Alternative Modernity: The Technical Turn in Philosophy and Social Theory

Andrew Feenberg

CONTENTS

CRISIS OF EXPERIMENTAL MEDICINE

III. Postmodern Technology

6. FRENCH THEORY AND POSTMODERN TECHNOLOGY: FROM LYOTARD TO THE MINITEL

7. FROM INFORMATION TO COMMUNICATION: THE FRENCH EXPERIENCE WITH VIDEOTEX

IV. Multicultural Modernity

8. THE PROBLEM OF MODERNITY IN THE PHILOSOPHY OF NISHIDA

9. ALTERNATIVE MODERNITY? PLAYING THE JAPANESE GAME OF CULTURE

PREFACE

This book concerns the emergence of a new radical critique of technology in recent philosophy and culture since the 1960s. I reinterpret various theoreticians, including Marcuse, Habermas, Lyotard, and major Japanese thinkers, in terms of their relation to this trend.

In an attempt to avoid mere abstract talk about technology in general, the inquiry proceeds in part through case studies. Each of the four sections contains one essay on a philosopher and another on a concrete literary, cultural, or technical phenomenon that illustrates the problems raised in the philosophical discussion. Each chapter is relatively self-contained, although they are intended to illuminate each other usefully.

The case studies discuss the early image of nuclear disaster in post-War science fiction, dystopian themes in the popular spy films of the 1960s, the impact of AIDS on medical experimentation on human subjects, the suprising success of the *Minitel* in France, and the Japanese reponse to modernization as illustrated by Kawabata's famous novel, *The Master of Go*.

Throughout these investigations, my theme is the inextricable intermingling of scientific-technical rationality and culture. I argue from this constructivist premise to

the possibility of reshaping the technical world around us. Technophobic ideologies of the sort that emerged in the mass culture and politics of the 1960s underestimate the potential for reconstructing modern technology. This potential is most clearly exemplified by the history of the computer. Social institutions which appear to rest on solid technical foundations, such as medicine, turn out to incorporate values in their very structure, and to be not so very solid after all. Modernization itself, I argue, is a contingent combination of technical and cultural dimensions subject to radical variation. Aesthetics, ethics, and culture can play a role alongside science and technology in the emergence of alternative modernities.

Although *Alternative Modernity* is strongly influenced by the Frankfurt School, in chapters two and four I explain why I think the Critical Theory tradition must now be revised. I attempt to overcome the frozen opposition, to which the Frankfurt School contributed, between those who are "for" and those who are "against" technology. At the same time, I am not willing to abandon the whole critical tradition of technology studies in postmodern resignation or celebration. The essay on Lyotard explains my reservations about this trend. The concluding chapters on Japan attempt to come to terms with the new multiculturalism in a way that avoids both positivist universalism and ethnic relativism. Here I draw provisional conclusions regarding the reconciliation of the often conflicting claims of reason and culture.

Both the philosophical and the political tradition need to be studied anew in the light of the growing importance of technology in modern societies. These essays make a start on this neglected task. However, my focus on technology is meant to bring it back into the critical discussion, not to eclipse the many other, equally important dimensions of modern societies that have begun to receive attention in recent years. In the hope of adding another thread to the discussion, I offer models here of a new kind of social criticism, mixing cultural hermeneutics, sociology of technology, and ethical inquiry, that is, I believe, urgently needed today.

Most of the essays collected here are based on earlier publications, heavily reworked for this book. With the exception of chapter 3, which belongs too fully to its time to be brought entirely up to date, they have all been updated wherever possible. The original versions appeared in whole or in part in the following sources: "Technocracy and Rebellion: Spy Films and Social Criticism," *Telos*, Summer 1970; "An End to History: Science Fiction in the Nuclear Age," *The Johns Hopkins Magazine*, March 1977; "The Bias of Technology," Pippin, Feenberg, Webel, eds., *Marcuse: Critical Theory and the Promise of Utopia*, Bergin & Garvey Press, 1987; "A User's Guide to the Pragmatics of Computer Mediated Communication," *Semiotica*, July 1989; "From Information to Communication: The French Experience with Videotex," *Contexts of Computer Mediated Communication*, M. Lea, ed., Harvester-Wheatsheaf, 1992; "On Being a Human Subject: Interest and Obligation in the Experimental Treatment of Incurable Disease," *The Philosophical Forum*, Spring 1992; "The Critique of Technology: From Dystopia to Interaction," *Marcuse Revisited*, J. Bokina and T. Lukes, eds., Univ. of Kansas Press, 1993; "The Technocracy Thesis Revisted: On *The Critique of Power*," *Inquiry*, Spring 1994; "Playing the Japanese Game of Culture: Kawabata's *Master of Go*," *Cultural Critique*, Fall 1994.

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Chapter 1

INTRODUCTION: Technology and Freedom

Democratizing Technical Change

A new understanding of technology has emerged from several decades of rising conflict over technical issues. Public debate and controversy has spread from ecology to nuclear energy to medicine and genetic engineering, and even, in less visible forms, to theoretical fields such as artificial intelligence and the human genome project.

Some of these controversies resulted in improved techniques. Here is one example among many of the new public participation in technical life.

* In the early 1970s, as a generation of baby boomers had their own children, expectant mothers demanded changes in childbirth practices and large numbers joined organizations promoting natural childbirth to get their way. They challenged the overemphasis on medical technology in the hospitals they frequented; some of their gains have become routine, for example, reduced use of analgesia and anesthetic, and the admission of husbands or coaches to labor rooms (Charles, et. al., 1977). In this case, a major technical institution--for have no illusions, medical care today is technical--adapted under pressure to public demands.

But some public interventions do not have such a happy ending. Here is another case in point.

* At about the same time women were joining movements for natural childbirth, rising public concern over the safety of the nuclear industry prepared the collapse of one of the major technological projects of modern times. Nuclear power promised to free industrial society from dependency on the bottleneck of fossil fuels. But the nuclear industry became fixated on unsafe designs in the 1960s and was unable to adapt to the standards of the '70s and '80s. In the head on confrontation with public opinion that followed, technology lost (Morone and Woodhouse, 1989). Today conversion initiatives multiply as the owners of old nuclear plants switch back to fossil fuels.

I could multiply such examples at length but the main points are clear. First, we are entering a new era characterized by pervasive technology that affects us in the most unexpected ways; and second, it matters what we do about technology because, perhaps for the first time in history, public involvement is beginning to have significant impacts on the shape of technological change. This is a book about the philosophical implications of this unprecedented situation.

However, philosophy of technology is not prepared to enter an age of technical politics. Until recently it polarized around two contrary positions: we were obliged to choose between uncritical acceptance of the claims made for technology, or uncompromising rejection of its dystopian power. This dichotomy depended in turn on the sharp distinction between technology and society that used to be shared by both advocates and adversaries of technical progress. Today this distinction has broken down.

For some that breakdown signals the end of history, the collapse of all resistance to alienation in postmodern celebration of a brave new world that fuses human beings and machines in a new totality; for others the same shift renews hope in radical change, contrary to the dystopian projections of those like Heidegger, Adorno, and Ellul who despair of technological society. From this standpoint, we are "enframed" in Heidegger's terms, but not helplessly so because in drawing us into its orbit the system has exposed itself to new forms of resistance. *Alternative Modernity* reflects the latter approach. It argues that modern technology is neither a savior nor an inflexible iron cage; rather it is a new sort of cultural framework, fraught with problems but subject to transformation from within.

As I explain in Part I, the popular dystopianism of the 1950s and 1960s was the original breakthrough that created the space for a critical politics of technology in the United States. Every chapter therefore responds to that breakthrough in attempting to understand the new conditions of agency in a technological age. Anticipating, I conclude that indeed it is possible to reconcile technology and freedom, however, not within the framework of the currently dominant technical culture. That culture supports a rigidly hierarchical conception of the technical order. In chapter 2, I argue that a very different world can emerge from the gradual democratization of technical change. But public participation in technical politics is often dismissed as symptomatic of irrational fears or hopes that are at best a nuisance, at worst a serious threat to progress.

An astonishing failure of insight is revealed by this commonplace reaction to environmentalism, the anti-nuclear movement, the struggles of AIDS patients, and similar activities. Understanding these initiatives requires change in the accustomed view of technology. Much of this book argues for that change, both theoretically and through case histories. But can we reasonably expect the generalization of democratic initiatives, with major socio-technical transformation as a consequence? In the remainder of this Introduction, I will consider that question in its relevance to the essays collected here.

Underdetermination and Public Intervention

To begin, I would like briefly to describe the results of my own recent book, *Critical Theory of Technology* (1991), which reflects several current trends in technology studies. This book attempted to establish three principal points: 1) technological design is socially relative, contrary to deterministic arguments or theories of technical neutrality; 2) the unequal distribution of social influence over technological design contributes to social injustice; and 3) there are at least some instances in which public involvement in the design of devices and systems has had significant results. (This last point is developed much further here in chapters 5 and 7.)

These points form the necessary foundation for a theory of democratic technical change. Indeed, were any of them false, were technology determined or neutral, were the unequal access to the design process without consequence, or were there no examples of constructive public involvement, the idea of democratic technical change would make no sense.

The simplest way to explain my position is in terms of the thesis of underdetermination, the so-called Duhem-Quine principle in philosophy of science. This principle refers to the inevitable lack of logically compelling reasons for preferring one competing scientific theory to another. In the realm of technology, the thesis holds that rational technical principles are insufficient by themselves to determine design. Of course it remains true that some things really work and others do not: successful design respects technical principles. But there are often several possible designs with which to achieve the same or similar objectives and no decisive technical reason to prefer one to the others. *Technical choices are thus "underdetermined" and the final decision between alternatives ultimately depends on the "fit" between them and the interests and beliefs of the various social groups that influence the design process* (Feenberg, 1992).

Typically, technological designs are negotiated achievements involving many partners, not rational inspirations that spring full blown from the mind of an individual genius or pure laboratory research. The design process is the place where the various social actors interested in a developing technology first gain a hearing. Owners of businesses, technicians, customers, political leaders, government bureaucrats, etc. all qualify as actors. Their variety guarantees that design represents many interests. They wield their influence by proffering or withholding resources, defining the purposes of the devices they require, fitting them into existing technical arrangements to their own benefit, imposing new directions on existing technical means, and so on. Technologies are social expressions of these actors. This argument, on which my earlier book rests, is also central to recent constructivist sociology of technology, and to Axel Honneth's reconstruction of Critical Theory, discussed in chapter 4.

I have proposed the term "technical code" to describe those features of technologies that reflect the hegemonic values and beliefs that prevail in the design process. Such codes are usually invisible because, like culture itself, they appear self-evident. For example, tools and workplaces are designed for adult hands and heights not because workers are necessarily adult, but because our society expelled children from the workprocess at a certain point in history with design consequences we now take for granted.

Technical codes also include the basic definition of many technical objects insofar as these too become universal, culturally accepted features of daily life. The telephone, the automobile, the refrigerator and a hundred other everyday devices have clear and unambiguous definitions in the dominant culture: we *know* what they are in principle simply because we are acculturated members of our society. Each new instance of these standard technologies must conform to its defining "code" to be recognizable and acceptable to people like us. Constructivists sometimes call the establishment of such codes "black boxing" because one does not question what is "inside" the technology once its definition is generally accepted.

If all this is true, we need to take seriously Langdon Winner's (1992) proposal that technology is a new kind of legislation shaping our way of life, not so very differently from law in the proper sense. Technical codes reflecting particular social interests decide where and how we live, what kinds of food we eat, how we communicate, are entertained, healed, and so on. As technology becomes central to more and more aspects of our lives, its legislative authority increases. But if technology is so powerful, then surely it should be measured by the same democratic standards as other political institutions. By those standards the design process appears outmoded and unfair. Owners of corporations, military bureaucrats, and the professional organizations of technologists have far more influence over it than ordinary citizens. For the most part it is they not we who determine technical codes. I will return to this problem of the "operational autonomy" of elites in chapter 4.

At this point a clarification is in order: I do *not* argue that these currently dominant groups obstruct technical progress to further their own interests. It would be more accurate to say that they channel progress in a particular direction compatible with those interests. Nor do I mean to imply that they wield an arbitrary dictatorship over technology. Clearly, under the influence of the market, they represent a wide range of social needs and achieve many important social goals. However, it is important not to confuse this sort of responsiveness with democratic control of technology. While markets in many goods are surely desirable, they lack the public character, the element of debate and conscious coordination we associate with democratic action. With rare exceptions, such as the French videotex case discussed below, there are rather narrow limits to what can be done by isolated individuals on the market. To call such a system consumer "sovereignty" is a pathetic exaggeration of the actual power consumers wield in advanced capitalist societies. Even with the help of state regulation they usually cannot break through the imposing facade of fiscal power and technical resources of modern corporations.

In fact the issue of control over technical decisions rarely surfaces in the context of the market. Thus, however responsive they may be in other respects, those in charge of our technical destiny meet few serious obstacles to reproducing their technical power in their relations with consumers. Indeed, their interest in maintaining that power is a kind of bottom line inscribed in all their technical decisions, biasing those decisions in the direction of centralization and hierarchy. *Thus undemocratic design procedures have substantive consequences through the attempts by powerful players to preserve their technical initiative and control in the systems they create.*

In my earlier book, I followed the lead of the many historians and sociologists for whom the assembly line exemplifies the biasing of design by powerful interests. The history of the deskilling of the labor process under capitalism, which culminates in a production system controlled by machines, points to the essential role of design in providing an objective basis for the class structure. These inequalities are by no means transcended in contemporary capitalism despite profound changes in technology and management. On the contrary, while some sectors of the labor force clearly benefit from recent advances, others stagnate or fall behind in a pattern that promises to reproduce a class divided society into the foreseeable future, and perhaps to intensify the conflicts to which it gives rise. I take up these problems in chapter 6 in relation to the computerization of society.

There was a time when a theory of the labor process such as this would have formed the infrastructure of a general social critique. In *Critical Theory of Technology* I presented it only as a particularly significant example of how technical decisions support inequality and injustice. Here I intend to introduce other examples that stretch democratic concerns well beyond these classic problem of control of production. In chapters 5 and 7, I offer case studies in medicine and computer design that show a few privileged actors obstructing the expression of important interests in ways not generally recognized by political economy.

The technical code of medical experimentation defined it in terms of the interests of scientific research and industrial product testing. That code offered subjects basic protection from exploitation, but it ignored terminally ill patients' demands for experimental participation. In the case of French videotex, a computer network installed on the scale of an entire nation through the distribution of millions of free terminals (the famous *Minitel*), was intended primarily to give access to information; users' interest in communicating with each other was ignored. In each case public interventions, by AIDS patients in one and network users in the other, significantly altered the systems to accomodate excluded interests. Now FDA regulations and experimental designs are in flux as medicine gropes toward a new approach that recognizes the demands of dying patients. Similarly, in France, the *Minitel* was transformed when users hacked the system and introduced new communications applications that had not been planned by the designers.

These experiences teach important lessons regarding the ideological blind spots inherent in the standard design process. They show, furthermore, that technical systems cannot be considered finished until they have withstood social tests that expose them to a wide range of public influences and concerns excluded in the design phase. The fact that in these cases at least, the technical systems underwent major changes after release suggests a flawed process. This observation is confirmed by other experiences with new technologies, and constitutes one argument for democratizing design.

Legitimacy and Rationality

Democratization of technical change requires the opening of the design process to actors

who lack financial or cultural capital or political power. There is no reason of principle to think that their participation would be detrimental since non-technical actors are already involved; democratization would simply increase their number and variety. Indeed, far from impeding progress as is sometimes supposed, it might help avoid later problems of the sort which currently plague clinical research and nuclear power. At the same time, it would insure adequate representation of interests that are currently undervalued because they conflict with centralized, elite control of design, such as the interest of workers in an outlet for their skills. The long-term implications of more democratic design are earth-shaking given the significant imprint of elite control on so many aspects of our society.

Typically, democratic interventions are the work of activists caught up in a local problem or crisis. This localism should not be surprising as technical issues are usually of interest only to those directly affected by them and therefore willing to devote the time needed to form what Donna Haraway (1991) has called a "situated knowledge." In some cases, active minorities select themselves on the basis of common social attributes such as neighborhood, race or gender, hobby or illness and then try to influence public opinion by provoking *technical controversies* (Cambrosio and Limoges, 1991). AIDS patients, for example, attacked regulatory procedures, demanded hearings and negotiated changes. In other cases public involvement in the design process takes the form of what I will call "*re-appropriations,*" i.e. modifying technologies through innovative applications. The modification of the French videotex system shows the effectiveness of such aposteriori interventions by users.

The reigning common sense still discourages exploration of these democratic potentials of technological society with the following two objections. First, while protest groups may occasionally be right, even against the opinion of experts misled by professional biases, there is no easy way to know if their views are representative. Thus there is no special reason to call their interventions democratic. Second, political activity in the technical sphere represents a step backward from experts' hardwon freedom from lay interference. The general public would likely disapprove of such interference if it knew the true cost.

The counter-argument in favor of the democratization of technical change must a) establish the *legitimacy* of informal public involvement; and b) reconcile public involvement with the *rationality* and *autonomy* of professional technical work. I cannot respond adequately to these problems in this brief introduction, however, the essays collected here offer some starting points for reflection. In this section I would like to suggest a framework for reading these essays in this light.

While it is sometimes difficult to tell whether the outcome of a technical controversy corresponds to a public will, there is another sense in which public involvement in technical change is intrinsically democratic. Democracy includes citizens' attempts to reform the procedures of government, business, education, and other social spheres in order to enhance participation and agency. I follow C. B. Macpherson (1973) here in claiming that a democratic society should offer opportunities to develop human

capacities and powers. All forms of public activity and participation should be sanctioned as democratic so long as they respect civil rights. *As more and more of social life is framed by technical systems, cases increasingly appear in which public interventions into technology determine the conditions of agency. If agency is a value in itself, its enhancement may provide a basis for calling certain technological controversies and re-appropriations democratic despite the fact that they do not appear political at first sight.*

Such activities foreshadow a world in which technical "legislation" will emerge from new types of public consultation. For example, in the *Minitel* case not only did the users exercise an unaccustomed agency in the technical sphere by significantly modifying the system, but they enlarged the realm of public discourse for many others by creating a new virtual space of public discussion, thereby indirectly enhancing democratic agency in general. This and many other cases show that technical politics, in the form of minority protests or re-appropriations, does not stand in unmediated opposition to democratic community as sceptics contend, but actually realizes important democratic values.

Nevertheless, democratic values are not our only concern. We also want to know if public intervention has unacceptable costs and diminishes the efficiency of our technological society. This brings us to the problem of the rationality of public intervention in technnology.

This problem is relevant to one of the major contemporary approaches in democratic social theory, Jürgen Habermas's theory of communicative action, which I consider in chapter 4. Habermas (1984, 1987) defines modernity in terms of the differentiation of cognitive, normative, and expressive spheres to which correspond facts, values, and feelings. What makes a society modern is the institutionalized distinction between these spheres reflected in different rationalization processes that support the progressive development of knowledge and technology, on the one hand, and political and personal freedom, on the other. This differentiation is apparently threatened by public involvement in technology because political opinions and situated knowledges are less differentiated and methodically disciplined than specialized scientific-technical knowledge. Habermas's theory thus could provide the basis for rejecting technical democratization as a regressive movement running counter to the main trend of modernity.

However, in his early work, Habermas (1991a) introduced another important concept, the notion of a "public sphere" as an informal institutional foundation of democracy. The public sphere and formal democracy are distinct but mutually dependent aspects of democratic political life. The extension of this dual system to technology promises an enrichment of public life, an advance in what Habermas calls the "communicative rationality" of the society. Environmentalism can be seen as a model for this new "technical public sphere." Once again, it is the underdetermination of technical decisions that leaves a space for public intervention.

Habermas emphasizes the importance of consensus in the legitimation process. But this aspect of his theory is particularly unconvincing in the case of technical politics. In this case, technocratic authority is based on the only truly effective machinery for building consensus, the mystification of technical choices by deterministic notions of development. Politicizing technology is all about dissensus, not consensus. I find support for this argument in Jean-François Lyotard, the postmodern theorist whose work I discuss in chapter 6. His concept of "paralogic legitimation" offers an alternative way of thinking about communicative rationality.

The rationality problem appears in another guise as the fear that the politicization of technology will destroy the autonomy of the technical professions (Florman 1981). This fear is based on an illusion specific to technical change. Successful protest or re-appropriation results in design changes that are embodied in a modified technical code reflecting interests excluded at earlier stages in the design process. The internalization of these new interests in the code masks their source in public protest. The waves close over forgotten controversies and the technologists return to the comforting belief in their own autonomy which seems to be verified by the conditions of everyday technical work.

Who today, in the hospitals where women once struggled to change procedures, recalls the sometimes fierce resistance to admitting husbands to labor rooms? How many nuclear engineers remember the history of radiation exposure standards (Caufield, 1989)? How many architects know the story behind emergency exits?

The notion that technology is apolitical is thus a misleading consequence of the very success of past protests; it reappears with each new phase of public involvement in technology as a defensive reaction on the part of professions and corporations that want no interference with their technical initiative. But in reality the autonomy they claim was violated long ago in the course of earlier controversies the outcomes of which they now unwittingly endorse in defending their traditions. Informal democratic procedures are thus already an implicit part of the design process despite the illusions of technologists.

The historical rhythm of public and professional dominance in technical fields parallels Kuhn's famous distinction between revolutionary and normal science, with, however, a significant difference. As it professionalizes, natural science wins ever more independence from direct expressions of public opinion and democratic interventions become rarer and rarer. Of course this does not mean that mature science is independent of politics and culture, just that their influence reaches it indirectly through established administrative channels and changes in scientists' personal vision. However, the constant involvement of the population in technical activity, if only as an object of technical systems, generates ever renewed situated knowledges that can become the basis for public interventions at any stage in the development of a technical field.

In these cases social initiatives influence technical rationality without destroying it. This is possible because the autonomy of technical professions has less to do with their

separation from politics than with their capacity to translate politics into rational technical terms. In this context, public intervention may actually enhance technical rationality by bringing significant issues to the surface early in opposition to vested interests entrenched in the design process

Value, Culture and Technology

The argument so far has established the design consequences of struggle over the democratic value of agency. But agency is a formal value. One can still ask, agency in the name of what, for what higher purpose? To put it bluntly, if technical design were to privilege agency rather than centralized power, would anyone care? Robert Pippin (1995) has formulated this objection in terms of the deeper roots of the modern reliance on technology. Pippin argues that the thrust toward ever expanding technical power over nature is rooted in the breakdown of traditional normative consensus and the substitution of productive efficiency for it as the only shared value of modern societies. Hence the objections I formulate to elitist design in the name of democracy do not really address the underlying problem of modernity, which is the never ending spiral of technical power satisfying ever-escalating demands for material goods.

I have two objections to this diagnosis of the problem.

First, even if it is true that modern societies are committed to an unending spiral as Pippin claims, it makes quite a difference whether the demands of the population can only be satisfied by an authoritarian technical system, or whether an alternative democratic system is possible.

To decide this alternative we need a theory of the exercise of power through technique. Every technology has an operator and an object, and a specifically technical power arises where both roles are played by human beings. This is the case for example with medical and management technologies, and, more generally, wherever a way of life is imposed through the choice of major technical systems. These types of power are central to the organization of advanced societies. However, it is important not to prejudge the issue of technical democracy by simply identifying operator and object with distinct classes as though technology itself determined the social system. There is a choice between technical elitism or democracy: are these two roles distributed between different classes or between different institutional expressions of the same class? This is not a trivial choice.

It is obvious that there will be different substantive consequences for subordinates in either case, such as more or less control over health and safety, hours, skills, convenience and fairness of administrative procedures, etc. In the long run technical design would evolve differently. The differences are even clearer in the relations of the first to the third world; all too frequently developing economies are restructured around advanced technical means to centralize control and to yield products for the world market. Often effective subsistence economies are shattered and no viable alternative is

put in their place. Modernization then has catastrophic consequences for the indigenous population. Surely even the most acquisitive individual would care about these matters, and they depend directly on who controls technology. In my earlier book, I argued accordingly that technical democracy is not inconsequential regardless of whether modernity is normatively paralyzed as Pippin claims.

I have a second objection. Is it really true that modern culture lacks any resources for achieving normative consensus? In fact consensus is commonplace; only its manifestations are unexpected and therefore overlooked by philosophers who assume that it must take the discursive form of agreement on legislation or doctrine as in the lost utopias of early parliamentarism or the medieval church. Today, on the contrary, consensus is materialized in various social and technical codes. At any given time, we do "know" such things as: that the victory of the Union in the Civil War was good; that Paris is a beautiful city and should be preserved; that medicine should serve the interests of patients; that lowering labor costs is socially more desirable than protecting workers' skills, etc. Such normative propositions are not mere opinions but, as I will argue in chapter 4, are institutionally "delegated," for example, to textbook standards, zoning codes, professional regulations, technical designs, in sum, the real foundations of modern life. The fact that each such value is both unfounded and contested merely proves that we are living in the modern world; it is no warrant for hasty relativism or cultural despair.

This point is important, because it shows that technology embodies the fruits of normative consensus in the aesthetic, ethical, and cultural domains and not merely pure efficiency or a consumerist delirium of acquisitiveness. To fail to see this is to accept positivistic claims at face value and to exaggerate the difference between premodern and modern societies. Whether such a position is taken up in criticism or celebration, it blocks a concrete grasp of actual social life.

Thus it is necessary to broaden the range of values involved in technical decisions. The issue is not just elitism vs. democracy, but concerns the whole cultural field which is embodied in one form or another in technical codes. Why is this not obvious to us today? Why do we tend to see modern technology as "pure" and contrast it with values as with an alien sphere? A view of technology I will call "Weberian" for convenience seems to have such a grip on the modern mind that we can only free ourselves from it with difficulty. According to this view, technology is based on knowledge of causal processes in contrast with values which express merely subjective preferences. Even if ethical norms are granted their own specific rationality, as in Habermas, they are still safely separated from technology.

This Weberian prejudice is deeply ethnocentric; it excludes the very possibility of a fundamentally different modernity based on another technological dispensation. Several chapters discuss challenges to the Weberian position from a variety of thinkers including Marcuse, Honneth, Latour, and Haraway. In one way or another, they all reject the sharp separation of value and fact in modern thought, and treat technology as relative to a framework of social practices. Technology no longer exemplifies pure

rationality, but is embedded in a value governed action system. From this standpoint, the technical order appears in its contingency as a possible object of political critique and action.

The chapters on Japan in Part IV confront similar problems historically, building on earlier discussions of ethics and aesthetics to argue for the possibility of an alternative modernity based on national culture. They challenge the invidious comparison of non-Western and modern societies the Weberian view assumes. That assumption was called into question before World War II in the work of the Japanese philosopher Kitaro Nishida, discussed in chapter 8. Like Marcuse, Nishida was strongly influenced by Hegel whose dialectic he applied to show that cultural alternatives haunt the scientific-technical achievements of Western capitalism.

This argument is continued in chapter 9, which explores the relation of rationalization to culture through an example from Japanese literature, Kawabata's *Master of Go*. Kawabata's novel concerns the modernization of Japan as exemplified in a championship Go match. The match symbolizes the confrontation between the old Japan and the new. From the constructivist standpoint the match is emblematic of the bias of modernity. It turns on a single move which, like a scientific fact or technical device, appears to be purely rational. But that move can be intepreted at many levels--strategically, but also socially, historically, aesthetically--in fact the whole content of the novel unfolds around it. The novel reveals the bias of the modernization process represented in that move, and the larger bias of rationality in general. Kawabata's challenge to the false universality of Western rationality suggests the possibility of an alternative modernity based on certain distinctive values of Japanese culture.

Conclusion

This Introduction has argued that the democratization of technical change reflects potentialities contained in the nature of technology itself. Coupling the technical design process to aesthetic and ethical norms and national identities through new and more democratic procedures is no utopia. The technologies of modernity open possibilities not only internal to the particular world they shape, but also meta-possibilities corresponding to other worlds they can be transformed to serve. Technical change is not simply progress or regress along the continuum so far traced out by the capitalist West, but may come to include movement between different continua.

As the postmodern age struggles to make the transition out of the technocratic heritage of the 20th Century, this project will appear increasingly as a practical task. Only if we can concretize the issues on the technical terrain will that transition succeed. Only then will we find out what it really means to live and create in a technological society.