons, and the commodification of labor, land, and even nature itself. They have been perpetuated throughout the long history of colonial and neocolonial domination. But they have been supplemented by extensions of private property rights into the realms of intellectual property (including rights to genetic materials extracted from tropical rainforests or other distinctive habitats without regard to the rights of indigenous populations) and the appropriation and commodification of cultural forms via the tourist trade and a wide range of organizational practices orchestrated in the name of free trade through the WTO. Technological systems have been used not only to protect monopoly powers but also to secure accumulation by dispossession.

The deepest continuity lies in the uses of the credit system and fictitious capital circulation to accomplish accumulation by dispossession. Such processes operate in the very heart of capitalism itself, as we have seen in recent corporate scandals and in the robbery of pension funds. The dispossession of family farms by corporate agribusiness in the American Midwest, with the aid of credit systems and foreclosures, provides another example. The fetish pursuit of privatization of everything, in recent times, then appears less a means to bring recalcitrant

elements into the logic and discipline of fair market exchange, as advocates argue, than an excuse for raiding residual common property rights and assets for purposes of accumulation by dispossession. The privatization and commodification of water supplies is a case in point. In this, the new softwares and organizational forms set up through credit and financial systems have played a less than innocent role. In the same way that Marx considered the credit system a primary means of primitive accumulation, so its growth and extended power have made it the primary mechanism for continuous and expanded accumulation through dispossession.

Capitalism survives in part through a partial cannibalizing of itself, and the technologies of credit circulation and finance have much to do with it. State power and the institutions of governance cannot stay on the sidelines. They are implicated in and depend for financial resources upon capital accumulation, be it of the free market, monopoly, or accumulation by dispossession sort. The state can throw its weight behind and give legitimacy to primitive accumulation. That the Chinese state, for example, is currently engaged in parallel policies is not entirely attributable to the supposed "backwardness" of China in relation to capital accumulation. It has equally to do with competition between states for wealth and power, based in capital accumulation of whatever sort. Successive U.S. administrations have been just as concerned with facilitating accumulation by dispossession internally as has China. (I rate "the end of welfare as we know it" as a prime example of the dispossession of rights.) The wave of democratization in stock markets, furthermore, preceded a wave of stock devaluations, imposing many of the costs of that devaluation on those who could least afford it. Fortunately, the proposal to privatize Social Security in the United States, pushed very hard in the early phases of the Bush administration, never got onto the statute books. Here, indeed, the most scandalous accumulation by dispossession of the common property right to a state-guaranteed pension might have been visited upon the whole U.S. population overnight. I emphasize the politics of accumulation through dispossession in the United States in order to counter the view that such processes are largely confined to marginal areas (e.g., countries with a substantial peasant population or vulnerable to neocolonial domination) or newly incorporated regions (such as Russia and Eastern Europe, where the advent of capitalism and market exchange relations have been accompanied by the major loss of rights and protections within the populations at large).

Government policies may also, of course, be directed towards quite other ends. Government investments in research and development (over and beyond those involved with military interests) can have important consequences both in terms of the direction and the extent of technological shifts. The evolution of the Singaporean economy drew much of its technological dynamism from the close collaboration of state and corporate enterprises around technological innovation. This also happened in many other Asian economies such as Japan, South Korea, Taiwan, and Hong Kong. In each case, primitive accumulation was parlayed into technological advantages yielding excess profits that could maintain that advantage when ploughed back into further research and development. The pursuit and acquisition of technological advantages in select areas supported the extraction of monopoly rents from those advantages.

But it is within the military apparatus and its associated "military-industrial complex" that the main problems lie. The fetish quest to achieve total dominance in the monopoly of the means of surveillance and violence couples with envisioned instrumentalities to produce horrific consequences. When newscasters proudly announced that the caves of Bora-Bora in Afghanistan had been attacked with bombs that suck all the oxygen out and thereby collapse the lungs and pull out the eyeballs of anyone hiding there (an "achievement" of such gruesome qualities that the newscasters quickly dropped all mention of it), they were signaling a history of technological innovation of a certain sort. The fact that the Taliban had created the cave network with CIA and U.S. support in the early years of resistance to the Soviet incursion suggests that the phenomena of "creative destruction" gets internalized within military strategy itself as a technological imperative. Whatever the military creates, it must also immediately construct the capacity to destroy or counteract, for fear that its opponents will soon gain the same technological capacity.

In none of these regards, however, are the paths of technological evolution contradiction free. The desire to wage war by remote control undermines the macho image of the soldier personally braving death to serve cause and country. The fictions of money of account and of fictitious capital more generally undermine confidence and reduce the power of positive expectations to bolster the market. Consumer passivity and susceptibility to manipulation by spectacle breed political indifference and undermine the core social values upon which any social order relies for its perpetuation. The uneven social and geo-

graphical development of technological forms creates major geopolitical and local tensions that are hard to modulate, let alone manage or alleviate. And the transcendental fetish belief in technological answers can produce political-economic and ecological conditions that are degraded to the point of major crises, without preparing the way for social and political solutions that may have to be substantial, if not draconian, in their implications even for the wealthiest strata.

It is also the case that the range of technological mixes is greater than it has ever been in human history. On this point, the basic Marxist insight is correct that the problem for emancipatory politics is to liberate these immense productive forces from their social and political constraints, in short, from their domination by capital and a particularly noxious form of an imperially minded state apparatus. This is provided, of course, that it is also very sensitive to the ways in which social relations and *mentalités* are embedded in the technologies themselves. The insight needs to be carefully stripped of its naive utopian assumptions, particularly as to the social and political neutrality of technological forms and to guard against its own forms of fetishization. A sober evaluation of our technological possibilities requires that we penetrate behind the fetishism of technologies in exactly the same way that Marx sought to understand the fetishisms of commodity production. Indeed, it is the commodification of technological forms (signaled by the ways in which science, technology, research and development, and management and marketing have themselves become big businesses in advanced capitalism in general and in our universities in particular) that binds the two spheres of fetishization so closely together.

Any major approach to combat worldwide environmental degradation, social inequalities, massive impoverishment, perverse population dynamics, deficits in global health and nutrition, and geopolitical tensions will entail the mobilization of many of these technologically defined capacities to achieve social, ecological, and political ends. No matter how problematic the technologies may seem (biotechnology and genetic engineering now posing the deepest of ethical as well as political-economic problems on a par with those posed by nuclear energy), there is no way we can, or should, rule them out as potential contributors to solutions. Our present technological state is the foundational nexus from which a very different kind of future society may be extracted. No matter how deeply past biases and fetish constructs

have been internalized within that state, the technological state cannot be jettisoned or laid aside as irrelevant to our future prospects.

Organizational form, hardware, and software are influential mediators of social change. All too easily, the mediators, if I may corrupt McLuhan's apt phrase, can become the message and thereby seem to have a guiding power over our social and political evolution. It is vital to penetrate behind such fetishism, not because it is inherently wrong or unproductive (indeed, the evidence shows that it has been highly productive), but simply because it limits the possibilities of conscious political choices. A redefinition and demystification of technology (a task the Frankfurt School of critical theory embarked upon but never completed) appears, therefore, as a necessary first step toward a more generalized approach to emancipation, not only from externally and naturally imposed necessities, but from imprisonment within our own fetish constructs. ◉

Notes

1. Noble 1986.
2. Marx 1976, p. 352.
3. Due to Marx. See Harvey 1982.
4. Schoenberger 1997.
5. Cottereau 1988.
6. See Braverman 1974; Edwards 1979; Noble 1986.
7. Leiss 1974; Jay.
8. Heidegger 1978.
9. Harvey 1989, 2001; Kern 1983.
10. See Harvey 2000.
11. Greider 1989.
12. Debord, *The Society of the Spectacle*, 1977.
13. See Baran and Sweezy.
14. See Harvey 2001.

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