Modernity, Science, and Democracy

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Abstract

Thinking about Western sciences has always also meant making assumptions about modernity and about democratic social relations. Yet in recent decades the standard meanings and referents of all three of these terms--"Western sciences," "modernity," and "democratic social relations"--have come under skeptical scrutiny. This essay will look at three critics of modernity who also examine the political practices and consequences of Western sciences. All three also think postmodernisms to be valuable but merely symptomologies without useful prescriptions for change, and they all propose specific strategies for transforming modern sciences into ones that are empirically more effective and politically more accountable. These are Bruno Latour, Ulrich Beck, and Ashis Nandy. Yet these otherwise valuable accounts each have serious shortcomings which create obstacles to the intellectual and political success of their projects.. Here I focus on one such limitation: their blindness to the gendering of science and of modernity.

Modernity, Science, and Democracy

"The modern" in "modern science" is a relatively uninterrogated and untheorized concept within the sciences and in the philosophy, sociology, and history of science. This is so today at a time when other aspects of Western sciences have been fruitfully explored in critical and illuminating ways, and when the exceptionalism and triumphalism characteristic of Western attitudes toward our sciences have been explicitly criticized and purportedly abandoned by many of the scholars working in science studies fields. By exceptionalism is meant the belief that Western sciences alone among all human knowledge systems are capable of grasping reality in its own terms--that these alone have the resources to escape the human tendency to project onto nature cultural assumptions, fears, and desires. By triumphalism is meant the assumption that the history of science consists of a history of achievements-- that this history has no significant downsides. Hiroshima, environmental destruction, the alienation of labor, escalating global militarism, the increasing gap between the "haves" and the "have nots", gender, race, and class inequalities--these and other undesirable social situations are all entirely consequences of social and political projects, to which the history of Western sciences makes no contribution. Such conventional Eurocentric assumptions no longer can gather the support either in the West or elsewhere that they once could claim.

In recent decades a huge literature on modernity has emerged from the social sciences and humanities. Stimulated by the massive shifts in local and global social formations during the last half of the Twentieth Century, and by the postmodern response to such changes, social theorists, literary and other cultural critics, and, especially, historians have debated the uneven and complex origins, nature, and desirable futures of modernity, modernization, and modernism. Such controversies about modernity are first and foremost about a culture's relation to its past and its possible futures. They arise as ways of asking what went wrong, and what needs to be corrected. The last half century has witnessed the global decline and fall of belief in the unquestionably legitimate authority of the white, bourgeois, male. Contributing to the

epistemological, economic, political, and cultural rubble left by his demise--or, at least, deflation-- have been compelling and influential counter-histories of social relations between the races, classes, genders, and within colonial and imperial eras.

In light of such extensive recent discussions of modernity and its woes, one might wonder whether yet another engagement with the topic could be worthwhile. I think there are two reasons to do so. Most of these accounts do not have modern science and technology clearly in focus, nor do they seem to think that gender relations are relevant to either modernity's crisis or its possible successor. First, the science and technology issue. When these authors are from the humanities or classical social theory and its successors in the West, and whether they are politically on the Right, Left, or Center, science and technology are usually to be found off at the periphery of such accounts. Modernity for them is about exclusion of the influence of religion and kinship in forms of government and citizenship, economy, and education, and about a shift from past to future in social orientation. Such exclusion makes possible the creation of autonomous, rational institutions, including those of value-free modern science and, consequently social progress. Since these scholars are largely unfamiliar with the critiques of exceptionalist and triumphalist science indicated above, they often treat modern sciences as if they played no role in whatever economic, social and political ills lead them to question modernity.

Yet interrogating what is meant by the modernity of Western sciences, and what have been the consequences and will be the likely futures of commitments to modernity in scientific institutions, their cultures and practices, is a more important intellectual and political task than such accounts reveal or comprehend. Such a project poses frustrating questions which challenge familiar ethical and political assumptions, and even seem critical of the psychic framework which well-intentioned academics bring to such a project. Do we have the right to try to answer such questions? Can we, especially those of us who are U.S. citizens, contribute to creating the polycentric democratic political spaces, in Egyptian economist Samir Amin's (1998) phrase, called for by so many critics of the West's modernity who want to encourage the design and

emergence of desirable successors to the West's global hegemony? On the other hand, what are the consequences of our neglecting to engage such issues?

A small handful of critics and defenders of modernity, its political realities and promises, have directly focused on the natural sciences and their technologies. In today's world, they ask, do Western sciences promote or retard the growth of the democratic social relations and social progress which have been taken to be distinctive marks of modernity? Some have argued that these sciences and their philosophies in some respects actually block important directions in the growth of scientific knowledge and toward social progress--though they have different visions of social progress. Here I look at the consideration of these issues by three such critics of modernity who focus on the sciences: the French ethnographer and philosopher of science Bruno Latour (Latour 1993), the German sociologist Ulrich Beck (Beck 1992, 1999), and the Indian science studies intellectual Ashis Nandy (1990).

The analyses of these three are especially interesting in several respects. First, I selected each to represent a distinctive focus in science studies. Latour is an ethnographer and philosopher, one of the founders and continuing contributors to mainstream European-American science studies. Beck brings a background in the German environmental movement and the sociology of labor to thinking about science's role in "risk socety." Nandy has been a continuing contributor to postcolonial science studies and especially to its critique of the disastrous recent effects of Western sciences in the Third World. Second, while all are critics of modernity, all find postmodernism an unattractive alternative. Third, all three argue that science has become a kind of governance which illegitimately bypasses democratic processes. However, fourth, in contrast to postmodern critics of modernity and of modern sciences, all three are optimistic about the possibilities for transforming the sciences into ones that are politically accountable for their practices and consequences and can contribute to social progress. All three call for more science, though they want different kinds of sciences than those favored in the contemporary West. They each strategize about how to democratize science in the service of a radically democratized social order, and how to do so by strengthening and expanding the reach of the

scientific impulse. This set of commitments and projects makes it difficult to categorize any of them as having fully modern or fully postmodern commitments. There is one more feature shared by all three. They are all gender blind--the second reason to critically examine the assumptions and promises of modernity and of its possible successors. Yet accounts of modernity from the social sciences and cultural studies reveal that gender relations are something like the proverbial elephant standing in the living room of modernity but invisible to all but feminist scholars. In ignoring gendered aspects of both their objects of study and of their own accounts, all three deeply undermine the chances of success of their projects. Those of us concerned with social justice need for their projects to succeed, so this lacuna requires attention.

The first section below outlines a few of the dimensions of debates over modernity. The following ones sketch out main claims of these three theorists. Section 5 suggests that these theorists' relations to modernity are even more complex than they have acknowledged in that their criticisms are themselves enlivened, for both better and worse, by central projects of the modern ethos which presumedly they would reject. The final section briefly identifies some of the gender issues which these and other participants in debates about modernity, science, and political theory need to address.

What Counts as Modern?

To begin, "modern" can refer to a temporal era such as the one following the European medieval era, or it can refer to substantive constituents of a society, its structures, practices, and discursive commitments or worldview. (Wittrock 2000)

The temporal notion currently is used in the West with three distinct referents. For philosophers and many historians of science, modern science begins with the scientific revolution of Copernicus, Galileo, Boyle, Harvey and Newton, and modern philosophy begins with Hobbes and Descartes. The early modern philosophers often engaged with implications of the new features of the world which new sciences such as astronomy revealed, and they thought

about the shifts in European social formations which they were experiencing. They thought about the new experimentalism in the sciences, and about the new science movements of their day. (Van den Daele 1977; Shapin and Schaffer 1985).

Yet some historians of science would date the emergence of fully modern sciences later, in the bourgeois revolutions of the Eighteenth Century and the industrial revolution of the late Eighteenth and early Nineteenth Century. They are concerned especially with the increasing power of scientific technologies. Modernization theorists, who produce the second kind of temporal notion of modernity, draw especially on this kind of history of science. Those concerned with modernizing traditional societies, for example in the Third World development policies of national and international agencies and institutions after the Second World War, always focus on transferring to underdeveloped societies, as they were characterized, Western scientific and technological rationality in manufacturing, health care, agriculture and other economic sectors. They take Western forms of modernization to be the only ones as did their Nineteenth Century forerunners such as Marx, Durkheim, and Weber. For such theorists, as well as for some of their critics, modernization is identical to Westernization. Modernization means Western modernization, and science refers only to Western science.[1] Like such Nineteenth Century theorists of modernity as Marx, Durkheim, and Weber, modernization theorists have expected a gradual homogenization of global societies as Western forms of modernity disseminate around the globe. By now, those Third World development policies are widely criticized for further immiserating the majority of the world's poorest citizens whom such policies were supposed to benefit. (Amin 1997, Sachs 1992, Escobar 1995) Feminist work has been an important part of this critique. (Mies 1986, Shiva 1989, Sparr 1994). Moreover, while modernity is now a global condition shaping how all societies engage with the world around them (Wittrock 2000), the expected homogenization of societies around the world has not occurred (Amin 1997, Daedalus 2000).

Finally, for literary and cultural theorists, modernism is the late Nineteenth and early Twentieth Century movement which follows romanticism. T.S. Eliot, James Joyce, Picasso and

Seurat are modernists. This literary and cultural movement has been the focus of what is perhaps the most developed analyses of the gender of modernity (E.g., Felski 1995, Jardine 1985.) though particular aspects of modernity have long been the topic of feminist sociologists and political theorists. "Postmodernism," also, can refer to any one of these three eras. No wonder discussions of "the modern" among people from different disciplines can get confusing.

Yet deciding just when such temporal eras begin and end requires the specification of substantive criteria of the modern which some particular era does or does not meet. Thus the temporal notion collapses into or depends upon the disputed substantive criteria. (Wittrock 2000) Substantive conceptions focus on the emergence of a differentiated social structure with independent political, economic, religious/moral, educational (including scientific) and family structures, and such democratic institutions as representative government and a free press. They usually insist on the presence of a secular world view, the idealization of universal instrumental rationality, and a social orientation toward the future rather than toward the past. They also include several kinds of contradictory tendencies, such as the insistence on universal reason, yet also recognition and even toleration of the pluralism of rationalities, and a critical and self-critical attitude along with severe restrictions on the appropriate targets of such criticisms. And these substantive conceptions contain unarticulated tensions such as the promotion of a continuing global dissemination of the modern alongside tacit approval of a continual reconstitution of modernity's other, the traditional--a point to which we return. (Eisenstadt 2000, Wittrock 2000).

This is the kind of complex and conflicted background against which Latour, Beck, and Nandy undertake their critiques of modernity and their examinations of the tensions between scientific practices and philosophies, on the one hand, and particular modern projects, on the other hand. This background enables them to revision modern sciences in illuminating ways. It also enables us to understand their work somewhat differently from how they understand it.

Latour: Where is a Science for Our World of Hybrids and Networks?

Latour argues that modernity and its sciences have an ontology problem. They conceptualize our knowledge of nature as separate from matters of our interests, of justice, and of power, though it is in fact inseparable.

> On page six [of my daily newspaper], I learn that the Paris AIDS virus contaminated the culture medium in Professor Gallo's laboratory; that Mr. Chirac and Mr. Reagan had, however, solemnly sworn not to go back over the history of that discovery; that the chemical industry is not moving fast enough to market medications which militant patient organizations are vocally demanding; that the epidemic is spreading in sub-Saharan Africa....[H]eads of state, chemists, biologists, desperate patients and industrialists find themselves caught up in a single uncertain story mixing biology and society. (Latour 1993, 1-2)

We live in an incommensurable mix of nature, politics, and discourse.

> Yet no one seems to find this [story] troubling. Headings like Economy, Politics, Science, Books, Culture, Religion and Local Events remain in place as if there were nothing odd going on. The smallest AIDS virus takes you from sex to the unconscious, then to Africa, tissue cultures, DNA and San Francisco, but the analysts, thinkers, journalists and decision-makers will slice the delicate network traced by the virus for you into tidy compartments where you will find only science, only economy, only social phenomena, only local news, only sentiment, only sex....By all means, they seem to say, let us not mix up knowledge, interest, justice and power. Let us not mix up heaven and earth, the global stage and the local scene, the human and the nonhuman. "But these imbroglios do the mixing," you'll say, "they weave our world together!" "Act as if they didn't exist," the analysts reply. (2-3)

Latour argues that the world we experience consists of networks linking aspects of nature, cultural legacies, states and nations, agencies, institutes, corporations, official and unofficial policies, de facto practices, mechanisms and other artifacts, and even deities. Reality consists of such hybrid networks. Yet modernity requires a representation of reality consisting only of

images of purified objects. It delinks nature from culture, appropriate policies and practices from deities, and it delinks agencies, institutes and corporations from mechanisms and other material artifacts. Modernity, its epistemologies, philosophies of science, and its sciences represent a world of broken networks and dismembered hybrids that is not the one in which we live or about which we want explanations. Its sciences are intentionally isolated from the reality that needs explanation, and that practice itself is a culturally distinct one. We do not live in the modern world that the epistemologies and philosophies of science of modernity imagine in their claims to transcend cultural values. We and our sciences have never been modern, he proclaims. We and our sciences are as historically specific, as much in the thrall of our own culturally shaped reality, he implies, as any other culture and its knowledge-system.

Where, Latour asks, are sciences of these networks and hybrids? Not in the laboratories or field sites. Rather such sciences have been developed in the disciplines of science studies, he argues. Its histories, sociologies, ethnographies, and textual studies of moments in the history of Western sciences focus on the relations between knowledge-seeking and the social, cultural, economic, political and even psychic projects of an era. (E.g., Biagioli 1999) Latour is not a fan of feminist contributions to this field, but they have been significant. (E.g., Braidotti 1994, Haraway 1989, 1991, Harding 1986, 1991, 2003) Moreover, we can note, though Latour does not, such studies have been expanded by postcolonial scholars to include scientific, instead of triumphalist and Eurocentric, investigations of other cultures' knowledge-systems and of relations between the knowledge projects of the West and those of other cultures. While Latour appears to be unaware of the increasingly large literature with just such a focus that has been developing in these extensions of science studies over the last three decades (Harding 1998a, Hess 1995, Petitjean et al 1992, Sachs 1992, Sardar 1988, Selin 1997), he is nevertheless critical of the West's traditional negative attitude toward other cultures. And his account opens the door to understanding the necessity of reevaluating other cultures' knowledge systems, though he does not himself step through that door or, more likely, even see the value of such a move.

Latour does not wish to abandon the West's Enlightenment project, in contrast to some other critics of Western philosophies of science. Instead, he proposes that we redefine the Enlightenment to exclude its vision and practices of modernity. Thus he is opposed to both the illusion and what he understands as the ideal of modernity. However, he is not anti-modern, he says, since the modern never has existed; he is only against taking as real the imagined world of modernity's sciences. And he is critical of postmodernists because, he says, they simply give up and enjoy the confusion of the present moment without trying to improve the sciences or their faulty ontology.

> Postmodernism is a symptom, not a fresh solution....It senses that something has gone awry in the modern critique, but it is not able to do anything but prolong that critique, though without believing in its foundations. Instead of moving on to empirical studies of the networks that give meaning to the work of purification it denounces, postmodernism rejects all empirical work as illusory and deceptively scientistic. Disappointed rationalists, its adepts indeed sense that modernism is done for.... (46)

Latour proposes that we think instead in terms of the "a-modern." More competent sciences as well as the political work of constructing democratic social relations both require reuniting aspects of the world which modernity keeps sundered. "Half of our politics is constructed in science and technology. The other half of Nature is constructed in societies. Let us patch the two back together, and the political task can begin again." (144) This project will be difficult. But "[t]he task of our predecessors was no less daunting when they invented rights to give to citizens or the integration of workers into the fabric of our societies." (145)

Thus Latour links failures of the modern political project to failures of its knowledge project, though he is vague about just what the former project and its failures have been. Advancing democratic social relations as well as restoring the environment, another important political project, both require a scientific study of kinds of objects around us that modernity has banished from view. It is the recently emerging field of science studies that has developed the resources to engage in such work, he argues. Such studies bring systematic scientific

assumptions and methods to the description and explanation of the hybrids and networks which constitute reality.

In a later book Latour illuminatingly expands his criticism of the standard conceptual framework of modern sciences which he delineated in the 1993 study. He also takes on the task of trying to redefine “the political,” recognizing that if sciences and what we know of nature are inevitably infused with social and political assumptions, interests, and desires, then revising science requires revising politics also. I recomnmend the part of this book on the faulty standard philosophy of science, but I think that the way he developes “the political” is excessively contained by distinctively French commitments to “republican democracy.” At least he understands the need to take on such a project.

Beck: The Incomplete First Modernity of Industrial Society

Ulrich Beck argues that a "risk society" has emerged alongside modernity's industrial society. Modern sciences and technologies have enabled industrial society to create terrifying global risks. Now we live in a context of generalized employment insecurity. We fear the kind of economic crises that have sunk national economies virtually overnight. We fear pandemics such as AIDS, SARS, or Asian Bird Flue which can quickly spread around the world with little warning, little possibility of immunity, and often few known remedies. New kinds of environmental destruction seem daily to threaten our lives and the natural resources upon which human life depends. Damaging forms of radiation, whether from armaments, power plants, or work sites, seem impossible to predict let alone to eliminate or control. "Everywhere pollutants and toxins laugh and play their tricks like devils in the Middle Ages. People are almost inescapably bound over to them. Breathing, eating, dwelling, wearing clothes--everything has been penetrated by them." (1992, 73) The effects of genetically-modified foods appear to be little known, yet it seems impossible to stop agribusiness from producing and selling them. And there are the dangers from second-hand smoke, mad cow disease, urban crime and violence, and a host of other contemporary phenomena--including, now, biological, chemical, and military terrorism-- all of which are enabled through modernity's sciences and technologies. However isolated from

cultural, social, and political influences scientists may imagine their work to be, the consequences of their work today are always already embedded in cultural, social, economic, and political possibilities for those with the power to turn such possibilities into actualities.

Who is to blame? Everyone and thus no one seems responsible for these risks. No one is held accountable for them. It is impossible to prove with a reasonable degree of certainty that the toxic industry upstream, the tobacco industry, or agribusiness's use of pesticides and chemical fertilizers was responsible for a particular pattern of increased cancer rates, or that blame for urban violence or terrorism should be placed on the hugely expanded, profitable, and minimally regulated arms industry. Scientific technologies seem out of control politically. Thus we all seem doomed to have to continue to countenance these increased threats to life and health. We live in an environment of manufactured uncertainties and institutional irresponsibility.

Beck argues that this risk society is not the consequence of failures of modern industrial societies but of their successes. Beck's question is "How can the risks and hazards systematically produced as part of modernization be prevented, minimized, dramatized or channelled?" (1992, 19) Modern sciences, their epistemologies and philosophies of science have permitted the development of only semi-modern societies, he proposes. Moreover, these sciences and their philosophies are not likely to look kindly on the kinds of transformations necessary to make possible fully-modern societies and their more self-critical, reflexive, sciences. They will resist the development of sciences which stand a chance of eliminating or even diminishing the extent and power of the risk society. The problem is that modern sciences profit too much from risk society. "[S]cience is one of the causes, the medium of definition, and the source of solutions to risks, and by virtue of that very fact it opens up new markets of scientization for itself." (155) The actual and perceived threats of the risk society are created by modern sciences and their technologies. However, it is also modern scientific and technological experts who are called on to analyze and measure for us these risks. Finally it is just such experts who are then called upon to "solve" the threats of the risk society. The risk society is knowledge-dependent. Thus modern sciences and technologies are profiteers dependent upon their monopoly on the production of

truths, and thus on the continuation of the very risks their epistemologies and philosophies of science made possible in the first place. Here is another way in which we can see how science has become a form of governance, a way of "ruling" our lives. Decisions that will affect how we live (and die!) are made on scientific and technological grounds that bypass the democratic processes to which political decisions are supposed to be subjected.

How are we to escape this dreadful scenario? Beck's solution calls for completing the modernity which, he argues, industrial society only began. He conceptualizes the present moment as a break or shift in modernity. The risk society is the consequence of incomplete modernization.[2] We have experienced only the first, industrial modernity, he argues. Only more strongly reflexive practices can open up scientific and technological decisions to appropriate democratic rule. We need the second, reflexive, modernity which can provide more extensive scientific knowledge-seeking, broader rationality and greater objectivity. By 'reflexive' he means self-critical.

> ...[T]he framework of risk society again connects what have been strictly discrete areas: the question of nature, the democratization of democracy and the future role of the state....Risk society demands an opening up of the decision-making process, not only of the state but of private corporations and the sciences as well.... (1999, 5)

A "democratization of democracy" is needed, he argues.

Beck pointed out why we should expect resistance to such an opening up of decision making. Yet he has another insight which leads him to be optimistic about the possibility of such a transformation. Such a transformation can occur through the expansion of science. There are two ways in which such a process is already under way, he points out. One is the dissemination of the scientific attitude and practices into the systematic study of sciences and technologies themselves: the development of "sciences of science" in the field of critical science and technology studies. This is one way in which the production of scientific knowledge has escaped the monopoly of laboratory and field scientists. Scientists do not and should not be given the “last word” on the nature of their own enterprise, the “culture of science” in which they

are the “natives.”. After all, one could point out, they always recommend against such a practice with respect to other groups of “natives.” Beck cites Latour's work as an example of this kind of critical science and technology studies (while disagreeing with Latour's claim that "we have never been modern.") (1999, 150-152) We need a reflexive modernity, he argues, one that can scientifically, describe, understand, and explain its own principles and practices, which industrial modernity cannot.

There is a second way in which the risk society itself has inadvertently expanded scientific practice, Beck points out. In the risk society, every one of us must participate in the production of reliable knowledge. We must do so because the first modernity proliferates experts who continually disagree with each other. "...[E]xperts dump their contradictions and conflicts at the feet of the individual and leave him or her with the well intentioned invitation to judge all of this critically on the basis of his or her own notions." (1992, 137) Consequently, "science becomes more and more necessary, but at the same time, less and less sufficient for the socially binding definition of truth." (1992, 156) Are smoking and second-hand smoke harmful or not? Do vitamins and herbal remedies improve our health and longevity? Which ones and how much should we take? Should we increase our intake of fish, since fish oils seem to provide protection against various forms of cancer, or decrease the amount of fish in our diet since fish seem to pass on environmental toxins? Should we take the radiation and chemotherapies recommended by Western biomedicine to stop the growth of cancers, or the herbal remedies recommended by German pharmacologists? Will the benefits of genetically modified foods outweigh their risks? Is global warming increasing, and if so what should we do about it? The proliferation of conflicting expert opinions on such topics requires that each of us must figure out how to make informed decisions about our own nutrition, health, and safety and that of our children and other dependents. We are forced to become part of the production of scientific knowledge. The production of scientific knowledge escapes the monopoly of scientist experts in this second way.

Both cases of the expansion of scientific processes contribute to a democratization of science in which previously inaccessible political processes are made observable. Like Latour, Beck inveighs against the division of the world into nature, culture, and discourses. There is no pure nature or pure culture, let alone disembodied and de-cultured representations of either. Like Latour, Beck also rejects postmodernisms since they simply abandon the crises of the risk society. "A new kind of capitalism, a new kind of economy, a new kind of global order, a new kind of society and a new kind of personal life are coming into being....This is not 'postmodernity' but a second modernity..." (1999, 2).

> Where most postmodern theorists are critical of grand narratives, general theory and humanity, I remain committed to all of these, but in a new sense. To me the Enlightenment is <u>not</u> a historical notion and set of ides but a process and dynamics where criticism, self-criticism, irony and humanity play a central role....[M]y notion of 'second reflexive modernity' implies that we do not have <u>enough</u> reason...in a new postmodern meaning to live and act in a Global Age...of manufactured uncertainties. (1999, 152)

Like Latour, Beck is also optimistic. Needed transformations of the first modernity's sciences and social relations are already underway. Beck's social theory is more robust and comprehensive than Latour's; it provides more clues to how and where progressive transformations can and, perhaps, are already occurring. This project is pursued in later books, and especially in <u>The Reinvention of Politics: Rethinking Modernity in the Global Social Order</u> (1997).

Beck's controversial writings have had great influence on German and European social theory. He has also been criticized on a number of grounds, most notably for underestimating the continuing power of class (Draper, 1993; New 1994), especially in global contexts, for essentializing science and failing to sufficiently analyze its political/economic content (Boyd 1993), for conflating the reality and the perception of risk, and for regarding as general a situation which is more distinctive to Germany than to other parts of the world. He has also been charged with overemphasizing the rift between a first and second modernity, and for taking the

ideology of modern science for its reality. He responds to some of these criticisms directly in the last chapter of Word Risk Society (1999), and indirectly in such other writings (see, e.g., his 1997). Whatever the limitations of his account, he has conceptualized in provocative ways important questions about how contemporary science functions as a kind of governance of our daily lives behind the back, so to speak, of democratic political processes. He also offers alternatives to both the current politics of modernity and its sciences and to postmodernism's fatalism. He points to valuable ways in which scientific expertise already is escaping the monopoly of natural scientists.

Both Beck and Latour mention science and Western modernity in their global contexts, and criticize Western attitudes toward other cultures. Indeed, Beck's 1999 book focuses on this topic. Yet neither exhibits the kind of deep grasp of this issue that can be found in postcolonial science and technology theorists. There are deep differences between various tendencies in this now rich literature. (See, e.g., Harding 1998 and Hess 1995 for overviews of central themes in these writings.) Yet Ashis Nandy articulates themes common to most of them.

Ashis Nandy and Postcolonial Science and Technology Studies

Postcolonial science and technology studies have produced a distinctive vision of modern Western sciences and their philosophies. The origins of this field can be found in attempts to reevaluate objectively--outside the familiar Eurocentric exceptionalist and triumphalist framework-- indigeous scientific and technological traditions in ex-colonized societies, and in criticisms of the imperial and neo-colonial character of the new Third World development policies in the 1950's. Development was from the beginning conceptualized as the transfer of Western sciences and technologies, and their distinctive rationality, to the so-called underdeveloped societies. Thus the practices and philosophies of Western sciences and technologies would be implicated in the successes and failures of Third World development. This point has been virtually invisible to Western philosophies of science which still focus for the most part on what happens in laboratories in Europe and the United States. These

postcolonial science and technology studies emerged as a distinctive field in English-language writings by the early 1980's, and so have now accumulated more than two decades of books, articles, journals, conferences, manifestos, websites, and a significant presence in ongoing projects of United Nations organizations as well as other national and international institutions and agencies. There have always been at least a sprinkling of Western activists and scholars involved in these projects.[3]

Meanwhile, studies of "multiple modernities" have appeared. (Daedalus 2000) Interestingly, modern sciences and technologies, Western or not, are barely mentioned in this work. Yet many of its assumptions and arguments appear also in postcolonial science and technology studies. One shared point is that modernity is not the same as Westernization. At least some non-Western societies are clearly modern, with differentiated social institutions, multiple political parties, representative government, a free press, or some combination of these, as well as highly developed technology and science sectors. (Consider, for example, India and South Korea.) Yet they look very different from modern Western societies. Often their sciences look different, for they overtly combine elements of modern Western sciences and of traditional knowledge systems, including their local values and interests. Many of the elements the theorists of modernity presumed were requisite for modernization are missing in these cases. For example, they often do not give up central elements of their traditional identities. Their sciences are often openly infused with traditional religious and cultural assumptions and projects.[4] Thus, in spite of increasing global economic, political, and cultural linkages, global homogenization has not been the consequence of the dissemination of modernization, its sciences and their rationality. Instead we have a world of "indigenous modern knowledge systems." Indeed, Latour and Beck, like the postcolonial theorists, both identified distinctively Western features of Western modernity's sciences. Are these "incomplete modernities" (Ortiz 2000) or simply different modernities? Does regarding them as incomplete invariably retain Western standards for modernity?

Here the focus will be on just one leading figure in the postcolonial science studies debates, the Indian psychologist and science theorist and activist, Ashis Nandy. His discussion of Western modernity's sciences expresses kinds of criticism widely articulated in the various streams of postcolonial science and technology studies. Nandy's work has made him a well-known and controversial intellectual in India as well as in the West. The Intimate Enemy: Loss and Recovery of Self Under Colonialism (1983) is the book most familiar to Westerners. He is the author or editor of some 13 other books, including one on racism in the West, reflections on Adorno and Marcuse, on environmentalism in India, and many other topics. In most of these writings he has focused on knowledge systems. As one observer puts his main point:

> How is it, as Nandy has asked, that the notions of modernity, science, development, and instrumental rationality have come to predominate in our understanding and ordering of the modern world, and what have been the consequences of imposing, largely through the mechanisms of colonialism, nationalism (the purported opposite of colonialism), and now the nation-state, these supposedly natural categories, upon the entire world? (Lal 7)

With this background in mind, I focus here on the particular issues he raises in his essay "Science as Reason of State"(1988). These bring into focus some themes shared with Latour and Beck's criticisms of science and modernity and some that are distinctive to postcolonial science studies.

In this essay Nandy focuses on the fact that modern sciences and technologies were developed by the Indian government after the end of British colonization as a way of claiming the power and potential global influence of the Indian state. India saw the establishment of state-of-the-art scientific and technological institutes and the training of huge numbers of Indian scientists and engineers as the way for India to excel at activities highly valued by and politically advantageous to the West, and to insert itself into the highest level of global politics.[5] Today India has the third largest scientific and technological workforce in the world. Large segments of it are located in "off-shore" research elsewhere in Asia for U.S. corporations, in Silicon Valley,

U.S. and European university science departments, and other science and technology sites in the West.

Nandy points out that like the space programs in the U.S., the Indian science and technology initiative clearly had military and commercial benefits. Also like the space programs, it also served nationalism, increasing the global status of the Indian state. Such a triumph justifies the means through which it was achieved which could not stand the scrutiny of democratic processes. That is, this state project was not the result of the democratic political processes to which the Indian government is supposedly committed. The status of science and technology was used as an excuse for the Indian state to install political programs--science and technology programs-- which bypassed democratic decision processes. Science became a "reason of state." But Nandy is not just making another “external” criticism of modern science. Instead he asks what it is about modern science itself that permits it to invite the state to develop and use scientific knowledge outside democratic processes. He is concerned not only about modern science as practiced in India, but also in the West, of course.

This question about the nature of science is a crucial one, Nandy argues. Through the application of scientific and technological expertise justified by appeals to social progress, violence is permitted around the globe against nature, cultures, and the Third World. Purportedly progressive scientific and technology projects destroy the environments upon which the world's poorest citizens directly depend for their daily subsistence, and upon which all of us and the generations following depend. They deny cultures democratic participation in decisions which have powerful effects upon their living conditions. “[M]odern science has the capacity within it to sustain a culture of science which is incompatible with democratic governance as well as with the democratic rights of those who are turned into the subjects of modern science and technology.” (10)

Scientific projects produce a massive silence about the future of the Third World which is being further immiserated through the practices and consequences of scientific and technological projects. He argues that in the imagination of Western states and their scientific and

technological thinking, apparently the Third World is to be discarded. It is to exist for the extraction of raw materials, to serve tourism, as the recipient of toxic industries and toxic dumps, and as a source of labor in such projects there and to meet labor needs in the West. (See also Amin 1997) We can add that it also serves as a consumer of the Western arms industry. Perhaps "exploited" is more accurate than "discarded" to characterize a segment of the world which is part of global networks so vital to Western interests; nevertheless, Nandy's point is well-taken.

Particularly disturbing to Nandy is "...the manner in which the link between science and violence in India has been strengthened by forces within the culture of Indian science, forces which in other cultures of science in some other parts of the world have been either less visible or less powerful." (6) The Indian science establishment,

> on its own initiative, has taken advantage of the anxieties about national security and the developmental aspirations of a new nation to gain access to power and resources....[T]he privileged among Indian scientists have often been the most vigorous critics of civil rights group struggling for protection against the hazards of a callous nuclear establishment. (6)

Thus it was not some totalitarian external power which forced the scientific establishment to state agendas. Rather, the scientific community used state and popular anxieties to advance its own status.

Nandy calls for the "repoliticization" of science. By this he means the establishment of an ongoing political audit of the effects of science projects by those external to the sciences and to the states at issue. "[T]he intellectual challenge is to build the basis of resistance to militarization and organized violence, firstly by providing a better understanding of how modern science or technology is gradually becoming a substitute for politics in many societies, and secondly by defying the middle-class consensus against bringing the estate of science within the scope of public life or politics." (10) In this respect, protest movements and their critical science studies writings can help to make "every man his own scientist"--to democratize decisions about what kinds of scientific and technological knowledge to seek and who will receive the benefits

and bear the costs of such projects. India needs to reexamine and reedit its own scientific traditions, incorporating aspects of Western sciences where desirable. Similarly, Western societies need to engage in such a project with respect to their own traditions.

India and other Third World societies could provide models for the West in this respect, Nandy argues. India has had some six centuries of interaction with the West, two of which were as colonies of England. It has a deep familiarity with Western knowledge systems as well as, of course, with its indigenous systems.

> ...the Indic civilization today, because it straddles two cultures, has the capacity to reverse the usual one-way procedure of enriching modern science by integrating within it significant elements from all other sciences--premodern, nonmodern and postmodern--as a further proof of the universality and syncretism of modern science. Instead of using an edited version of modern science for Indian purpose, India can use an edited version of its traditional sciences for contemporary purposes. (11)

Thus India, "by virtue of its bicultural experience, manages to epitomize the global problem of knowledge and power in our times." (11) Its strategies for resisting the substitution of science for politics by democratizing science and technology, and for strengthening a modernity which is not identical to Western modernity, can serve as an important model or social experiment for Western societies.

Still Modern, Still Traditional

Each of these theorists of modernity and its sciences has drawn to our attention distinctive aspects of the current crisis. Each criticizes the limitations of the modernity and its sciences that we have had. Each criticizes the inability of postmodernism to provide solutions to these limitations. Each focuses on the tensions between the commitments of Western societies to democratic processes of governance, on the one hand, and, on the other hand, the authoritarian ways that scientific and technological decisions are made, decisions which "govern" our lives in powerful ways. Each calls for democratizing science in the sense of

extending critical scientific practices to the examination of sciences themselves, and providing an "audit" of which groups bear the costs and which receive the benefits of the practices and consequences of particular scientific projects.[6] Each proposes ways to transform, update for the present world, and democratize modernity and its sciences, while Nandy also suggests that such projects in the Third World can serve as models for the Western ones. All three are optimistic about the possibilities for successfully engaging in such immensely challenging projects.

One could argue that the ways that these theorists relate their concerns to issues about modernity, pro and con, are not the most important or valuable parts of their rich analyses for those interested in relations between systems of knowledge and of democratic governance. This may be so. Yet I suggest that because issues about how a culture thinks about modernity are issues about its relation to its past and to possibilities for the future, we should resist the temptation to dismiss the modernity issues as irrelevant to the scientific and political projects of these theorists. Moreover, it is interesting to note that the relationship of their accounts to modernity remains more complex than their pronouncements about it acknowledge.

Still Modern. For one thing, in several significant senses of the term all three of these analyses are fully inside modernity's program. Of course Beck already frames his analysis as demonstrating the need for an even more completely modern program than the first modernity, industrial modernity, embraced. And Nandy calls for multiple modernities. As several commentators on Nandy's work have pointed out, Nandy's relation to modernity is far more complex than a simple rejection or affirmation can convey (Lal 2000). Yet all three theorists' projects can be understood as centrally modern ones in more conventional ways. This becomes clear once we keep firmly in mind the insistence of Nandy as well as of others that modernization does not have to--indeed, should not-- mean only Westernization (See, for example, Philip 2003, Prakash 1999, and the Daedalus 2000 essays).

Consider how all three accounts exhibit a good part of the classical set of substantive characteristics of modernity indicated earlier. All three emphasize the importance of active, human agency in transforming the sciences we have. All appeal to the reasonableness, the

rationality, of their proposals as a motivation for voluntary action. All three stress the importance of bringing the sciences and their philosophies under the control of commitments to a rational and democratic social order. Thus all three are committed to social progress. All three call for an expansion and intensification of science's self-critical attitude and practices, specifying distinct aspects of science which need criticism. All articulate an historical consciousness, insisting on conceptions of sciences as fully inside not only the conventional intellectual histories, but also social, cultural, economic, and political histories.

Moreover, from its origins modernity has promoted pluralism and protest movements. All three specifically assert the value of multiple, culturally distinctive sciences. And all are engaged in precisely the kind of protest, and protest movements, that have been prominent in the history of modernity (whether or not one fully agrees with the agendas of these movements). Furthermore, all three contribute to contemporary struggles over the appropriate definition of the realm of the political. Contrary to the standard view that politics occurs only in and about formal governmental structures, these theorists argue that expert scientific decisions are inherently political, for they disenfranchise those groups which don't count as experts from participating in decisions about the basic conditions of their lives--conditions which determine whether they will live or die.

Finally, one could argue that all three represent an unfortunate, but not accidental, tendency in modernity in that they ignore women's issues and, in particular, women's relation to modernity and its sciences. They treat women as if they existed outside the realm of the social and political; we could be led to think that perhaps women are just a natural phenomenon. And these theorists are writing not in the Nineteenth Century when they would have had to have struggled to produce the kinds of feminist analyses which emerged three decades ago, but in the 1990's, when gender analyses are to be found virtually every day in the newspapers and other media. This is not to say that these authors have no appreciation at all of feminist work. Indeed, Latour gestures to Donna Haraway's work, Nandy has voiced support for some feminist issues, and Beck evidences a most fulsome appreciation of the political importance of women's

movements in his 1997. Yet none engage with feminist science or modernity critiques; none take women to be agents of the transformations of science of interest to them.[7]

Thus it appears that these three severe criticisms of conventional forms of modernity are still fully within the historical ethic and practice of modernity in a number of ways--a claim to which perhaps none of the three would object. Yet the plot thickens, for it turns out that modernity's projects are always dependent on the persistence of premodern skills and practices.

Still Pre-modern The power of appeals to the modern always depend upon the continued discursive construction of its opposite, the traditional. "The modern" is always defined in relation to this partner. Or, to be more precise, modernity continually discursively recreates the power of the threat of the traditional as its own rationale. This is one way in which modernity does and must continually reproduce the pre-modern as its necessary Other which is both outside it and yet inside its discursive framework..

But it is not the only way. Modernity also hides its reliance on actual pre-modern skills and practices. Modernity cannot make its way in the world without the skilled, "expert" work, one could say, of people who can and will continuously translate, network, or otherwise link modernity's conceptions and activities to traditional ways of living in and interacting with the world around us. In this way also modernity perpetuates the pre-modern inside itself, so to speak. Or, to put the point another way, modernity can only exist within an unacknowledged cocoon of pre-modern skills and activities. A couple of examples can clarify this issue.

In an earlier essay I argued that if we take the standpoint of the economically and politically most vulnerable women in the Third World--those who have been a main target of First World so-called development aid--we can come to understand an aspect of modern scientific rationality which is hard to see from the perspective of those of us who most benefit from it here in the First World. (Harding 1998b) This is that modern scientific philosophies and modernization practices can only succeed if they continually reproduce social practices which they associate with the premodern. Premodern cultures and their knowledge-seeking practices are <u>inside</u> modernity and its sciences in this sense.

Consider how this phenomenon became visible to feminists engaged in the debates over women's work, environmental destruction, and Third World development. Early feminist criticisms of development policies argued that women around the world were being left out of development. The kind of scientific and technological training which made possible greater access to agricultural and manufacturing jobs for export production had been restricted to men. This was because Europeans and Americans in the development agencies and their funders perceived such jobs as men's work regardless of which gender had performed traditional forms of agricultural and manufacturing labor in Third World societies. Modern production was consistently gendered as masculine. Thus men were drawn into modernized work in distant cities or plantations, leaving women, children, the old and the sick behind to survive on their own largely without benefit of adult male economic or social assistance. The early feminist argument went that women, too, should be educated so that they could access such means of livelihood. Modern work didn't have to be gendered. Androcentric development policies were unfairly leaving women behind with access only to premodern forms of work and community, and under conditions of deprivation at that.

However, it soon became apparent that there was another story to be told about such development processes. Maria Mies (1986) argued that development policies succeeded, when they did, only because they legitimated the appropriation of women's and peasants' land rights. They did so through processes much like the enclosing of the "commons" in industrializing Europe and the United States in which public grazing and agricultural lands were transferred to private owners. Moreover, the labor of women and peasants was appropriated from subsistence work for their own kin and communities into the capitalist agricultural and manufacturing export economies favored by Northern corporations and international agency sponsors. Mies pointed out that the Marxists were wrong; "primitive capital accumulation" had not ended by mid-Twentieth Century, but rather continued through Third World development policies and practices. The families and communities dependent on women's domestic labor were left even more the responsibility of women alone, who now had to replace through low-paid labor for

local and international industries, as well as through sex work and domestic labor far from home, the economic contributions that had been provided to them, their dependents and communities through their work and their men's work on their own lands.

Thus the claimed social progress of modernization could only be achieved through social regress for women and peasants. Women and peasants lost their premodern rights and ways of living, though their premodern labor was and remains a necessary part of modern scientific agriculture and manufacturing. Indeed, someone must reproduce the next generation of agricultural and manufacturing laborers. The new forms of pre-modern labor of women and former peasants were created through modernization processes; they are not an anachronistic residue of premodern conditions. As Beck put a similar point about women's continuing contemporary "feudal" household labor in the North, modernity transformed a form of oppression and exploitation that existed outside capitalism into a different one that was central to the successes of capitalism. (Beck 1992, Ch. 4)

Third World development policies and practices thus exemplified the pattern earlier detected by historians whereby women's political and economic regress often is an enabling condition for "progress for humanity." Joan Kelly-Gadol (1976) had drawn attention to the persistence of this phenomenon, focusing in particular on how women consistently lost legal rights, economic power and social status at moments of so-called democratic progress from Fifth Century BC Greece through the European industrial revolution and the Jacksonian era in the U.S. In spite of the benefits “social progress” has brought to some groups of women, on balance women in every class tend to lose social status and material benefits in such processes. Women’s losses thus constitute a "contribution" to so-called human progress.

This reproduction of the premodern within modernization processes has now also been described with respect to the introduction of modern sciences and technologies themselves into traditional societies. For example, Japanese philosopher and historian of technology Junichi Murata (2003) describes how the creativity of an advanced sector of modern technology has depended upon the restriction to culturally acceptable patterns of the flexible ways it may be

interpreted or linked to local practices. This adaptation is provided by the traditional technology sector in Japan.

> One of the most conspicuous characteristics of the modernization process in Japan is the dual structure of its sociotechnical network with an advanced sector of modern technology and a parallel domestic sector of traditional technology. The advanced sector functions as if transferred technology guides and determines the way of modernization. In reality, however, the advanced sector interacts with the domestic sector, where traditional technology plays a role of instrumental rationality, decreasing the gap between the two sectors sufficiently that advanced technology becomes adapted to local practices. Through this interaction, the scope of flexivity is restricted, the process is channeled in a certain direction, and rapid and continuous adaptation and development of technology becomes possible. (Murata 263)

The very abstractness and generality of modernity's sciences and technologies permit them to be interpreted in many different ways and thus to be practiced, applied, or interpreted in many different cultural contexts. But in each case, such abstract and general principles must be connected to local cultural resources, values, and interests. This task can only be done through pre-modern "craft labor." In such accounts we can see another way in which the intellectual and social progress achieved by modern scientific and technological rationality in fact depends upon the continued nourishment of pre-modern, traditional local modes of thought and practice within modern practices.

My point here is, first, that it is a mistake to think that modern ways of thinking and acting could ever completely replace pre-modern ways, as the classical modernization theorists supposed. Thus the spread of modernization globally does not have a homogenizing effect on cultures, as the theorists predicted. Rather, the advance of modernization requires the continual culturally-local adaptation and realignment of pre-modern thinking and acting. They do not disappear, but rather adjust themselves to “the modern” as they adjust their particular, local part of “the modern” to culturally distinctive values and interests.[8] Modernity's commitment to trans-

cultural abstractness and generality insures that it can only be practiced in ways pre-modern thinking and practice can interpret. This realization provides yet another reason to question the kind of temporal specification of modern societies which locate them after traditional ones. Rather, it appears that the former emerge within or alongside traditional societies. Moreover, to the extent that the three science theorists discussed adopt the temporal specification of modernity, they fail to engage with modernity's persistent and necessary dependence upon tradition skills and practices.

Two Missing Foci. This brings us to two issues underengaged in these accounts. One is the role already being played by existing practices of social justice movements, such as some environmental movements, anti-racist movements, and feminist movements in developing and putting into practice precisely the programs recommended by these theorists. Of course Nandy speaks from the history and practices of the lively postcolonial science movement and points to its importance in agitating for political audits of science and technology programs. And Beck (1997) emphasizes the importance of environmental movements and of "subpolitics," by which he means social movements. Yet critical examinations of the gender of modernity (Felski 1995, Gole 2000, Jardine 1985, Philip 2003) and of androcentrism in science and technology projects and their philosophies, North and South, are virtually unacknowledged in the thought of all three theorists. (See earlier citations.) Gender analyses have charted the distortions and political damages created by the hyper-masculinization of modernity and its scientific and technological projects. Third World feminist criticisms of development policies have specifically focused on their androcentrism as well as their racism, colonialism and imperialism. These identify how such androcentrism further disempowers not only the half of the Third World constituted by women and girls, but also the other half, the male half, which depends upon the knowledge and labor of women to maintain families, the elderly and sick, and the community relations and resources upon which men and boys depend, as well as to produce cash income. The range and power of gender analyses is too big a topic to pursue further here, but its necessity should be noted. The "modernities" on which Latour, Beck, and Nandy focus are distinctively gendered,

and the remedies to their scientific and political limitations must directly engage with these gendered aspects of the democracy to which these theorists aspire is to be achieved.

Another absence from these accounts is recognition of the relatively recent change in the economic status of the production and management of information. This kind of work has moved to the "base" of the global political economy thanks to the development of electronic media, especially the internet. (Castells 1996ff) The production and delivery of goods (food supplies, manufacturing components, retail store stocks), as well as scientific research, and international environmental policy are now organized through the Web, e-mail, and cell phones. So are terrorism, criminal activity, and progressive political protests. New configurations of scientific communities have emerged following the 1989 end of the Cold War and the huge migration into expertise-hungry private industry of scientists whom university laboratories no longer had funds to employ. (Gibbons et al 1994, Nowotny et al 2000) New forms of capitalist production are complicating the traditional understandings of modernity's rationality in yet further ways. (Kleinman and Vallas 2001.) A large-scale map of possible future directions of capitalist expansion and of possible effective forms of resistance to it are required for effective planning for democratic sciences in democratic societies. (E.g.,Amin 1997) The West's prevailing philosophies of science, modernity, and democracy are ill-equipped to enable democratic policies for directing these new social relations. Latour, Beck, and Nandy have provided helpful clues for how we might begin to rethink central aspects of this new production and management of information, but none provide the conceptual resources to grasp such phenomena in maximally inclusive and effective ways .

In conclusion, there is a tendency among both defenders and critics of modernity in the humanities and in social theory to neglect or undervalue the role that modern sciences have played in advancing modernity and modernization projects, and to misunderstand the relation between the modern and the traditional. Reflecting on the arguments of these three critics of modernity enables us to appreciate how historically specific forms of knowledge-production always are co-constituted with specific forms of governance and of public politics. Today, when

the production and management of information have moved to the base of the global political economy, and when sciences' power to govern behind the back of democratic political processes is at its all-time high, we certainly cannot afford to ignore identifying fully the actual links between scientific practices and democratic principles, nor can we ignore the need to debate in maximally democratic spaces goals and strategies for change. We cannot afford to turn our backs on our own actual and desirable embeddedness in a modernity which has consistently defined itself against the feminine and the traditional, both of which are firmly lodged, and necessarily so, in its very core.[9]

1

Though Marx had a more ambiguous assessment of modern science, which has left his intellectual heirs today on at least two opposing sides of debates over modernity and its sciences--a topic I cannot here pursue.

2

Here one could argue against Beck that the risk society is the result of a central failure of modernity, namely its restrictions on the modern project, its imposed limits on the scientific impulse, and its devaluation of the ethics and politics of science. Beck could respond that he means to point to how the modern project restricted its own goals to precisely the kinds of successes which have produced these problems.

3

A few of the important works here are Adas 1989, Blaut 1993, Braidotti 1994, Brockway 1979, Crosby 1987, Goonatilake 1984, 1992, Haraway 1989, Headrick 1981, Hess 1995, Joseph 1991, Kochhar 1992-93, Lach 1977, Maffie, McClellan 1992, Nandy 1988, Needham 1954ff, Petitjean et al. 1992, Philip 2003, Prakash 1999, Reingold and Rothenberg 1987, Sabra 1976, Sachs 1992, Sardar 1988, Selin 1997, Shiva 1989, Third World Network 1988, Watson-Verran and Turnbull 1995. See also Harding 1998a.

4

I say "openly" in contrast to the widespread but unacknowledged permeation of Christian assumptions in European/U.S. sciences and their philosophies, as historians of science point out. (Needham 1969, Noble 1992, 1995) And, of course, Western sciences and their philosophies also contain distinctively Western economic, political and social assumptions beyond the religious ones.

5

See Prakash 1999 for another illuminating account of this history.

6

It is useful to refer to this extension of critical scientific practices as "politicizing science" by returning issues of governance to the realm of public discussion and political decision. Yet it would be as reasonable to refer to the processes by which scientific institutions come to monopolize scientific and technical decisions that have political consequences as the politicization of science. Such processes surreptitiously redefine as merely scientific or technical issues fundamental political issues of how we shall live our lives, who shall receive the benefits and who bear the costs of scientific and technological work, which, incidently (for financing is not the main issue here), is itself financially supported by the citizenry. The scientific

monopolization of what are fundamental political issues removes from the public realm discussion of how we shall be governed. I borrow this point from Proctor's (1988) discussion of how the Nazis politicized science.

7

The relations to feminism of Latour and Nandy deserve more critical assessment than I have here given them, as some readers will be aware. On the other hand, Beck is more eloquent in his overt appreciation for the power of the women's movements than I have indicated. Nevertheless, he does not engage with their work on science or modernity. He doesn't see them as making any distinctive contribution to the kind of project he is advancing.

8

See, for example, Prakash's (1999) illuminating discussion of this kind of process in India.

9

Other versions of this essay will appear in Modernity in Transit/La Modernite en Transit, ed. Pascal Gin and Walter Moser, Toronto: Les Editions du GREF, 2006, and in University Science and Mathematics Education: Challenges and Possibilities, ed. Paola Valero, Ole Skovsmose, and Ravn Christensen, Springer-Verlag US, 2007.