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Technocrats and Humanists:
Debates about Technology in the
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1. Setting the Stage

Any attempt to review in a relatively brief space the intellectual discussions about technology in the United States runs into the immediate problem of delimitation. So much is possible to take up that it is necessary at the outset to explain the underlying motives of the paper and its criteria of selection. My aim has been to summarize what I take to be the historical state of the art and discuss a number of intellectual positions which are usually relegated to separate historical specializations and seldom related to broader sociological themes. A guiding motivation has been to bring together in one place some of the results of recent work by cultural and intellectual historians, historians of technology, and biographers of individual thinkers. Another aim has been to develop a categorization of intellectual positions in relation to modern technology that can help inform contemporary discussions. Indeed, I would argue that contemporary discussions cannot adequately be understood unless we return to the early years of the twentieth century, when American intellectuals, in the wake of the first world war, started to become aware of modern technology as a significant social problem and develop frameworks of interpretation for "appropriating the machine."

While being shaped by their historical context, the positions that were staked out in the interwar years by Thorstein Veblen and Lewis Mumford, in particular, continue to influence the ways in which American intellectuals think about technology. Technocratic disciples of Veblen, be they institutional economists, corporate managers or bureaucratic "social engineers," continue to do battle with Mumford-inspired critics - the disparate cluster of historians, philosophers and environmentalists who seek to humanize the machine - even though the original sources for their viewpoints and disagreements may not be readily apparent. A closer look at the debaters of the early twentieth century can thus provide an important historical perspective on the debates that are taking place as the century comes to an end.

The United States served as both model and counterpoint for intellectuals debating the meanings of modern technology in the other countries. Throughout the world, the technological age and its various implications came to be identified with and/or blamed upon the United States. Not surprisingly, many foreign perceptions differed from those of commentators within the country itself; and, even more pertinently, the perceptions of foreign intellectuals were often based on limited readings or, as some would have said, misreadings of the writings of American intellectuals.

The appropriation process in the United States is seldom examined in relation to experiences in other countries, for instance, the German (cf. Hård 1995). German intellectuals are often depicted in the historical literature as the pessimistic "other" to the optimistic Americans. And it is true that in Germany, the nineteenth century industrial leader which had suffered national humiliation in losing the first world war, the debate was more commonly formulated in drastic, extreme and even reactionary terms (Herf 1984), while in the United States the terms of discourse were generally more positive, sometimes even naively so. The difference between the two countries was, however, not as absolute as many accounts suggest, based as they usually are on a close reading of only one of the relevant national debates. In the United States, Fordism and Taylorism, derived from Henry Ford's methods of mass production and Frederick Winslow Taylor's techniques of scientific management, led many to celebrate the emergence of America as an international technological and economic leader. After the war, American styles of production and consumption spread around the world as the quintessential models of modernity, even in the new Soviet Union. As Stalin put it in 1924, "American efficiency is that indomitable force which neither knows nor recognizes obstacles; which continues on a task once started until it is finished, even if it is a minor task; and without which serious work is inconceivable" (quoted in Hughes 1989: 251).

In his recent survey of American technological history, Thomas Hughes has noted that "the United States had never enjoyed greater respect, or been more envied, than after World War I. Many foreign liberals and radicals perceived its examples as opening for their nations a path to the future" (Hughes 1989: 249). It was particularly the new production technologies and organizational techniques - the system of production - which inspired admiration; the social system, and the cultural ideals which guided the new technologies were often seen more critically. Indeed, there was concern that the new mechanical civilization in America would lead to a general decline in cultural values. As Max Weber put it in 1918, in his famous lecture on "Science as a Vocation":

The American boy learns unspeakably less than the German boy.... The young American has no respect for anything or anybody, for tradition or for public office - unless it is for the personal achievement of individual men. This is what the American calls "democracy." This is the meaning of democracy, however distorted its intent may in reality be, and this intent is what matters here. The American's conception of the teacher who faces him is: he sells me his knowledge and his methods for my father's money, just as the greengrocer sells my mother cabbage.... no young American would think of having his teacher sell him a *Weltanschauung* or a code of conduct (Weber 1946: 149-150).

This is, of course, not an accurate picture of the "American schoolboy," nor was it intended to be. Weber, the eminent German sociologist, had not systematically investigated the differences between German and American education, but he was nonetheless articulating a fairly widespread impression that many European intellectuals had concerning American culture. After all, this was the time when American advertisers, department store managers and marketing brokers were constructing what William Leach has recently labelled the "land of desire," a place in which all other forms of human activity were subordinated to the sphere of consumption (Leach 1993). And it was that commercial aspect of America that was most visible to foreign visitors and observers.

Weber and other European "mandarins" emphasized what was lost, or left behind, in the promulgation of modern instrumental values, and these attitudes, as we shall see, would find a certain resonance among younger intellectuals in the United States, such as Lewis Mumford and Joseph Wood Krutch. In the 1920s, several German philosophers - from Heidegger to Scheler, from Jaspers to Husserl - would subject the values of the modern industrial civilization to reflective critique, bemoaning the loss of wisdom, circumspection, and idealism in an age dominated by the logic of technological rationality. Interestingly enough, it would be largely under the influence of such ideas as they came to be expressed by transplanted German intellectuals, emigrating to America to escape Nazi oppression, that a critique of "mass culture" would develop in America in the 1930s and 1940s. Herbert Marcuse, Hannah Arendt, Teodor Adorno, and Erich Fromm, among others, were important carriers of the German interwar technology debate into the postwar United States. These disciples of Heidegger and Weber would criticize the hold of technological rationality over American life and identify new forms of

authoritarian control based on instrumentalism, which Marcuse came to call "one-dimensional thought" (Jamison and Eyerman 1994). In the mixing of this imported "critical theory" with the more indigenous brands of reflection that I will discuss in this paper the intellectual seeds were sown for a new wave of technology debates that have emerged in recent decades to grapple with what Peter Wagner has called the "second crisis of modernity" (Wagner 1994).

In the 1930s, Germany's intellectuals and politicians often interpreted and implemented modern technology in particularly reactionary, even barbarous ways, while American intellectuals sought to "reinvent" their country as a global technological leader, and as the embodiment of a new kind of civilization. Although there were critics of the technological regime that took shape in the United States, the interwar years generally were a time in which the new technological potentialities were seen not so much as threats as opportunities. "The American beams with a certain self-confidence and sense of mastery," the philosopher George Santayana - himself an immigrant from Spain, who eventually resettled in Italy - proclaimed in 1918, "he feels that God and nature are working with him" (quoted in Tichi 1987: 120).

It was the experience of the first world war which inspired a mood of questioning and discontent throughout the world, particularly among the younger generation of intellectuals, who came to articulate what can be termed a cultural critique of technology; in their writings, the underlying assumptions of technical and industrial progress were subjected to radical reappraisal and critical evaluation. Cultural critique can be thought of as an overall process of response on the part of intellectuals, as well as different social groups, to the spreading of new technologies (cf. Baark and Jamison 1986); and in the interwar years, it had a practical as well as a theoretical side. In this paper, however, I will primarily be concerned with the intellectual articulation of critique. The ambition is to identify certain characteristic features and influential voices in the American debates about technology in the first four decades of the twentieth century. The emphasis will be primarily on the 1920s, because it was then that the positions became more clearly differentiated from one another. This differentiation was, as we shall see, in large measure a generational phenomenon, as well as a result of the first world war.

2. The Discursive Framework - Technology and Republican Values

American culture has long been identified with technological progress; among the earliest waves of colonists were Puritans, who brought an interest in Baconian "useful knowledge" and technical improvements with them from Britain in the 17th century (cf. Perry 1989). John Kasson, in his book *Civilizing the Machine* (1977), has pointed to the role that things technical - the so-called mechanical arts - played during the revolutionary period, as practical ingenuity and a search for labor-saving devices came to form a

central part of what he and other historians have termed republican ideology. The American above all else was an industrious and skilled worker, transforming, either as farmer or artisan or homemaker, a bounteous nature into useful products. It was the practical and technical bent of the population that was so striking to foreign observers in the early years of the republic, and so it would continue to be as the settlers moved westward across the frontier in the course of the nineteenth century. Indeed, the ideal of a "republican technology" continued to provide important cultural resources for those who would appropriate the machine into twentieth century American civilization.

Unlike the situation in most European countries, where the values of an older and established aristocratic culture were pitted against those of the emerging industrial order, American national identity was and, to a large extent, still is intimately intertwined with practical values. Republicanism served as an idiomatic filter, translating commonsensical everyday beliefs into a more coherent framework of ideas, in which individual freedom, equality of opportunity, American "exceptionalism" and technological progress were combined into a collective social vision (cf. Ross 1991). In the garden that was America, there was plenty of room and understanding for the machine; according to the influential account of Leo Marx, American culture assimilated technology through the discursive framework of pastoralism (Marx 1964). The machine was conceptualized as a helpful mediator between nature and society, generally accepted as one of the main contributors to progress which in the American context came to mean the conquest of the continent, the exploration of the frontier, the taming of the wide open spaces and native peoples of the American west.

Most writers and publicists - that is, those social groupings out of which would emerge those who would later be considered intellectuals - tended to welcome the emergent industrial order as it took shape in the so-called gilded age of the late nineteenth century, after the defeat of the southern confederacy during the civil war. With the closing of the frontier, science and technology - and the positivist philosophy that they had stimulated - came to be seen as the new arenas of expansion and modernization (cf. Wilson 1990); the main task was to diffuse their fruits among the population, and, by so doing, domesticate the machine into the American republic. There was a general acceptance of the machine and only a small number of "genteel" intellectuals taking on the self-appointed task of upholding a sense of old world morality in an all too vulgar society (Perry 1989). But even the genteel believed in progress; their main complaint was not with technology, but with the anti-intellectual climate that a hegemonic culture of practical and commercial interests so readily fostered (Lears 1981; Leach 1993). Where opinions differed was in regard to who should determine the course of the diffusion process: should it be the farmers

with their ambiguous populism and their dedication to hard work, or the engineers with their mechanical logic and technical rationalism; or should it be the "captains of industry", the capitalist barons who had brought the machinery into productive use or their opponents in the increasingly militant working class?

The United States approached the twentieth century as a young nation moving rapidly onto the center of the international stage. With the growth of powerful industrial empires in steel, oil, chemicals, telephones, electricity, transportation, weaponry, and machinery, America had come to stand for technological progress itself, having taken the poor and dispossessed immigrants from Europe and forging a dynamic, productive nation. Of course, the impact of industrialization had been stratified; many had benefited, but there were also many who had suffered and had sought, in the course of the nineteenth century, to challenge some of the more noticeable problems that had arisen. Particularly influential in the political arena were populists of various stripes, who opposed the new industrial elites of managers and bankers with what might be termed democratic alternatives. Henry George's *Progress and Poverty* (1879), with its ideas about single taxes and support to small industry, had given some intellectual shape to the populist movements, which provided an option for many of those who saw a threat to democracy and republican values in the emerging corporate order (Lasch 1991: 63ff).

There was also, particularly in the industrial cities, a socialist response which, in the United States, had a strong anarchist and syndicalist dimension, as well as containing an American version of the reformist trade-unionism of European social democracy. Many of the socialist groupings retained strong ties to Europe, and labor organizations often split along national and ethnic lines. Particularly notable at the turn of the century, and a source of inspiration for intellectuals like Jack London and John Reed, were the Wobblies, the international workers of the world, who preached a kind of religion of collectivism: the one big union. They attracted a following particularly in the western states, among workers on the railroads and in the mines (Renshaw 1968). The racial question was also significant in the United States, as former slaves and their descendants sought a place for themselves in the modern society, while significant numbers of southern whites refused to accept the new realities and formed racist organizations. A kind of southern traditionalism emerged in the late nineteenth century, which looked back to the plantation days rather than ahead to the technological future.

There were thus both regional, ethnic, as well as class differences in the ways in which intellectuals responded to industrial development and modern technology; but it is usually argued that most Americans were nonetheless positively disposed to the machines, which were given a central place in the national identity (Boorstin 1987). The symbolic importance attached to the figure of Benjamin Franklin, the Philadelphia artisan printer and scientist who discovered the electrical current in lightning and carried out sensitive

diplomatic missions during and after the revolution, lived on after the new republic had been formed; Franklin's autobiography came to serve, for many Americans throughout the nineteenth century, as an introduction to the American value system, with its belief in enterprise, efficiency and instrumental rationality. In the 1830s, the widely read analysis of *Democracy in America*, by the Frenchman Alexis de Tocqueville pointed to the role of practical knowledge and technical interest in shaping the American democratic spirit: "democratic peoples...cultivate those arts which help to make life comfortable rather than those which adorn it. They habitually put use before beauty, and they want beauty itself to be useful" (quoted in Kasson 1977: 142). The United States was a nation that prided itself on its technical achievements; after all, the frontier had been tamed and the Indians had been conquered through skill and ingenuity - and with guns and railroads.

In the mid nineteenth century, Ralph Waldo Emerson had equated technological dynamism with American character, and even though he was critical of a technological development that was not controlled by human beings, he nonetheless welcomed the opportunities that machinery provided. "All the elements whose aid man calls in will sometimes become his masters, especially those of most subtle force," Emerson wrote in 1860, "Shall he then renounce steam, fire and electricity, or shall he learn to deal with them? The rule for this whole class of agencies is, - all *plus* is good; only put it in the right place" (Emerson, *The Conduct of Life*, quoted in Kasson 1977: 134). Emerson's friend, Henry David Thoreau, left urban life to build for himself a house near Walden Pond in Massachusetts in order to return to a more natural existence, thus initiating what would be a significant romantic current in American arts and letters, but even with Thoreau there was no real rejection of technology (Marx 1988). Throughout the nineteenth century, it seems safe to say that Americans, far more generally than their counterparts in Europe, were infatuated with machinery, which, in a country of wilderness and limited manpower, seemed to provide the main vehicle for national greatness. As Arthur Molella puts it, "While Europeans appreciated technology, the love of it was considered essential to the American character" (Molella 1990: 23). It would not be until the first world war that more discordant tones would enter into this peculiarly American love affair with technology.

Throughout the industrial world, the first world war marked a turning point in the attitudes of intellectuals to technological development, and, more generally, to industrial civilization itself. In the United States the war divided intellectuals among themselves and encouraged a sense of disillusion among many of those who had earlier believed not merely in the promise of a peaceful industrial future, but also in the general beneficence of the American government. The devastation of the war brought to an abrupt and dramatic

conclusion the late nineteenth century progressive project, which, like European social democracy, was based on a linear view of history and a positivist ideal of knowledge.

In the words of Christopher Lasch, "For those who lived through the cataclysm of the First World War, disillusionment was a collective experience - not just a function of the passage from youth to adulthood but of historical events that made the prewar world appear innocent and remote" (Lasch 1991: 107). For some, preindustrial values were counterposed to the dominant instrumentalism and the apparent lack of any social control over technology. The longing back to earlier times - to classical antiquity, to the middle ages, even to the more remote past of the so-called primitive peoples - became one kind of response. In the case of the United States, there was a movement on the part of many young intellectuals to the cafes and universities of Europe partly in pursuit of those older values and partly just to get away. For other intellectuals, the response was to propagate one or another "modernist" ideal of culture based on the methods and products of scientific-technical reason. This modernism was seen as portending a new historical epoch, and the main task for the intellectual was to give this scientific-technical rationality a larger influence in the body politic and in the world of "high" culture.

For almost all sides of the intellectual debate, the war disclosed a fundamental problem of industrial civilization, a certain lack of explicit human purpose underlying the industrialization process. For many, the machine itself seemed to be in charge of social development without having any particular goal in mind. The task was thus to define goals for the mechanical civilization derived from the "traditions" of the American past, and, in particular, the characteristic virtues of republicanism: equality, frugality, public service. For others, archaic social institutions and ways of life were seen as constraining the machine from unfolding its logic in a comprehensive way - and a new kind of republicanism was therefore required, which was more subservient to the demands of technological efficiency. As such, the lines of debate came to be drawn between those who would try to "assimilate" the machine into already existing social and cultural patterns and those who would seek to "adapt" society and the human personality itself to the imperatives of the machine age. The debate about technology in the 1920s thus often took the form of a conflict, or tension, between the articulators of one or another set of cultural values on the one hand and the defenders of an instrumental civilization of technically-oriented material progress and economic prosperity on the other. In the pages of new intellectual journals, like the symptomatically-entitled *New Republic* (founded in 1914), intellectuals took on the task of providing technical development with a new kind of legitimation: a new form of "republican" virtue which would be appropriate for the 20th century.

3. Progressivism: Reordering Modernity Through Technology

The Great War, as it was called at the time, inspired a debate about industrial civilization throughout the world, but in the United States that debate was colored by two main contextual factors - the consolidation of managerial capitalism and its corporate style of expertise, and the concomitant decline of liberal progressivism. The war and the need for weaponry had helped to increase the power of the large corporations that had emerged in the nineteenth century, and one of the unintended results was a devaluation of the ideals that had fostered prewar progressivism. As Richard Pells has written, "It was not that Progressivism as a program or ideology suddenly died in 1919, but rather that it disintegrated into its component parts....The intellectual community found itself after 1919 in a world that seemed only to magnify many of the problems with which the Progressives had desperately struggled" (Pells 1973: 11). For Lasch, "the war put an end to a whole series of interlocking debates about democracy, the intensity of which had made the intellectual climate of the prewar years so invigorating. In the years to come, the assimilationist, consumerist, distributive version of the democratic dogma would seldom be subjected to such searching criticism" (Lasch 1991: 360).

Both in reality as well as symbolically, the war marked the end of an era, the so-called progressive era, with its active programs of government reform and its even more active flowering of radical politics and social movements. Debates about American involvement in the war and, then afterwards, the divergent assessments of the war's implications served to break up what had been a progressive consensus, grounded in the pragmatism of William James and John Dewey and epitomized by the social work of Jane Addams and her Hull House in Chicago. In the decade and a half preceding the first world war, a broad movement of politicians, intellectuals and academics sought to improve the social order and bring some of the more problematic aspects of industrial society under control. During Theodore Roosevelt's presidential administration at the turn of the century, among "muck-raking" journalists, city and state government officials, as well as in a range of public service organizations, a spirit of reform swept across the land, seeking to break up the trusts, help the poor and downtrodden and bring ideas of planning and expertise into American public life.

This was the age of the pragmatic expert, who took on important new social functions in both technological development as well as in politics; and except for a few disenchanted old aristocrats like Henry Adams, the progressive era marked a new period in the continuing celebration of modern technology. The new century was to be the American century, and above all

else that meant a century of technical improvements; from Thomas Edison to Henry Ford, from Alexander Graham Bell to the Wright brothers, the key inventors of modern technology were all Americans. It would be through ingenuity and inventiveness that America would conquer the world (cf. Hughes 1989). And for a time, the pragmatic philosophy of James and Dewey combined with the future-oriented and reform-minded politics of Roosevelt and Robert La Follette, the progressive party governor of Wisconsin. The liberal synthesis of the progressive era would be short-lived, however. It could not permanently unite the disparate and often conflicting interests that it sought to represent, nor could its proponents agree on the morality of American participation in the war. By the late 1910s, the progressive synthesis had split apart into a number of different positions.

Progressivism in the United States represented an attempt on the part of the established order to bring modern life in general and capitalism in particular under control. Progressives believed in technological and scientific progress, and generally sought to use "the machine" and its logic to impose some kind of regularity and order onto the chaotic society in which they lived. The progressive prophets - Thorstein Veblen, John Dewey, William James, Jane Addams, Charles Beard - were all imbued with republican virtues, with democratic leanings and instrumental values. Their faith was generally less ideological than similar political and intellectual currents in Europe, less a program than a vague and somewhat elusive project of reform, which later historians have had some trouble pinning down (cf. Susman 1984).

Intriguingly, the historical portrayals of the progressive era have reflected the concerns and conflicts of the historians' own times. The period was given the progressive label post facto, after whatever had been accomplished had been transformed into something else (Rodgers 1982). What was bequeathed to the future, by all accounts, was more a spiritual legacy of reform than any particularly significant accomplishments, legal, administrative or otherwise. But there can be no denying that technology as a means to achieve social order was a central ingredient in many a progressive tract or program. What Samuel Hays called the "gospel of efficiency" in relation to the conservation measures that were undertaken in the name of progressivism by Theodore Roosevelt and Gifford Pinchot was a widespread belief (Hays 1959). According to many progressives, Americans were felt to have a certain predisposition for things practical and technical.

In a characteristically ironic formulation, Richard Hofstadter, writing in the 1950s, put it this way:

It was not so much the movement of any social class, or coalition of classes, against a particular class or group as it was a rather widespread and remarkably good-natured effort of the greater part of society to achieve some not very clearly specified self-reformation. Its

general theme was the effort to restore a type of economic individualism and political democracy that was widely believed to have existed earlier in America and to have been destroyed by the great corporation and the corrupt political machine; and with that restoration to bring back a kind of morality and civic purity that was also believed to have been lost (Hofstadter 1955: 5).

In the 1960s, Robert Wiebe focused on the middle-class, urban basis of progressivism. Like many American social movements before and since, Progressivism was not so much ideological as practical: a "search for order". As Wiebe put it, in what was to become a standard textbook treatment of the period, "The heart of progressivism was the ambition of the new middle class to fulfill its destiny through bureaucratic means" (Wiebe 1967: 166). This amorphous middle-class was the harbinger of pragmatism in philosophy, as well as in social and political life. In the late 1960s, James Weinstein characterized the period in more conspiratorial terms as the effort to establish a "liberal corporate social order". The aims of the progressive movement, for this historian of the "new left", were defined as the "stabilization, rationalization and continued expansion of the existing political economy, and, subsumed under that, the circumscription of the Socialist movement with its illformed, but nevertheless dangerous ideas for an alternative form of social organization" (Weinstein 1970).

David Noble in the late 1970s applied this view of progressivism to the process of technological development:

At the turn of the century, these reformers embarked upon a far-reaching enterprise, to bring American society into line with technological advance and corporate growth. At a time of considerable social turmoil, marked by a chronically unstable economy, a widespread popular demand for industrial and political democracy, a militant labor movement, an unprecedented flood of immigration, and an indigenous movement for socialism, they set about to design the new social institutions and foster the social habits which this transformation required (Noble 1977:64).

Progressivism, for Noble, was thus an attempt to design a new scientific and technological order which would be central components of twentieth century "corporate capitalism".

Recently, Dorothy Ross has stressed the "pluralistic politics" of the progressive movement, which "though weighted toward business interests, led to a series of legislative reforms, including the extension of economic regulation, modernization of the banking system, passage of the income tax, and the first hesitant steps to bring social welfare issues to the attention of the federal government" (Ross 1991: 144-145). Ross notes that the leading intellectuals of the period "struggled with socialism and tried now to escape its ideological polarization....The paradigms they formulated - neoclassical economics, liberal economic interpretations of history, a sociology and ideology of social control, and pragmatism - laid the groundwork for twentieth-century social science" (Ross 1991: 143).

After the war, the prewar ideas lost much of their power and influence, as a new generation sought to create its own social criticism and its own intellectual practices. As Randolph Bourne, one of the more vocal public intellectuals of the progressive era, expressed it, "To those of us who have taken [John] Dewey's philosophy almost as our American religion, it never occurred that values could be subordinated to technique" (quoted in Blake 1990: 161). For Bourne, whose outspoken opposition to American involvement in the war was an inspiration for many young intellectuals who had identified with prewar progressivism, the war was a turning point, a decisive break with the past. "With the outbreak of the Great War," Bourne wrote about himself, "most of his socialist and pacifist theories were knocked flat. The world had turned out to be an entirely different place from what he had thought it. Progress and uplift seemed to be indefinitely suspended" (quoted in Blake 1990: 321).

This American version of "organized modernity" (Wagner 1994) was hard hit by the experience of the war. Its hopeful view of the future, with experts in control and the state providing a paternally helping hand for the private pursuit of profit, seemed for many younger intellectuals after the war to have been little more than a naive dream that needed to be replaced by more hard-nosed approaches to the problems of industrial civilization. The 1920s were thus a time for reassessing and eventually redefining the progressive vision. This process of reassessment was particularly complex in the United States of America, which emerged from the first world war as the world's strongest industrial power. In many ways, and for many different kinds of people, the United States came to symbolize a new kind of twentieth century civilization of mass consumption and mass production, but also an exceedingly technological civilization. It was thus with a new kind of global role in mind, with a new international resonance, that American intellectuals debated the meaning of their technological civilization in the 1920s.

The general spirit of the age was shifting from a collective concern for social welfare and public service to the more private and individual concerns of the marketplace. The active government of Woodrow Wilson and of Theodore Roosevelt before him was replaced by the corporate expansion and consumerism of the "roaring 20s". The corporations served as the main developers of technology, as well as the main sponsors of scientific research and management education. Through the largesse and policies of the corporate foundations, a particular kind of instrumental expertise, at once quantitative and scientific, was given a major role to play in American intellectual life. The social sciences, after being associated before the war with the progressive ideas of John Dewey and Jane Addams, were largely transformed into instruments of corporate development (Ross 1991). Quantitative surveys and statistical investigations entered sociology and political science, and helped these new fields acquire scientific legitimacy, as well as a place for themselves within the new technological civilization.

The decade following the war was a time of rapid technological change, as the private automobile - most often Ford's Model T and after 1927, the Model A - led to a new sense of personal mobility and contributed to a transformation of the natural landscape, which became both more accessible and more threatened. At the same time, the widespread diffusion of electric appliances transformed the home and helped draw firmer lines of demarcation between the public and the private spheres. And there were the movies and radio and other "mass media" to transform the experience of life itself. Sound, sight and emotion could be mechanically recorded, reproduced and widely disseminated with far-reaching consequences on the common culture (cf. Levine 1993). This "culture of consumption", as it has been called, was largely constructed by corporate interests, which established modes of producing, distributing, advertising and, in the case of the communications technologies, utilizing the new products without any conscious plan or vision of moral enlightenment (Fox and Lears 1983). A technological revolution took place, we might say, without any corresponding revolution in human consciousness. The new technical potentialities were contained within an economic system that was only interested in maximizing profits.

In large measure, the intellectual appropriation of technology can be thought of as the articulation of different strategies to deal with these developments, to reinvent America in the light of the new social, political, and techno-economic conditions. What was involved, among other things, were various reappraisals of American history, various attempts, in the memorable phrase of Van Wyck Brooks, to create a usable past (Blake 1990). As elsewhere, culture was mobilized in the rhetorical struggle of intellectual debate against a blind, or autonomous, technological progress, and to a large

extent, the debate among intellectuals concerned which cultural "resources" or which components of the common culture were to be mobilized. In the United States, however, where the common culture in the nineteenth century had come to be identified so strongly with mechanical ingenuity and instrumental rationality, that mobilization often took a peculiarly practical or utilitarian form. American culture, for almost all debaters, was usually imputed to have a practical bent, and the American was seen by almost all comers as possessing a particularly strong materialistic set of values. Within that general consensus, a number of contrasting viewpoints competed with one another for public favor.

4. The Cast of Characters

Because of the widely felt rupture in the political culture, brought on by the war, it seems particularly appropriate to approach the technological debate of the 1920s from a cyclical theory of social change, in which relatively brief and intensive intervals of "social movement" are seen as being periodically followed by periods of institutional consolidation and incorporation (cf. Eyerman and Jamison 1991). Ideas or intellectual positions which are combined in social movements are decomposed in periods of incorporation. In this way, social movements serve to recombine ideas that, in "normal" times, tend to be formulated by different types of intellectuals linked to separate, even opposed, social actors and/or political projects. From such a perspective, the 1920s represent a period between movements, that is, between the labor activism and "progressive" movement activity in the prewar years and the mass mobilizations that came in the 1930s in the wake of the depression. In the 1920s, ideas - in our case, ideas about technology - that can be said to have been recombined for a time in the new deal order of the 1930s were formulated in a differentiated manner by different intellectuals and taken in different ideological and political directions. The 1920s were a time when the ideas of one movement - progressivism - were transformed into the intellectual seeds of another. A key element in this process of intellectual transformation was the reinterpretation, literally the reinvention of republican ideas about technology.

In what follows, four positions will be briefly examined, which, somewhat schematically, I will label technocratic, traditionalist, humanist and pragmatic. The basic distinction is between those who would seek to adapt society to the imperatives of the machine - the technocrats and the pragmatists - and those who sought to assimilate technological development into one or another cultural framework. My slicing of the debate obviously draws on other historical accounts of the period, but the positions are largely of my own construction, since they are meant to lend themselves to comparison with similar debates elsewhere. The positions are meant to capture the range of

debate in general terms, as well as highlight positions which have continued to inform the intellectual appropriation of technology in America. It can be suggested that the basic distinction is more European than American, since the critics were and are rather marginalized in the American political culture, as compared to the situation in Germany, England and France. The lack of a pre-industrial culture and its institutional and ideological legacies has kept the anti-industrial critique from becoming as influential in the United States as it has been in Europe. But it has also perhaps meant that a more constructive kind of humanist critique like Lewis Mumford's has been able to gain a wider foothold among intellectuals in America than elsewhere.

For reasons of space and clarity, I have let one central figure stand for each position, and I have discussed at greater length two figures - Thorstein Veblen and Lewis Mumford - whose opposing positions continue, over fifty years later, to influence the American debate about technology and stand, as it were, for the dominant poles of opinion. Both Veblen and Mumford also gave rise to more formalized, disciplinary discourses about technology: namely institutional economics and history of technology, respectively. As sources of inspiration, the writings of Veblen and Mumford helped to carve out intellectual "spaces" that continue to be filled and reconstituted. There were, of course, other contributors to the frameworks of interpretation that Veblen and Mumford were perhaps the first to articulate: in the development of institutional, or innovation, economics, the writings of Joseph Schumpeter, who moved to the United States from Austria in the 1930s, would come to be particularly important; and in the history of technology, other writers - perhaps especially the medieval historian Lynn White - would specify the methods of analysis that would be developed in later years. While I focus on particular individuals to represent the different positions, it is important to realize that the individuals were involved in broader contexts of opinion-making and intellectual practice.

The grouping of individuals into particular positions is primarily based on the different definitions or characterizations of "culture" that are opposed to technology. Thus, I link avowed technocrats like Howard Scott and Stuart Chase with the eccentric theorist Thorstein Veblen because they draw on a similar - largely negative - notion of culture as outdated and premodern. Their critique is of the nonrational, anti-intellectual American cultural values that are, to their way of thinking, constraining the proper modernization of the country and the control of its destiny by experts and engineers.

Traditionalist critics like T.S. Eliot and Van Wyck Brooks shared much of the modernism, but little of the technological enthusiasm of the technocrats. In America, they stood for a new kind of disenchanted intellectual role, challenging the vulgar materialism of American society with classical cultural

values or with a reconstructed American cultural ideal. While Eliot depicted the wasteland of contemporary civilization and spent his life defending and articulating a cultural elitism, Brooks mobilized classical American culture against the present (cf. Blake 1990). The traditionalist critique of the modern was, of course, immortalized in the *Education of Henry Adams* in the United States, which was extremely influential in artistic and cultural circles during the 1920s. While many artists and authors sang the praises of the machine age - and poets like William Carlos Williams transformed poetic meter itself into a kind of mechanical rhythmic form - cultural critics of industrial civilization mobilized different cultural traditions to challenge the present (Tichi 1987). Joseph Wood Krutch's book from 1929, *The Modern Temper*, came to epitomize this position, and I will examine its arguments as representative of the traditionalist critique.

In the 1920s, a different kind of critique of modern civilization emerged from ecologically, or biologically oriented social thinkers like Lewis Mumford, Howard Odum, and other "regionalists" (Thomas 1990). Mumford's lesser known activities of the 1920s can be seen as a new form of populism; he defined the community as the antipode to civilization, but for Mumford and Odum, the community or region was not merely historical traditions and memories, it was also a socio-geographic environment, a conditioning place. Out of the ecological, or communitarian critique would come new criteria for technological development and new ideas about diffusing knowledge. Its wrath would be directed both against the undesirable social and human consequences of technology as well as the overextension of instrumental rationality into modern American life. What Howard Odum termed "super-civilization" stood, as he put it, "in many bold contrasts to culture.... organization over people, mass over individual, power over freedom, machines over men, quantity over quality, artificial over natural, technological over human, production over reproduction" (quoted in Pells 1973: 102). For the human ecologists, culture included social traditions as well as natural conditions; both needed to be mobilized to encourage what came to be called a regionalist approach to development.

Our fourth category is where we place the critique of Western civilization emanating from the pragmatism of John Dewey and his disciples. In America, the critique from pragmatists was of the values of modern civilization, rather than of the technological achievements. In this category we can also place the young Reinhold Niebuhr and other socially-involved theologians, who were not critical of technology itself, as much as the powerful capitalists who controlled its development. The call, from Dewey as well as from Niebuhr in the 1920s - and, from a very different direction, from the young Margaret Mead investigating adolescence in Samoa - was for a new morality, a democratic gospel, as a way to respond to the new technological potentialities. In keeping with William Ogburn's influential notion of the "cultural lag", the latter-day progressive intellectuals sought to reform social

institutions to meet the challenges of modern technology. In the arts and in functionalist architecture and design, this pragmatic position would become influential, and provide ideas and approaches that would enter into the "new deal order" of the 1930s.

5. Thorstein Veblen and the Technocrats

C. Wright Mills once wrote that "there is no failure in American academic history quite so great as Veblen's." (Veblen 1953: ix) In the 1920s, however, Veblen had a brief period of glory, as his writings on the engineers gained for him a certain following among technocratic progressives. In any event, his books from the early 1920s, *The Engineers and the Price System* (1921) and *Absentee Ownership and Business Enterprise in Recent Times: The Case of America* (1923) provided a view of technology's role in economic life that was influential. These later writings emphasized the central importance of the "instinct of workmanship" in industrial production; like a latter-day Marx, Veblen analyzed the crucial transformation of the industrial order from one based on simple commodity production to a system based on the conscious use of technological research. Unlike Marx, however, Veblen had little faith in the working class to take over these new science-based means of production; instead, he urged the engineers to take greater responsibility for industrial development and management.

While his prewar writings had been written from a professorial distance, in later life as he moved to New York and wrote articles for the *Dial*, he argued a more explicitly political, or ideological message. The *Dial* was a literary magazine that had been taken over by young progressives in 1916 and moved to New York, where Veblen joined Dewey and Helen Marot in supporting the war effort and then in "the task of reconstructing society after World War I" (Perry 1989: 322). Unlike his more democratically-inclined colleagues on the editorial board - Marot was a member of the socialist party - Veblen used the magazine as a platform for technocratic elitism. His articles on the machine age and the new role of the engineers were later turned into books that were spread among the corporate managers and engineers. His writings provided a kind of theoretical underpinning for the various efforts taken during the 1920s by politically and socially-minded engineers, from scientific management to industrial research to political propaganda for "social engineering".

It is ironic that Veblen should be best known for inspiring an elitist movement; in actual fact, he was throughout his life an individualist and an outsider and about as far from power as anyone could be: that was his failure.

His strength was in subjecting the new modes of production to systematic and critical scrutiny. Veblen's first book, *The Theory of the Leisure Class* (1899), had sought to identify the cultural constraints to an efficient industrial order in the "pecuniary" tastes of the businessmen and the nouveau riche. He was particularly critical of their ostentatious interest in rejecting machine-made products. As he put it, in his characteristically ironic way,

the generic feature of machine-made goods as compared with hand-wrought articles is their greater perfection in workmanship and greater accuracy in the detail execution of the design. Hence it comes about that the visible imperfections of the hand-wrought goods, being honorific, are accounted marks of superiority in point of beauty, or serviceability, or both. Hence has arisen that exaltation of the defective, of which John Ruskin and William Morris were such eager spokesmen in their time; and on this ground their propaganda of crudity and wasted effort has been taken up and carried forward since their time. And hence also the propaganda for a return to handicraft and household industry (Veblen 1899: 115).

In this passage, we can see how Veblen stated his arguments: wit, exaggeration, and an unbridled belief in the progressive nature of "machine-made goods" are combined in order to question the competence of the business, or leisure class. Veblen never swayed from his basic technocratic position, namely that the "machine age" required a new kind of planning and management, and that those activities were best placed under the control of engineers. The captains of industry, on the other hand, Veblen's leisure class, had taken on many of the "archaic" or conservative trappings of the old aristocracy, and by so doing, served to constrain the logic of technology from effectively determining the rhythms of cultural life. He was particularly scornful of his fellow academics, who had developed the "higher learning" into leisure class orientations, that is, into uselessness.

In *The Theory of Business Enterprise* (1904) and *The Instinct of Workmanship and the State of the Industrial Arts* (1914), as well as in a number of articles published in economics journals, Veblen tried to develop a more "useful" kind of academic science. He carved out a new kind of economics, which focused on the processes of industrial change, as well as on the institutional aspects of economic life. His institutional economics was related to similar efforts elsewhere, especially that of Joseph Schumpeter in Austria, but Veblen's writings bore his own characteristic stamp. The son of Norwegian immigrants, who grew up on a farm in Wisconsin, Veblen was a decidedly strange character, with his unkemptness, his fondness for other professors' wives, and, not least, his sympathy for marxism - none of which

was popular in American academic circles. Hence his failure to retain academic posts or to produce students and disciples.

Veblen's emphasis on the central importance of machinery in the industrial economy of the early twentieth century was not unique; many of his fellow "progressive" intellectuals - John Dewey, Charles Beard, Jane Addams, Randolph Bourne, Herbert Croly - recognized the new technical potentialities that had been unleashed by the linking of science with engineering, and by the infusion of systematic research into the production process. But no one singled technology out as the decisive force of social transformation to the same extent that Veblen did. At the outset of his most ambitious philosophical work, *The Instinct of Workmanship*, he boldly stated:

It is assumed that in the growth of culture, as in its current maintenance, the facts of technological use and wont are fundamental and definitive, in the sense that they underlie and condition the scope and method of civilization in other than the technological respect, but not in such a sense as to preclude or overlook the degree in which these other conventions of any given civilization in their turn react on the state of the industrial arts (Veblen 1914: 1).

In the book, Veblen sought to derive the technological urge not from cultural values and traditions, but from a psychological theory of instincts. In his wartime writings, he continued to read behavioral psychology in order to develop a more solid material grounding for his unwavering belief in modern technological development. His intriguing comparison of English and German industrialization (in *Imperial Germany and the Industrial Revolution*) was a first intervention into a more explicitly political discussion. The war, we might say, brought him out of the academic, or theoretical phase of his career into more "applied" concerns that would occupy him until his death in 1929. In *Imperial Germany*, he tried to explain the conflict between England and Germany as based on different modes of developing technology. The Great War, for Veblen, was a conflict between England and America's technological civilization and Germany's "Prussian-Imperial state". In Veblen's words, "The most characteristic habit of thought that pervades this modern civilization, in high or low degree, is what has, in the simplest terms hitherto given it, been called the mechanistic conception. Its practical working-out is the machine technology, of which the intellectual precipitate and counterpart is the exact sciences." Veblen's argument was that the Prussian-Imperial system was a historical digression:

This warlike-dynastic diversion in which the Imperial State has been the protagonist is presumably of a transient nature, even though it can by no means be expected to be ephemeral. The Prussian-Imperial system may be taken as the type-form and embodiment of this reaction against the current of modern civilization...In the long run, in point of the long-term habituation enforced by its discipline, the system is necessarily inimical to modern science and technology, as well as to the modern scheme of free or popular institutions, inasmuch as it is incompatible with the mechanistic animus that underlies these habits of thought... (Veblen 1915: 268-270)

After the war, Veblen's irritation with the captains of industry and their pecuniary values grew in intensity. He argued, in a series of articles that were later published under the title *The Engineers and the Price System*, that the continued dominance of industrial production by financial managers rather than engineers constrained production. The captains of industry were not primarily interested in developing the industrial arts; they were governed by a commercial logic, which evaluated technology only in terms of profitability and not necessarily productivity. Another problem was due to the growing complexity and specialization of technological development, which created problems of understanding for the business leaders: "they have been less and less capable of comprehending what is required in the ordinary way of industrial equipment and personnel" (Veblen 1921: 61-62).

For Veblen, the constraint of production had been less serious in the "earlier decades of the machine era;" but now, it had become increasingly important that those who actually understood the machinery of industrial production should also be in charge of its development. The dead hand of finance was becoming a serious problem for the future development of the industrial process itself. Inspired by the Bolshevik revolution in Russia, Veblen called for a "soviet" of engineers: "the technicians may be said to represent the community at large in its industrial capacity, or in other words the industrial system as a going concern; whereas the business men speak for the commercial interest of the absentee owners, as a body which holds the industrial community in usufruct" (Veblen 1921: 163). The engineers needed to form a new political and cultural elite that could counter the unproductive and pecuniary interests of the absentee owners. The development of technology required a cultural and political transformation if it were to go forward and not stagnate and ossify.

In his book from 1923, *Absentee Ownership and Business Enterprise in Recent Times: The Case of America*, Veblen contrasted the habits and customs of American culture with the requirements of the "new order" of mechanization and technology-based industry. For Veblen, the quintessential

American value was trade and business, and throughout his life he castigated the businessmen and their vested interests for holding back the flow of mechanical innovations and technological progress. In *Absentee Ownership*, he located the source of the problem in the dominance of the values of the country town: "The country town is one of the great American institutions," Veblen wrote, "perhaps the greatest, in the sense that it has had and continues to have a greater part than any other in shaping public sentiment and giving character to American culture" (Veblen 1923: 142). For Veblen, the business of the country town was primarily real estate and retail trade, both of which promulgated an approach to success and economic activity that ran directly counter to the technological logic of modern industry. But now the future could no longer be held back. In Veblen's words, "the material conditions are progressively drawing together into such shape that this plain country-town common sense will no longer work" (Veblen 1923: 165).

Instead, Veblen and others called for an increased status and increased managerial role for engineers. After proposing a Soviet of engineers, a revolution of the technicians in 1919, in *Absentee Ownership* Veblen added arguments for the necessity of a technocratic order. It was not sufficient for the engineers to become the managers of industry. There was also a need for the engineering mentality to be applied to the management of society itself. Without apparently calling them by name, Veblen argued for an increased responsibility for engineers in public administration and politics:

The safe and sane plan of common sense now dictates that industrial operations must be conducted by competent technicians. And this holds true in a special degree for the larger operations and the more formidable organisations of work and equipment, where many technological factors and a wide range of materials and processes are drawn together for teamwork in quantity production on an extensive scale. So it should also hold true in a superlative degree as regards the oversight and control of the industrial system at large as a going concern; the balance, articulation, and mutual support among the several lines of production and distribution that go to make up the system (Veblen 1923: 273).

As David Noble has shown, the 1920s were a time when many engineers did try to design corporate America in their image, and their achievements are still with us (Noble 1977). This technocratic pole in the technology debate

included many of the founders of management science, as well as the corporate research managers and production consultants. In America, the iconoclastic Veblen served as theorist, while Herbert Hoover came to embody the engineer as politician and state bureaucrat. In his activities at the Department of Commerce during the 1920s, Hoover sought to bring technological logic into the center of state economic policy.

The call for a "revolution" of the engineers was popular among certain intellectuals; there were Veblen clubs and study groups and a number of younger writers and even some engineers developed the ideas further (Layton 1971; Tichi 1987). But Veblen himself slipped back into the obscurity from which he had briefly emerged and died in 1929 poor and largely forgotten. The technocrats in the 1930s who claimed to take their lead from his writings were never a very significant political force; they exercised an influence over some city and state governments, and particularly some of the "system builders" of electricity distribution networks considered themselves followers of Veblen (Hughes 1989).

In the 1920s as later, Veblen's influence was actually based more on his earlier writings - *The Theory of the Leisure Class* (1899) and *The Theory of Business Enterprise* (1904) - and on his skeptical, even cynical attitude to the follies of his fellow Americans. Veblen's sharp analyses of the technological age provided sources of inspiration for many technocratically-oriented progressive intellectuals, from Walter Lippmann to Stuart Chase. The position they developed in the 1920s was one of guarded optimism, a kind of continuation, by experts, of the progressive reform ambitions of the prewar years. In *Tragedy of Waste* (1925) and *Men and Machines*, published in 1929, Chase popularized Veblen's basic arguments, and outlined an approach to social and political life that recognized the formative role of machinery. In his common-sensical journalistic style, Chase translated Veblen's theories into everyday language. He traced the history of the machine from antiquity to the present, and he tried to distinguish the machine itself from its myriad social consequences. His goal was to make the technological civilization function more efficiently in its own terms, not by a revolution of engineers, but by a transfer of scientific and technical rationality to economics and politics. Chase and many of the later new deal experts can be considered pioneers in technological assessment; they tried to "assess" particular technologies, to construct balance sheets of "pros and cons" that could be used by politicians and administrators in the choice of projects and techniques. Chase helped bring about the operationalization of Veblen's ideas that was to play a certain role in the social engineering that characterized at least part of the new deal order.

6. The Traditionalist Critique of Joseph Wood Krutch

Joseph Wood Krutch wrote many books in his later life, primarily about the plants and animals in the deserts of southwestern America, where he moved after the second world war, and after discovering Henry David Thoreau, about whom he wrote a biography in 1948. In the interwar years, he was a well known drama critic for the *Nation* and an English teacher at Columbia University in New York, where he received a doctorate in 1923 with a dissertation on "Comedy and Conscience in the Renaissance". Krutch, we might say, was a typical literary man, identifying with an earlier, more cultivated age, and seeing his and culture's role more generally in terms of moral, or spiritual elevation. In his essay from 1929, *The Modern Temper*, Krutch gave voice to a critical position that was thus not his alone, even though he gave it perhaps its most influential formulation. He was bringing the traditionalist position up to date, following in the footsteps of Henry Adams, who had berated the materialism of the age in his famous *Education*.

Science and technology had led modern man astray, Krutch contended. The material facts of the world, however true and reliable they might be, could simply not address the question of human existence. "We are disillusioned with the laboratory," he wrote, "not because we have lost faith in the truth of its findings but because we have lost faith in the power of those findings to help us as we had once hoped they might help." (Krutch 1929: 53)

There had been a religious motivation to the scientific quest in the early modern period that had now withered in a spiritless drive for an ever more meaningless utility:

We went to science in search of light, not merely upon the nature of matter, but upon the nature of man as well, and though that which we have received may be light of a sort, it is not adapted to our eyes and is not anything by which we can see. Since thought began we have groped in the dark among shadowy shapes, doubtfully aware of landmarks looming uncertainly here and there - of moral principles, human values, aims and ideals. We hoped for an illumination in which they would at last stand clearly and unmistakably forth, but instead they appear even less certain and less substantial than before - mere fancies and illusions generated by nerve actions that seem terribly remote from anything we can care about or based upon relativities that accident can shift. (Krutch 1929: 47)

Krutch was totally uncompromising in his criticism, and found a receptive audience among what might be termed the literary intelligentsia. As Pells puts it, "The melancholy tone of its conclusions summarized the attitudes of a generation of writers weaned on Henry Adams, T.S. Eliot, and Oswald Spengler" (Pells 1973: 29). For most other Americans, it was an unusually downbeat book, a depressed and highly skeptical view of the modern world. Science, for Krutch, had failed to deliver anything of importance to humanity, and now modern man was stuck with it whether he wanted it or not. Disillusion was the characteristic of the modern mood that Krutch identified: the dream of enlightenment through reason had been found to be ultimately meaningless.

For Krutch, modern society had rejected its humanity in pursuit of comfort, speed, business, but, he argued, "we cannot make physical speed an end to be pursued very long after we have discovered that it does not get us anywhere" (Krutch 1929: 56). In a final rhetorical flourish, he made his choice clear: he would leave the future to "those who have faith in it." For his part, he would proclaim in Shakespearean fashion:

Hail, horrors, hail,
Infernal world! and thou profoundest hell,
Receive thy new possessor. (Krutch 1929: 168)

Krutch would be on the side of man against nature, culture against science. His was the first significant anti-science tract in twentieth century America. By drawing the dichotomy as sharply as he did, he left no constructive role for culture to play in developing technology. Culture became the preservation of the non-technical, and eventually, as he would write in the 1930s, literature was valuable to the extent to which it did not try to be socially useful (Pells 1973: 184). Krutch would inspire other literary figures to take up arms against the modern temper, but his would be a decidedly minority position in the interwar years. The more constructive approach of the "human ecologists" and the pragmatists would have a far greater influence on the range of activities that would take place during the new deal era of the 1930s. But Krutch could be said to have come again, when he would have a change of heart and grow closer in perspective to Lewis Mumford, who had been so critical of *The Modern Temper*. In an interesting convergence, Krutch's more constructive ecological writings of the 40s and 50s would complement Mumford's more disillusioned postwar writings, and both would contribute to the making of an environmental consciousness amidst the countercultural enthusiasms of the 1960s (Fox 1985).

7. Lewis Mumford and the Human Ecological Critique of Technology

In looking back on his long life in the 1970s, Lewis Mumford wrote in his autobiography, "The 1914 war had left my generation, even those who had taken no active part in it, in a state of shock: the unthinkable had happened, and from now on nothing would be quite unthinkable" (Mumford 1982: 377). Having been born in 1895, Mumford came of age during the war; and his thinking would be strongly affected by the fading of the progressive dreams that came in the wake of the war. A man of many interests and talents, he would be one of the most active "reinventors" of American culture in the 1920s, and in the 1930s, he would produce perhaps the most influential interpretation of the meanings of modern technology that any American intellectual has ever written. His views on technology would develop gradually in the course of the interwar years, only to be shaken again by the dropping of the atomic bomb at the end of the second world war. But that is another story (Mendelsohn 1990).

In 1923, Lewis Mumford published his first book, *The Story of Utopias*, sketching, in the words of John Thomas, a "plan for the regional reconstruction of the United States which Mumford would develop, expand, modify, elaborate but never essentially change" (Thomas 1990: 79). Not yet thirty, Mumford was already an active public intellectual, having written for the progressive journals, the *New Republic* and the *Dial*, and serving as secretary for the Regional Planning Association. While sharing many of the prewar concerns of the progressive pragmatists, Mumford brought something new into the discursive framework: an ecological sensibility that he had adopted from the Scottish biologist and urban sociologist, Patrick Geddes. For Mumford, as for Geddes, culture was primarily the geographical landscape, what we today would call the environment. After reviewing visions of the ideal society from the ancient Greeks to the late nineteenth century conceptions, or from Plato to William Morris, Mumford concluded not with a new utopian vision of his own but rather with a proposal for a new kind of scientific practice, which, following Geddes, he called the Regional Survey. Mumford admitted that science had "provided the factual data by means of which the industrialist, the inventor and the engineer have transformed the physical world; and without doubt the physical world has been transformed. Unfortunately, when science has furnished the data its work is at an end....So far, science has not been used by people who regarded man and his institutions scientifically. The application of the scientific method to man and his institutions has hardly been attempted" (Mumford 1921: 271-2).

Mumford went on, as he would continue to do throughout the interwar period, not to criticize science, but to suggest ways to complement its cold

truths with a sense of life. On the one hand, he argued that the specialized knowledge of the scientist needed to be placed within a more holistic or general viewpoint, and that the factual orientation of the scientist needed to be balanced by the emotional and subjective wisdom of the artist. Most importantly, the abstractions of science had to be connected to real life. There was a danger in separating thought from action in that scientists lost any sense of limits or values, and the general public lost any contact with the truths of science. "The upshot of this dissociation of science and social life is that superstition takes the place of science among the common run of men, as a more easily apprehended version of reality" (p 275). The Regional Survey, as Mumford outlined it, was a way to cultivate a more socially useful and relevant technological development:

The aim of the Regional Survey is to take a geographic region and explore it in every aspect. It differs from the social survey with which we are acquainted in America in that it is not chiefly a survey of evils; it is, rather, a survey of the existing conditions in all their aspects; and it emphasizes to a much greater extent than the social survey the natural characteristics of the environment, as they are discovered by the geologist, the zoologist, the ecologist - in addition to the development of natural and human conditions in the historic past, as presented by the anthropologist, the archeologist, and the historian. In short, the regional survey attempts a local synthesis of all the specialist 'knowledges' (p 279).

Mumford thus developed a notion of culture that combined ecology and history, geography and sociology. He emphasized the region, or the local context, as the basis for all development; and as he explored American history over the next few years in search of a "usable past" and worked as secretary of the Regional Planning Association, he would continue to develop what might be termed a human ecological critique of modern American civilization. Mumford's perspective resembled that of other groups of human ecologists which emerged in the interwar years, such as the "southern regionalism" developed by the sociologist Howard Odum at the University of North Carolina.

Mumford's most influential text in the 1920s was the book that the philosopher George Santayana called "the best book about America, if not the best American book that I have ever read." This was Mumford's *The Golden Day*, which he published in 1926. By then there had developed something of an intellectual movement amongst literary and artistic critics to reevaluate the artistic achievements of nineteenth century America. The movement began before the war, in the writings of Waldo Frank and Van Wyck Brooks, and continued with the American Caravan yearbooks and in a number of other

works. What distinguished Mumford's book from those of the literati was, on the one hand, his ecological view of culture, and, on the other, his active use of history to evaluate contemporary writers and standpoints. Even though there is a great deal in the book that was new and interesting, it was Mumford's critique of the pragmatisms of William James and John Dewey that apparently attracted the most notoriety at the time. Mumford took issue not with technology itself but with the materialism that it had inspired, both in philosophy and in life, and he saw that materialism as being most clearly formulated in the writings of Dewey.

His book sought to affirm the significance of the classic writers of the nineteenth century, as the creators of an American culture; Hawthorne, Emerson, Thoreau, Whitman represented the emergence of a distinct national culture, framed by the natural environment, but, in particular by the interaction of an older, European sensibility with a new environment. The writers whom Mumford would continue to praise throughout his long life, had been the morning of the golden day; by the end of the century, with the closing of the frontier, night had come, and the engineer had become the cultural hero: "The Edisons and Carnegies came to take the place in the popular imagination once occupied by Davy Crockett and Buffalo Bill" (Mumford 1926: 118). The engineer had become a cultural hero, and, as Cecilia Tichi has shown, a number of popular novels appeared at that time celebrating the work of the engineer as the modern-day embodiment of American virtue (Tichi 1987). It was also the time when at least some engineers had become industrialists, or at least joined forces with industrialists to create new forms of economic and technological development. It was not by chance that Edison and Carnegie, the inventor and the corporate leader, were linked together in Mumford's mind. For Mumford, the glorification of engineering was part of a broader transformation of American culture in the direction of regimentation and order: the "note of the period was consolidation. The great captains of industry controlled the fabrication of profits with a military discipline: they waged campaigns against their competitors which needed only the actual instruments of warfare to equal that art in ruthlessness..." (p 119).

He criticized Dewey and James and other writers of the progressive era for their "acquiescence", their acceptance of the new technological society; in trying to control its excesses, they succumbed to its materialist values. Like the realist novelists of the era - Theodore Dreiser, Frank Norris, Upton Sinclair - who could only describe the problems but could not envision an alternative social order, Dewey's pragmatic philosophy was, according to Mumford, a product of the time and place in which it was formulated: "No one has plumbed the bottom of Mr. Dewey's philosophy who does not feel in back of it the shapelessness, the faith in the current go of things, and general utilitarian

idealism of Chicago..." (p 131). Mumford had taken Randolph Bourne's critique of Dewey as his own: pragmatism, and progressive thought in general, represented a failure of imagination. In glorifying the machine, the utopian side of man had been eliminated, and with it, the possibility of a cultural evaluation of the contemporary technological civilization:

As Bourne said, the whole industrial world - and instrumentalism is only its highest conscious expression - has taken values for granted; and the result is that we are the victims of any chance set of values which happens to be left over from the past, or to become the fashion. An instrumental philosophy which was oriented toward a whole life would begin...by a criticism of this one-sided idealization of practical contrivance....Without vision, the pragmatists perish (Mumford 1926: 137-138).

There were, and would continue to be, important differences between Mumford and Dewey, but Mumford was not always justified in his critique of Dewey. What was at work, it seems, was more a difference in generational sensibility than a difference in standpoint (Westbrook 1991: 380ff). Mumford, coming of age in the 1920s, saw Dewey, and Veblen as well, for that matter, as part of the problem; his criticism of pragmatism was a critique of the older generation. But it was also a critique of an overly positive, or adaptive attitude to technology. Mumford for all his utopian envisioning of an alternative technological order, remained throughout his life a critic of the values which he saw as intrinsic to modern technological civilization. If, as we shall see, he pointed to some positive potentials in technology in his writings of the 1930s - the writings that brought his own position closer to Dewey's - he nonetheless remained a cultural critic of technology. The same cannot really be said of Dewey and certainly not of Veblen. In the course of the 1920s, however, the two elder statesmen of progressive thought responded rather differently to the increasingly technocratic climate of the times. While Veblen became a kind of prophet for the young turks of technocracy, Dewey rethought the relations between democracy and philosophy. They both remained, as it were, faithful to the power of technology, but they looked to different actors for the necessary social and political renewal.

Mumford, for his part, delved deeper into the meanings of the machine. As the 1920s wore on, he grew more interested in the creative potentialities of the new science-based technologies. One can see in his writings of the late 1920s, and in particular in *Technics and Civilization*, which he published in 1934, a far more sympathetic view of the industrial civilization than he had expressed in the 1920s. In the wake of the depression, he realized that technology's promise was still largely unfulfilled and its human potential

largely unexplored; the task of a cultural critic was not merely to identify problems, but to provide constructive ideas for bringing the machine under human control, and even more, using machinery to enrich human life. It had become clear that the machine needed a conscious program for its guidance; and it was this that Mumford aimed to provide, however contradictory it eventually turned out to be (Blake 1990: 279ff).

Donald Miller points to the significance of Oswald Spengler's *The Decline of the West* in the development of Mumford's thinking. "That big and oddly brilliant book, the work of a reclusive German schoolteacher, had been on Mumford's mind since 1926, when he reviewed the English translation of the first volume for *The New Republic*." (Miller 1989: 300) Spengler offered to Mumford a view of history as moral prophecy, as well as an organic way of thinking about the development of civilization that well fit Mumford's own ideas. "Mumford agreed with Spengler that Faustian culture had entered the 'winter' of its development; but where Spengler peered into the future and saw only spreading blackness and blight, Mumford saw a brilliant post-Faustian world, a great revival of the regional and organic outlook" (p 302).

It is important not to exaggerate the similarity between Spengler and Mumford, however. While they shared an organic approach to human history, Mumford was perhaps somewhat more sympathetic to modern science and technology, and less opposed to the tenor of modern technological civilization than Spengler other "traditionalist" critics. He explicitly renounced the attitude of despair that he saw in Joseph Wood Krutch's *The Modern Temper*, when he reviewed it in 1930. "We would not destroy the rigorous method of science or the resourceful technology of the engineer," Mumford wrote in his review. "We would merely limit their application to intelligible and humane purposes. Nor would we remove altogether the mechanical world-picture, with its austere symbolism; we would rather expand it and supplement it with a vision of life which drew upon other needs of the personality than the crude will-to-power" (quoted in Pells 1973: 31).

When Mumford was asked, in 1930, to give a course at Columbia University on the Machine Age in America, he made it the occasion for a much more ambitious project than any he had previously carried out. He read widely in the history of technology and he won a fellowship to visit the technical museums in Europe, in order to prepare himself for what he increasingly saw as his great book, his new synthesis (*Technics and Civilization* would actually be the first of a series of four books, which Mumford, in his typically immodest way, would label the *Renewal of Life*). The first result, in any case, was an original, exceedingly stimulating, if highly personal, reflection on the history of technology which provided a new role for culture and for cultural analysis in the social process of appropriation.

In *Technics and Civilization*, Mumford applied an organic philosophy of history to technology; and he drew both on his ecological, as well as his humanistic background. He described the rise of the machine as a cyclical process, and showed how the development of technology was itself a product of culture - and of cultural criticism. The machine civilization had been prepared through centuries of institutional and intellectual developments; he referred to the medieval monasteries, the Renaissance artists, the scientific revolution, and the rise of capitalism, and a great deal more as having been cultural preconditions for the development of the technological universe. But he also distinguished the waves of mechanization from one another, borrowing from Patrick Geddes a terminology and a historical framework, which Geddes had adapted from archeology (Williams 1990). First had come the *eotechnic* wave, based on water power and primarily using wood as the working material, when technics were well integrated into the surrounding landscape; and then had come the *paleotechnic* nightmare of the industrial revolution, when coal and iron had brought about a totally different, and far less attractive technical regime; and, in the twentieth century, a third period, a *neotechnic* epoch could be distinguished, in which technological innovation was based on applied science, and a new organic guiding principle could be discerned in relation to technical development. As Mumford wrote:

... we have now reached a point in the development of technology itself where the organic has begun to dominate the machine. Instead of simplifying the organic, to make it intelligibly mechanical, as was necessary for the great eotechnic and paleotechnic inventions, we have begun to complicate the mechanical, in order to make it more organic: therefore more effective, more harmonious with our living environment....one can now say definitely, as one could not fifty years ago, that there is a fresh gathering of forces on the side of life. The claims of life, once expressed solely by the Romantics and by the more archaic social groups and institutions of society, are now beginning to be represented at the very heart of technics itself (Mumford 1934: 367, 368).

His aim was to humanize technology, to give the machine a life of its own, a life-cycle: from the infancy of the middle ages, through the wild aggressive youth of the nineteenth century, to the potential maturity of the twentieth century. He saw, in many of the new science-based technologies, a biological or organic vision, which was superseding the mechanical philosophy of the eighteenth and nineteenth centuries. He saw opportunities for assimilating the machine into patterns of regional organization - opportunities which he would discuss in more detail in *The Culture of Cities* in 1938. The great promise of

the science-based technologies was that they were amenable to decentralization and to democratic control.

Perhaps most significantly, Mumford saw a new esthetics emerging, a new kind of art that was not only embodied in the technological products, but was made possible by the new instruments of artistic reproduction. For Mumford, photography, recorded music, moving pictures expanded the human personality: "Whereas in industry the machine may properly replace the human being when he has been reduced to an automaton, in the arts the machine can only extend and deepen man's original functions and intuitions" (Mumford 1934: 343). Modern man expressed himself by means of technological instruments; he could record his feelings and portray his environment in ways that enhanced his experience of life, and that, for Mumford, was always the main goal of all activity.

Mumford's contribution was to provide a personal, some might say eccentric, reading of the multiple meanings of the mechanical order. Through his organic philosophy, at one and the same time humanist and ecological, Mumford could characterize the social and human problems of technology in a more comprehensive way than any other single individual. The book itself created a new field of study: history of technology. While there would be many who would follow Mumford in subjecting technology to historical analysis, particularly in the postwar United States, no one, not even Mumford himself, would manage to take so much into account as he did in *Technics and Civilization*. If its personal and opinionated language can irritate, and its lack of references can annoy the academic reader, the sheer amount of thought continues to fascinate. Mumford succeeded in placing technological development in a human context; after *Technics and Civilization*, the debate about technology moved to a new level of constructive ambition and seriousness. It would never be quite the same again.

8. John Dewey and Pragmatic Assessment of Technology

John Dewey, as we have seen in earlier sections, was one of the main articulators of the progressive standpoint at the turn of the century. Even more than William James, Dewey had sought to reconstruct philosophy along modern, experimental lines. Dewey had also sought to link philosophy with progressive practice, particularly in his pedagogical activities and his work with the Laboratory School at the University of Chicago.

By the 1920s, Dewey had come to see some of the problems with his earlier positions. He came to see that the war - and his support for American involvement in it - had been a mistake, a failure of democratic principles. The

war had not ushered in a more equitable world order, as Woodrow Wilson had promised, but rather a new imperialism that Dewey himself came to oppose. Particularly important in his later development was his confrontation with China in 1919, in the midst of the May 4th movement. Also important were the criticisms of his position that had been written during the war by Randolph Bourne. The 1920s were for Dewey a period of reassessment, which culminated in a series of writings which directly addressed the concerns of people like Mumford and Krutch. For our purposes, the key text is *The Quest for Certainty*, published in 1929, the same year as *The Modern Temper*. There Dewey reaffirmed his pragmatic faith, but he also offered perhaps his most reflective defense of science and technology.

What was important for Dewey was to distinguish scientific facts from reality. "The man who is disappointed and tragic because he cannot wear a loom is in reality no more ridiculous than are the persons who are troubled because the objects of scientific conception of natural things have not the same uses and values as the things of direct experience" (quoted in Westbrook 1991: 356). Dewey was critical of Krutch and other anti-modernists because they misunderstood what science actually produced. It was not a knowledge of things, but an instrumentally mediated knowledge of relations: "the relations a thing sustains are hardly a competitor to the thing itself" (p 355). It was also important to distinguish between scientific knowledge and the positivist philosophy of science, and, as always, Dewey opposed those philosophers who valued reason and logic above practical judgment. Instead of reason, Dewey argued for intelligence in public affairs and in the cultural control of science and technology:

A man is intelligent not in virtue of having reason which grasps first and indemonstrable truths about fixed principles, in order to reason deductively from them to the particulars which they govern, but in virtue of his capacity to estimate the possibilities of a situation and to act in accordance with his estimate. In the large sense of the term, intelligence is as practical as reason is theoretical (p 357).

The point for Dewey, as an egalitarian, was to keep science and scientific reason firmly in their place, under democratic control. In the words of Robert Westbrook, "For Dewey, substituting intelligence for transcendent reason...in the moral life of a culture required vesting authority not in the insights of philosophers (or scientists) but in the deliberations of ordinary men and women skilled in the art of practical judgment" (p 360). Dewey was, above all else, a philosopher of democracy, who came to see that technology was becoming as much a threat as a contributor to American democratic behavior. It was a democratic technics, a functional and egalitarian version of utilitarianism that Dewey promulgated, and, as he continued to "reconstruct"

his philosophy in the interwar years and serve as a spokesman for a new wave of pragmatic populism among intellectuals, he developed a more skeptical view of technology (Hickman 1990). He no longer identified science and technology with progress, and he no longer saw the linking of technology and democracy as inevitable. Ever more radically in the 1930s, he called for a new morality to deal with the consequences of science and technology. As he put it in *Freedom and Culture*, a widely read book published in 1939:

Science through its physical technological consequences is now determining the relations which human beings, severally and in groups, sustain to one another. If it is incapable of developing moral techniques which will also determine these relations, the split in modern culture goes so deep that not only democracy but all civilized values are doomed....A culture which permits science to destroy traditional values but which distrusts its power to create new ones is a culture which is destroying itself. War is a symptom as well as a cause of the inner division (Dewey 1939: 154).

By 1939, Dewey was already 79 years old and long retired. As an elderly philosopher, he certainly had some significance in the interwar technology debates, but it was perhaps more through his disciples that his position was articulated and further disseminated. In the 1920s, a group of progressive social scientists, following in the footsteps, if not the letter of Dewey's philosophy, developed a kind of pragmatic sociology that would play an important part in the practical efforts that were taken in the interwar years to "assess" the social consequences of technology. Robert Lynd and William Ogburn would, as it were, reinvent pragmatism as a kind of social engineering (cf. Ross 1991). And they would not be without influence in shaping the new deal order in the wake of the depression. Indeed, much of the reform activity of the 1930s was a conscious attempt to bring together the different positions which had been staked out in the technology debates of the 1920s. The task in the 1930s was increasingly seen as one of creating a new national project that could combine the best of the assimilators and the adapters, the elitists and the egalitarians. In the words of Warren Susman, "a key structural element in a historical reconstruction of the 1930s is the effort to find, characterize and adapt to an American way of life as distinguished from the material achievements (and the failures) of an American industrial civilization" (Susman 1984: 156).

9. Conclusions

The four positions that I have discussed were certainly not the only ones that were articulated in the interwar years. But they do seem to represent the poles of a wide-ranging debate about the meanings of modern technology that would continue into the postwar era, and even into the present. Out of these four positions have grown several distinctive "discourses" which have even manifested themselves in the formation of academic specialties. On the one hand, there have been those who have identified the nation's greatness and new role of global leadership with technological superiority, and that position would grow in strength after the second world war, with the development of the atomic bomb and the more general experience with "big science". In the 1950s, technocracy would gain a new lease on life through the largesse and the institutionalization of what came to be called the military-industrial complex. Latter-day followers of Thorstein Veblen, such as the economist John Kenneth Galbraith, would see in the "technostructure" of American corporations a new source of economic dynamism and social transformation as well as a new form of political power. And, for the small, but growing group of institutional, or innovation economists, Veblen is still seen as a kind of founding father, even though his own views have tended to be moderated as the years have passed.

Lewis Mumford would be one of the most outspoken critics of the megamachine that America had become in his eyes. In the postwar era, Mumford's writings would help shape a new range of humanist disciplines, from the history of technology to human ecology, which would explore ways to assess the impacts of modern technology on the natural environment as well as on social relations. Joseph Wood Krutch would be one of several intellectuals who would carry the criticism of modernity further into an appreciation for the ways of life of the traditional cultures of North America. The Indian spirit that he wrote about from his new home in the American southwest would be a source of the countercultural movements that developed in the 1960s and which have continued to inspire environmentalism as well as cultural practices.

The pragmatism of John Dewey, downplayed and largely forgotten in the immediate postwar era, has come to be rediscovered as an indigenous, American kind of philosophy, at once practical and sophisticated. And in the writings of Richard Rorty and other philosophers, Dewey's instrumentalism has come alive again to inform contemporary debates about technology, science and the kinds of knowledge that are appropriate for a post-industrial age.

The positions that were staked out in the interwar years have thus continued to inform the intellectual appropriation of technology in America. While technologists fashion new forms of "virtual reality" and environmental extremists oppose further encroachments into the wilderness, there may be something to learn from recollecting the debates of the interwar years, when

the terms of reference for many contemporary disputes were first established. The battle between the technocrats and the humanists lives on.

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