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Whose Technology? Whose Modernity?: Questioning Feenberg's *Questioning Technology*

Tyler Veak

In his trilogy of books on the philosophy of technology, Andrew Feenberg has provided one of the most sophisticated theories of the technology/society nexus. In his most recent work--*Questioning Technology*--Feenberg demonstrates forcefully the shortcomings of traditional theories of technology, which either characterize technology as neutral, or essentialize technology as some kind of autonomous, deterministic, and homogenizing force acting on society. In short, as Feenberg claims, there is no "essence" of technology. Technology is defined contextually and locally by the particular technology/society relationship. Feenberg, in agreement with Don Ihde, claims that technology can never be removed from a context, and therefore can never be neutral (99: 213). Technological design is inherently political. Consequently, the observed constraint on design choice is not some "essence" of technology, but can be explained by the hegemonic control of the design process by privileged actors.

He suggests that a "radical democratic politics of technology" can thwart this hegemony and open up space to steer the face of modernity from within. The design choice process must be liberated by what he calls "democratic rationalization," where subjugated actors intervene in the technological design process to shape it toward their own ends. Of particular note is Feenberg's claim that environmentalists' struggles with technology represent "the single most important domain of democratic intervention into technology" (1999, 93).

I take no issue with Feenberg's criticism of essentialist philosophies of technology, nor his claim that technological design is political. However, I want to challenge the efficacy of his proposal for a "democratic rationalization" of the design process. In focusing on the "micro-politics" of local struggles over technological design, he largely ignores the broader context of the global market system, and how the "logic" of the market always seems to prevail.

In addition, Feenberg's claim that "environmentalism" will lead the charge in this transformation can not substantiated. History indicates that his optimism is unfounded. Grassroots resistances typically become either overcome by the context of global-fluid capital, or co-opted by the bureaucratic machine (where environmentalism becomes mainstreamed). I argue that any attempt to merge philosophy of technology and environmentalism must address our increasing embeddedness in technological systems (i.e., second nature), or conversely the increasing disembodiedness from the material world (i.e., first nature).[1]

Feenberg's Radical Democratic Politics of technology

Before moving on to Feenberg's proposal for a radical democratic politics of technology, it is first necessary to briefly layout his critique of traditional theories of technology. Little needs to be said concerning the "neutrality" of technology. Since the social-political nature of the design process has been exposed by Langdon Winner and others, few adhere to the neutrality of technology thesis (Winner 1985). "Essentialist" philosophies of technology, on the other hand, still hold much credence and therefore must be addressed.2

Feenberg argues that scholarly interpretations of the social construction of technology3 have established convincingly that the technology-society relationship is not unilinear (99: 78--83). These theorists have demonstrated through their analysis of particular technological artifact designs that the design process is not deterministic.4 There is a significant degree of contingency, difference, or, as Feenberg terms it, "ambivalence" in society's relationship with technology (99: 76). The essentialist characterization of technology as an autonomous rationalizing force acting on society is thereby vitiated by social constructivist studies of technology development.

While constructivism offers a serious challenge to essentialist philosophies of technology, Feenberg rightly points out its deficiencies, namely, that it is too narrowly focused on the development of particular technological artifacts/systems (99: 11). The problem that constructivism ignores is the larger question of how particular design choices are made over other choices, which, as Feenberg argues, is an inherently political question.

To formulate his politics of technology, Feenberg offers a two level critique: one focusing on the local level of technological design, and the second focusing on the meta-level of cultural worldview, or hermeneutic (i.e., the of presuppositions and biases inherent in our present relations with technology) (1999, 202). This two-level analysis by Feenberg seems appropriate--he is not alone in arguing that local movements, whether environmental, technological, or other, must be coupled with overarching meta-level critiques of culture/society.

In addition to drawing on the constructivists mentioned above, Feenberg also borrows from Critical Theory, specifically Habermas and Marcuse, to arrive at his proposal--a "democratic rationality" of technology. According to Feenberg, Marcuse was right in arguing that technology is largely socially determined, as the social constructivists of technology have amply confirmed. Nevertheless, Feenberg agrees with Habermas' criticism of Marcuse; that is, Marcuse appeals to a romantic myth of "outsiders" as the basis for transforming society (99: 153). Marcuse argues that those caught-up in the "one-dimensional" society are too inundated by instrumental rationality to provide a means of escape, hence the change must come from the "outside," either through an aesthetic dimension, or through marginalized groups that are not part of the one-dimensional society (Marcuse, 1964) Feenberg, on the other hand, argues that the goal is "not to destroy the system by which we are enframed but to alter its direction of development through a new kind of technological politics" (Feenberg, 1995: 35). In other words, steer the system from within through subtle hybridizations not mass revolution.

Feenberg adopts Habermas' conception of the democratic community as the context for liberating technological design choice from hegemonic constraints. However, he makes significant modifications to Habermas' theory of communicative action.

Habermas argues that technology is neutral, but dominated by instrumental rationality and therefore a hindrance to communicative action. The best that can be hoped for, according to Habermas, is to hold technology's instrumental rationality at bay so that communication may continue unabated within the democratic community (Habermas, 1968).

Feenberg argues that Habermas is mistaken in his conception of technology as neutral and instrumental. Again, the neutrality of technology is no longer debatable--technology can not be separated from a cultural context. In regard to Habermas' claim that technology equates to instrumental rationality, the constructivist studies of technology have demonstrated that actors are able to successfully shape design choice for their own non-instrumental ends. However, since the struggle over design choice is centered around technology, Feenberg claims that it is "rational"--but not instrumentally rational (99: 105). Feenberg, therefore, brings rationality into Habermas' vision of a democratic community to arrive at his suggested "democratic rationality." The possibility exists to choose rationally more liberating technological designs that further the various interests of the community of actors, as Feenberg states "there are ways of rationalizing society that democratize rather than centralize control" (1999, 76).

There is, however, an obvious tension between the contingency observed in the design choice process, and the constraints placed on this process by the larger cultural-political milieu. Feenberg characterizes this tension as the "ambivalence" of technology, which he conveys in the following two principles (1999, 76):

1. Conservation of hierarchy: social hierarchy can generally be preserved and reproduced as new technology is introduced. This principle explains the extraordinary continuity of power in advanced capitalist societies over the last several generations, made possible by technocratic strategies of modernization despite enormous technical changes.

2. Democratic rationalization: new technology can also be used to undermine the existing social hierarchy or to force it to meet needs it has ignored. This principle explains the technical initiatives that often accompany the structural reforms pursued by union, environmental, and other social movements.

Feenberg admits that it is "undeniable that advanced societies exhibit the great concentrations of power in technologically mediated organizations" and that "despite occasional resistance the design of technical institutions disqualifies modern men and woman for meaningful political participation" (1999, 101). Nevertheless, he is optimistic that democratic rationalization can overthrow this entrenched power: "the tensions in the industrial system can be grasped on a local basis from "within," by individuals immediately engaged in technically mediated activities and able to actualize ambivalent potentialities suppressed by the prevailing technological rationality" (1999, 105). The crux of the issue, in terms of Feenberg's proposal, is the degree to which democratic rationalization can override capitalism's conservation of hierarchy. The key to this overthrow, according to Feenberg, is to expose the hegemony constraining design choice through what he calls a reflexive "hermeneutic technology."

Feenberg draws on a number of intellectual traditions--hermeneutics from Heidegger, cultural theorists such as Foucault and Baudrillard, and critical theory--to reveal how the interests of certain actors achieve and maintain control of the design choice process.[5] According to Feenberg, control over design choice is not necessarily economically motivated as many have argued. That is, the utilitarian efficiency of the

market is not always the motivating factor. Frequently, the aim is to either de-skill workers, or for management to maintain operational autonomy (95: 87). These "strategic" actors, as Feenberg calls them, are able to concretize their particular biases as the given technological code (99: 113). And because they intentionally choose technological designs that maintain operational autonomy the centralized-hierarchical power structure is perpetuated. Feenberg, therefore, admits that although technocratic power is foundationless and contingent, it nevertheless has a "unidirectional tendency" (1995: 92). Subjugated--tactical--actors are thereby excluded from the design choice process unless resistance is successful, which Feenberg obviously believes is possible.

What is needed, according Feenberg, is a theory of cultural change: "A new culture is needed to shift patterns of investment and consumption and to open up the imagination to technical advances that transform the horizon of economic action" (1999, 98). However, transformation is no longer simply about transfer of the ownership of capital, because of the "technological inheritance" of hierarchical control (Feenberg, 1991: 39). Feenberg believes that "environmentalism," as it brings other values to bear on the technological design process, is one of the most promising terrains for evoking this change (1999, 92).

Critique

On the one hand, Feenberg acknowledges that economics (i.e., capitalism) is the greatest hindrance to a more liberatory politics of technology: "Technological design must be freed from the profit system" (1999, 57). Nevertheless, he argues that this hindrance can be overcome through the struggle of various local movements over technology. To illustrate, he provides several examples of these "democratic rationalizations" of technology, such as the struggle over the Internet, and AIDS activist's successful attempt to reshape the FDA drug approval process.

Contra Albert Borgmann, Feenberg frames the Internet as an example of a successful attempt to steer technology toward more democratic ends--e.g., enhanced communication (99: 191). And no doubt, the Internet has brought many formerly disparate groups and individuals together. Nevertheless, in the larger context of the market system we can see that the design space created by the Internet is well on its way to becoming colonized as just another place to consume--the Bill Gates, Microsoft's bullying of Sun Systems, advertising on virtually every web page, junk email. How long before the logic of the market prevails, or has it already? The Internet is still in its infancy, but it is rapidly gaining technological momentum[6] (to use Thomas P. Hughes term), and every step taken narrows the playing field, in terms of which actors will have a stake in shaping its future.

Even if we concede that it is possible to thwart the plans of the Microsofts and somehow make the Internet a continuing sight of liberation,[7] how democratic is the Internet? That is, can anyone enter the game? The answer is no. It costs $2000 plus to step up to the table, and another $20+/month to stay in. Then there is the perpetual need for costly upgrades because your $2000 machine becomes obsolete within two years. The technological obsolescence built into our new virtual world puts the old program of planned obsolesce from Detroit to shame.[8]

Economics aside, how many really have the technical expertise to hack into the Internet or some other burgeoning virtual technology and "steer" it toward their own ends? In many ways the Internet has been a source of democratization, but at the end of

the day how democratic is a technological system that has built-in obsolescence, is based ever increasingly around consumption, and requires dependence on a cadre of techno-elites[9] to manage the "problems"--and they are numerous as many of you have experienced.

Another example of demoncratic rationalization offered by Feenberg is AIDS activism. Granted, AIDS activism did result in altering the direction of AIDS research and the drug approval process. However, in his history of AIDS activism, Steven Epstein tells a tale of co-optation and fragmentation. Because of the extreme amount of expertise involved in AIDS research, activists were dependent on their adversaries, the scientists. They could only gain credibility and authority by becoming experts themselves (Epstein, 351). The problem, however, is that this emphasis on expertise created a hierarchy among activists and consequently a fragmentation. There were the "insiders"--the activists that worked directly with the scientists, and the "outsiders" (i.e., all the rest) (Epstein, 287). Moreover, because of the immense amount of disagreement over the direction of AIDS research, not all voices could be heard. Epstein concludes from his analysis of AIDS activism that for any significant change to occur "efforts...must be carried out in conjunction with other social struggles that challenge other, entrenched systems of domination" (Epstein, 352). As history indicates, this is easier said than done.

Even if we grant that some of these movements have been successful, to whatever degree, Is there a danger in celebrating these important, but nevertheless local, victories? In this regard, Feenberg appears to fall into the same trap as the constructivists, who he rightly criticizes. He seems to argue that if a particular design process is "democratic," then it is good. Bracketing technological design in this way makes his optimism understandable.[10] There is an implied "progressionism" in his attitude toward technology--that is, technological advancement is fine as long as it is democratic (as defined by him). However, focusing on "particular" relations with technology obscures the fact that most of the local "victories" become co-opted in the larger context of global capitalism.[11] In the long run this emphasis on the local obfuscates the hegemony that, on the one hand, Feenberg acknowledges, but, on the other, offers no real strategy for addressing other some vague notion of a "reflexive technological hermeneutic." Can the technological hermeneutic ask questions deep enough to undermine the prevailing attitude of "technology equates to economic progress"? In short, it is difficult to understand Feenberg's optimism when he admits capitalism's "unidirectional tendency" toward "conserving hierarchical structures" through technological design.

Although not completely pervasive, it appears that in the long run the logic of the market does seem to prevail. Thomas P. Hughes' history of the electrical utility industry is one such example where initially a large amount of contingency existed in the design process. He compares the development of electrical systems in Chicago, London, and Berlin, and shows how each context transfigured the shape of the electrical system. Chicago was dominated by laissez-faire economics, Berlin by heavy government regulation, and London by parochialism--each giving, initially, a unique face to "electricity." London held out the longest against standardization with its extremely fragmented and non-standardized conglomerate of electrical systems. Nevertheless, Hughes claims that by the 1930s all three systems were homogenized by the market demands of utilitarian efficiency (Hughes).[12]

As in the case of the Internet, "electricity" was hailed as a liberatory technology--emancipating the common person from the drudgery of everyday life. But in the end, we find ourselves more deeply embedded in a system in which we have no control over and no way out of--that is, short of dropping out completely. Like London, we are all forced to capitulate to the standard (e.g., Microsoft) of the present (Internet) system. Why should the Internet be any different? The larger context of the global market system has only intensified, since the birth of the electrical industry. Hence, unless the broader context is adequately addressed, there is no reason to believe things will be any different for the Internet, or any other "hopeful" technologies.

Granted, there may be occasional successes in shaping modernity as Feenberg suggests, but the larger train of capitalism on which modernity is securely fastened rolls on:

> Since the mid-1970s, the top 1 percent of households have doubled their share of the national wealth. The top 1 percent of U.S. households now have more wealth than the entire bottom 95 percent.
>
> The top 1 percent of households control 40 percent of the wealth. Financial wealth is even more concentrated. The top one percent control nearly half of all financial wealth (net worth minus equity in owner-occupied housing).
>
> Microsoft CEO Bill Gates owns more wealth than the bottom 45 percent of American households combined. By the fall of 1998, Gates' $60 billion [now closer to 100 billion] was worth more than the GNPs of Central America plus Jamaica and Bolivia.
>
> Average weekly wages for workers in 1998 were 12 percent below 1973, adjusting for inflation. Productivity grew nearly 33 percent in the same period. (Mokhiber and Weissman, 1999.)
>
> 350 individuals own as much wealth as the bottom half altogether. (Luke, 1997)

The hegemonic control of technology by capitalism has played a major role in increasing the disparity between the haves and the have-nots.[13] Even today, while much of the world is in a recession, the United States is reveling in a techno-fetish induced economic high. In a world where 20% of the population consumes 80% of the energy and resources, consumption must be addressed (Boff, 18). It can not be denied that much of this disparity in consumption is a result of the wasteful energy systems in which we are embedded.

The increasing embeddedness in technological supersystems, with their associated consumptive lifeworlds, lies at the root of the increasing disparity (Mellor). What does a more democratic Internet mean to a rural Nigerian with no electricity whose main concern is obtaining clean water, food, and fuel? Or the FDA approval process to Africans suffering from AIDS? Nothing. As we carry on with efforts to "democratize" the virtual world, we leave the rest of the real world further and further behind. Feenberg argues that the design process can be democratized by including subjugated knowledges, but many of the subjugated can not even step up to the table and make their voices heard. And while the freight train of technology rolls on, these marginalized groups become further and further distanced from any chance of being heard. Obviously, technology must be questioned, but more importantly the fuel that drives the train of technology--capitalism--must be questioned.

What is needed is not a technological hermeneutic, but a sustained critique of the global market system in conjunction with an ecological politics sympathetic to this

critique.14 Workers cannot democratically resist attempts to de-skill, or protest poor working conditions when a corporation can simply move to another country and continue to exploit without resistance. In the long run, the logic of the market still carries the day. Flexible-fluid capital must be addressed, if there is to be any possibility for significant transformation.

This is the primary reason why Feenberg's faith in environmental resistance movements is unfounded. He states that "as a new century begins, democracy appears poised for a further advance. With the environmental movement in the lead, technology is now about to enter the expanding democratic circle" (1999, vii). The history of environmentalism tells a less optimistic tale. Andrew Hurley's history of the steel mill community of Gary, Indiana clearly portrays the problems inherent in sustaining grassroots environmental movements in the context of global capitalism. Hurley's analysis demonstrates how cooperative efforts are thwarted. Although initially the movement had some success, the steel industry used the rhetoric of "economic downturns" and job loses to disregard environmental and safety reform. This kind of rhetoric, as evidenced, quickly drives a wedge in solidarity, because it reduces everyone to a "catch-as-catch-can" mentality (Hurley).

In addition, Robert Gottleib's comprehensive history of environmental activism indicates that grassroots movements ultimately are either squashed by corporate capitalism or co-opted by the Washington bureaucratic machine--big payrolls, Washington lobbyists, and long lists of members who do nothing but write a check once a year. (Gottlieb).

I am not saying that these movements are never successful. They have done a tremendous amount of good, but for whom? In other words, whose "democratic circle" is being expanded, and at whose expense? My point is that, because the larger context (i.e., global capitalism) is not being adequately addressed , the problems have simply been moved out of sight, and consequently out of mind (e.g., The creation of tariff free Export Zones throughout the Third World, and NAFTA's opening up the southern border so that Multi-National Corporations can freely shop for the best place to exploit labor.).

Granted, the successful democratization of technological design in one instance does not necessarily mean that someone in the Third World loses out. In other words, I am not foolishly suggesting that the West/North should throw away one-hundred plus years of social-political reform, or cease striving for additional reform because the rest of the world has not yet experienced it. Rather, I am arguing that *focusing on the micro-level politics of particular relations with technology, as Feenberg does, can be detrimental if those particular technologies are part of a larger context that is increasing the disparity between the haves and the have nots*. In short, Feenberg does not sufficiently "question" technology, which is inextricably linked to a system that inherently increases disparity.

Conclusions

In spite of my criticisms Feenberg's analysis remains extremely valuable. His critique of essentialist philosophies of technology alone is a significant step toward clarifying the future direction of the philosophy of technology. Moreover, his blending of constructivism, critical theory and cultural studies brings some of the most

sophisticated theories to bear on technology studies, and has opened up new ways of perceiving the technology/society relationship.

Although Feenberg does offer examples of the "democratic rationalization" of technology (i.e., where actors have been able to steer technological design toward their own interests), I would argue that he has exaggerated the significance of these victories in light of the larger context of global capitalism. Given time and space the logic of the market remains the prevailing force shaping the face of modernity.

This is not to say that modernity cannot be significantly changed for the better. Nor am I suggesting that the "successes" of the developed world directly result in the oppression and exploitation of the non-developed world. My point is that emphasizing the *local* successes of technology relations (which are in themselves questionable) will not only leave us far short of the goal of a more democratic-egalitarian modernity, it may, in fact, blind us to the head-long plunge into an ever increasing disparity that is the plight of so many in the world today. Even more significant, in celebrating the "democratization" of technology in these limited contexts, Feenberg largely ignores the fact that we are becoming increasingly embedded in technological systems (which are characterized by fetishized consumerism) that remove us further and further from the real world in which many still face crucial life threatening problems.

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Do We Need a Critical Theory of Technology? Reply to Tyler Veak

Andrew Feenberg

Let me begin by thanking Tyler Veak for his sharp critique of *Questioning Technology*. I am particularly interested in what he has to say as he has attacked my argument from the Left, a position I had hoped to occupy myself with a critical theory of technology.

Veak's criticism comes down to the charge that in focusing on local struggles for the democratization of particular technologies, I forget the larger framework of the world market which absorbs everything it touches into consumer capitalism. What is the point of democratizing this or that small corner of the vast human catastrophe that is global capitalism? Why criticize technology, when economics controls our destiny? Veak concludes that what we need is not a critical theory of technology but a critique of economic globalization.

So baldly stated, the principal flaw in Veak's position is obvious: these are all false dichotomies and nothing compels us to choose between them. Nowhere in my book do I propose that a critical theory of technology can replace all other forms of social criticism. In fact, as Veak himself is compelled to admit, I am no more enthusiastic about capitalism than he is. One whole chapter is devoted to the French May Events of 1968 and the demand for self-managing socialism that inspired that movement. Another chapter discusses Barry Commoner's early socialist environmentalism. I argue that these were among the many movements and debates that politicized the question of technology in the late '60s and early '70s, to which we owe our current critical consciousness of technology.

In the Preface to the book, I also acknowledge the importance of patriarchy, racism, and other forms of oppression that existed long before modern techology and survive within our society today. I do suggest that technology criticism is under-represented on the Left despite the fact that technology issues are increasingly central to many different types of protest. Surely this position is not harmful to progressive social movements! Why then the harsh critique?

Could it be that it is my lack of moral outrage that bothers Veak? It is a fact that although I mention many of the issues he considers important, I do not respond to them as he would like. I do not target Bill Gates as a villain, nor do I highlight the absolute misery of the poorest of the poor. Differences such as these have more to do with intended audience than substantive disagreement. *Questioning Technology* was not written with any pretention to value-free scientific objectivity, but I have tried to expose my commitments without bludgeoning my readers. I would like to be read by students and scholars interested in technology studies regardless of their politics.

These readers are certainly aware of the fall of the Soviet Union and share the widespread disillusionment with the type of socialism it represented. However critical they may be of multinational enterprise, they see no alternative. Denunciation of world

capitalism is easier than providing a credible solution to the problems it causes. The call for a global oppositional strategy leaves many skeptical in the absence of significant global struggles. Verbal gesturing is no substitute for a politics, although it is quite popular on the academic Left.

Veak's gestures are no doubt honorable, but they are also particularly desperate. Everything is co-optable in his view. Even the most hopeful struggles, like that of AIDS patients for access to experimental treatment, ultimately fail.15 The Internet will soon be totally commercialized.16 Environmentalism has already been converted from a social movement into a marketing ploy. And so on. If all this is true, our choices are limited: we can either join the tragic struggle against the inevitable alongside the wretched of the earth, or watch the global disaster in the relative comfort of the Western academy.

As I write this, a little bell rings in my memory. I am transported back to the early '70s when some radicals denounced the peoples of the West for benefiting from world capitalism at the expense of the Third World. Reforms in the advanced countries were useless, serving only to strengthen an oppressive system. The true agent of the revolution was to be found in Africa, Latin America, Asia, where consumer society had not yet corrupted all classes of society.

Veak says this is not his position, but goes on to claim--inconsistently, it seems to me--that technical democratizations are "detrimental if those particular technologies are part of a larger context that is increasing the disparity between the haves and the have nots." My worst fears are confirmed when Veak condemns electricity for failing to achieve the liberation promised at its inception. No wonder he has doubts about the Internet! How can we accept Veak's pro forma assurances that he is in favor of local reforms when he seems so enthusiastic about condemning them for masking global problems? So despite his many disclaimers, I feel Veak drawing me back to the discredited politics of the old New Left.

Questioning Technology starts out from entirely different assumptions and problems. Veak would like us to turn to political economy for the serious business of social critique, but a great many fundamental questions of civilization cut across the distinction between economic regimes. Feminists and race theorists have made the point that equality is always an issue. Abolishing discrimination under capitalism will not abolish economic inequality, but it is just as true that a socialist reform of the economy can leave discrimination intact. Reforms dismissed as trivial distractions by some dogmatic revolutionaries have made a difference. And that process is far from over. The civil rights movement, women's movements, movements of the disabled, environmental movements continue to have impacts one would be foolish to discount.

The problems with Veak's uncompromising position extend further, to the model of socialism itself. The alternative to a process oriented politics based on reformist social movements is the old statist model of total transformation. In the Soviet Union, revolution, nationalization of capital, and economic planning did indeed abolish key state institutions and markets, but that was not sufficient to create a humane society. Authoritarian techniques of management and administration imitated from the West, combined with ferocious political and police oppression, turned out to be far more significant than ideological and economic innovations both for the daily life of individuals and for the long term prospects of the regime. Presumably, a similar disaster

would follow the abolition of the global capitalism in favor of Soviet style socialism on a world scale. Who would want that?

If Veak is representative, it is time to refocus the discussion among radical theorists. Technology studies can contribute to that task. After all, Marx may be considered the first serious student of modern technology. He observed that the technical mediation of work accelerated economic growth but also created new social hierarchies and devastating economic crises. At the same time, Marx argued, technology had brought into being a new kind of lower class capable of democratizing the economy and resolving its problems. Over a century later, we see technical mediation reaching far beyond the domain of production into every aspect of social life, whether it be medicine, education, child rearing, law, sports, music, the media, etc. And, while the economic instability of market capitalism has been reduced significantly, everywhere technology goes, centralized, hierarchical social structures follow. In this context, the issue of domination through technology has come to the fore in many domains.

Struggles against the arbitrary exercise of technocratic power have been going on since the 1960s, beginning in the universities and extending to other institutions, but often it is difficult to classify the resulting movements. Similarly, social movements have challenged specific technical designs in fields such as computers and medicine without waiting for the blessing of the Left. Technology studies has contributed to our understanding of these unprecedented movements. Steven Epstein's book on AIDS, *Impure Science,* shows how much we can learn from research on social conflict over the technical framework of our lives.

Questioning Technology is situated in this context. It is an attempt to make sense of the political consequences of generalized technical mediation. The book argues that technology is emerging as a public issue out of a variety of struggles in something like the way in which environmentalism emerged at an earlier date from hitherto separate issues such as population control, pollution control, nuclear protests, and so on. The enlargement of the public sphere to encompass technology marks a radical change from an earlier consensus which held that technical issues should be decided by technical experts without lay interference.

Is it unrealistically optimistic to hope for positive developments from this change? Perhaps, but I make fairly modest claims for what has been accomplished thus far. The point is not that struggles over technology will do the work of world revolution, but that they exist at all. Veak is the optimist if he thinks that we are ready to take on the capitalist world market. I am concerned with something more basic, *the survival of agency* in technocratic societies, and more particularly, the ability of modern men and women to act as agents in the technical sphere from which the technocracy draws its force.

Contrary to Veak's claims, this approach does not privilege local struggles at the expense of global ones. As of now, there are no global struggles around technology, if by "global" one means the sort of total challenge we associate with the socialist opposition to capitalism. There is no reason to assume that feminists trying to improve childbirth procedures or protesters opposed to nuclear power detract from the fight against multinational oil companies in Nigeria, assuming, as Veak appears to, that the latter can be considered more "global" than the former.

Technical politics today involves a variety of struggles and innovations with significant consequences for the structure of major technical institutions and the self-

understanding of ordinary people. We need to develop theory to account for the increasing weight of public actors in technological development. That world capitalism will survive this or that technical change should no more surprise us than its ability to survive the women's movement or the civil rights movement.

Nevertheless, there is a difference and it is perhaps this difference that explains the vehemence of Veak's challenge and his interest in my work despite sharp disagreements. Although capitalism and socialism perpetuate to one degree or another such pre-existing phenomena as racism and sexism, they can--and we hope they will--learn to live without these aberrations. But modern technology is essential to their existence. Hence any major change in technology raises fundamental questions of economic organization.

Capitalism is still about extracting surplus labor from a work force with no interest in generating profits for capitalists. To the extent that that inherently conflictual situation is stabilized through specific technical choices, other technical choices can destabilize capitalism. In recent years, technocratic ideology and management have emerged as an effective approach to maintaining subordinate masses under the rule of capital. By the same token, to be worthy of our continuing interest in the post-Soviet era, an alternative to capitalism must be about democratizing technical administration and technical choices under economic conditions which permit the extension of democracy to the world of work.

The core institutions of modern societies are thus at stake in technical development. A broad democratizing trend that undermined technocratic ideology in society at large would weaken capitalist hegemony and block Stalinist backsliding on the part of the Left. If a critical theory of technology contributes to this trend, surely that should suffice to justify its existence even to the most politically committed of critics.

REFERENCES

Epstein, Steven (1996). *Impure Science: AIDS, Activisim, and the Politics of Knowledge*. Berkeley: University of California.

Hughes, Thomas (1983). *Networks of Power*. Baltimore: Johns Hopkins.

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1 First and second nature are terms used, primarily by Critical Theorists, to distinguish between the humanly constructed world of culture and technology and the material world. Granted, as Marx himself admitted, there is no true "first" nature left, hence we are talking about degrees.

2 Essentialist philosophies of technology originated with Heidegger and were further developed by the Frankfurt Schoolers: Adorno and Horkheimer, and Marcuse.

3 which he broadly conceives to include social constructivists, contextualist historians of technology such as Hughes, and actor-network theorists, such as Callon and Latour

4 See Bijker, et al, 1987; and Bijker and Law, 1992 for expositions on the various schools of constructivist studies of technology, and of particular studies of design processes.

5 In addition, Feenberg explains how "essentialist" philosophies of technology have argued mistakenly for an essence of technology, because of their exclusive focus on the meta-level of culture. If one ignores the contingency evidenced at the secondary level of design, as essentialist theories of technology do, it is easy to see how technology can be misconstrued as being an autonomous-rational-deterministic force. Feenberg rightly argues that it is not "technology" per se that evinces this at times unilinear trajectory, but the interests of particular actors.

6 Or becoming "concretized" to use Feenberg's term.
7 Microsoft has successfully defended itself against two anti-trust lawsuits to date, and others are still pending.
8 Not to mention the economic road block in getting people living in non-developed countries, where the cost of a computer is frequently two or three times their annual income, "on-line."
9 For a discussion of the emerging "techno-elite," see , Timothy W. Luke. Capitalism, Democracy, and Ecology: Departing from Marx. (Urbana and Chicago: University of Illinois Press, 1999).
10 I believe Feenberg's unfounded optimism is largely due to his reliance on Habermas' conception of a democratically ideal community that is limited both temporally and geographically.
11 I am in no way discounting the achievements of social reform movements over the last one-hundred plus years. My point of contention is primarily concerned with Feenberg's emphasis, which I discuss in more detail below.
12 While Hughes admits that "load factor" was a technological limitation driving the direction of the electrical utility industry, he also concedes that the industry would look considerably different in a society that did not count "capital cost"--i.e., if the industry was driven by values other than utilitarian efficiency and the "bottom-line" of the market (463).
13 In the face of the growing affluence of the few, nearly 20% of Americans now live below the poverty line (CNN, July 11, 1999)
14 See the works of Timothy W. Luke, David Harvey, and David Pepper as examples that both critique capitalism and attempt to formulate some kind of environmental politics. In addition, a number of eco-feminist (i.e., of the socialist brand) authors have also made similar arguments: see for example the works of Mary Mellor, or Carolyn Merchant.
15Veak attributes this view of Steven Epstein, who in fact draws a contrary conclusion. See Epstein, 1996 (353).
16Veak invokes Thomas Hughes's study of electric utilities in support of this point, but the analogy is weak as there is nothing resembling load factor on the Internet. See Hughes, 1983 (chap. XV). Furthermore, there continue to be innovations on the Internet that contradict Veak's dire predictions, such as the emergence of support for online communities on portals.