

Introduction

In one disguise or another, technology has been a central theme in political thought for the past two hundred years. Although the definition of the issue of concern has again and again shifted, it has been clear during this time that there is something in the nature of modern technology thinkers can ill afford to ignore. A partial catalog of the topics that have been associated with various aspects of modern technics would include the following: the industrial revolution and the rise of industrial society, the ascendancy of the middle class, the possibility of utopia, the misery of the working class and the necessity of revolution, the rise of new elites, the social and psychological turmoil involved in rapid change, alienation, nationalism, imperialism, leisure, and the possibility of ecological disaster.

Despite its widely acknowledged importance, however, technology itself has seldom been a primary subject matter for political or social inquiries. While technological developments are commonly cited as among the most important causes of the shape of modern society, the tendency has been to see the matter solely in terms of economics and economic history, perspectives that due to their special mode of abstraction and selectivity give us a very limited vision of the role technics have played in modern history. Writers who have suggested the elevation of technology-related questions to a more central position—William F. Ogburn, Lewis Mumford, Leslie White, and others—have for the most part been politely ignored. The prevalent opinion has remained that the true problems of modernity could best be understood in ways that excluded all direct reference to the technical sphere. Technology could be left to the technicians.

In recent years, however, the prevailing winds of neglect have begun to shift. Technology and its various manifestations have become virtual obsessions in discussions about politics and society on a wide variety of fronts. Social scientists, politicians, bureaucrats, corporate managers, radical students, as well as natural scientists and engineers, are now united in the conclusion that something we call “technology” lies at the core of what is most troublesome in the condition of our world.

There is, of course, little agreement as to the nature of the problem

Introduction 5

or about the approach that an intelligent person should take in the quest for understanding. In the eyes of scientists and technicians, the issue takes the form of a moral dilemma that hovers menacingly over their work. Since World War II they have become increasingly sensitive to the fact that scientific technologies have profound and often unfortunate consequences in the world at large. With the neutrality of their professions and products now in question, they have begun intensive inquiries into the political and ethical context in which their activities exist.<sup>1</sup>

From the point of view of social scientists and managers, the crucial issues are those of the increasing complexity and rate of change in modern society. Developments in the technical sphere continually outpace the capacity of individuals and social systems to adapt. As the rate of technological innovation quickens, it becomes increasingly important and increasingly difficult to predict the range of effects that a given innovation will have. When compounded by the increasing complexity of sociotechnical systems, these changes make it more and more difficult to carry out some of the most basic activities of contemporary social life: planning, design, and functional coordination. For this reason complexity and change are increasingly studied as “independent variables” said to have objectively knowable correlations to certain kinds of social and political phenomena.<sup>2</sup>

In other modes of interpretation, however, the concerns of the natural and social scientists are held to be trivial, self-serving, and beside the point. Radical critics of “the technological society” in both Europe and America have insisted that what deserves our attention is not the rate of technological innovation and its effects but rather the very existence of advanced technology in the life of man. Technology is, according to this view, a source of domination that effectively rules all forms of modern thought and activity. Whether by an inherent property or by an incidental set of circumstances, technology looms as an oppressive force that poses a direct threat to human freedom. In the words of Allen Ginsberg, “Ourselves caught in the giant machine are conditioned to its terms, only holy vision or technological catastrophe or revolution break

'the mind-forg'd manacles.'" <sup>3</sup> A slogan of the Black Panther party, "The spirit of the people is greater than the man's technology," expresses the conviction that someday the system of domination will be overcome, a testable hypothesis somewhat different from those social scientists currently ponder. <sup>4</sup>

*Technology* is a word whose time has come. Its rise as a conscious problem in a wide variety of social and political theories requires some explanation. We are now faced with an odd situation in which one observer after another "discovers" technology and announces it to the world as something new. The fact is, of course, that there is nothing novel about technics, technological change, or advanced technological societies. One can argue that medieval Europe was a highly sophisticated technological society of a certain sort, involved in a fairly rapid, continuing process of sociotechnical change. One does not have to wait for the industrial revolution or the so-called postindustrial period of the twentieth century to see political societies remolded in response to technical innovation. We are justified in asking, then, why this topic should suddenly arise as a matter of intense concern.

Paul Goodman once suggested that the widespread uneasiness about science and technology amounts to a religious upheaval similar to that of the Protestant Reformation. "Science," he explained, "has long been the chief orthodoxy of modern times. And precisely science which should have been the wind of truth to clear the air, has polluted the air, helped to brainwash, and provided the weapons of war."<sup>5</sup> Current protests surrounding the military-industrial complex are in effect a call for a return to "the high tradition of science and technology" much like Luther's call for a new affirmation of the true Christian faith. A reformed scientific technology would reemphasize the ideals which, according to Goodman, once guided its progress: prudence, decentralization, ecology, and incorruptibility. Lewis Mumford holds much the same view. There is, he believes, a humane tradition of science and technology based on "an earth-centered, organic, and human model" to which Western civilization must return if it is to avoid the disastrous course of the "megamachine."<sup>6</sup> "For its effective salvation," Mumford

warns, "mankind will need to undergo something like a spontaneous religious conversion: one that will replace the mechanical world picture, and give to the human personality, as the highest manifestation of life, the precedence it now gives to machines and computers."<sup>7</sup>

While such analogies of religious crisis help to illuminate the outrage present in much of the contemporary criticism of technology, they fail to capture an important characteristic of the discussion—its pervasive sense of puzzlement and disorientation. The writers who have isolated technology as an issue have repeatedly stressed that what is involved is not merely a problem of values or faith but, more importantly, a problem in our understanding of things. There is, they assert, something wrong in the way we view technology and man's relationship to it. In its present array of vast and complex forms, technology continually surprises us and baffles our attempts at comprehension. From all sides one hears the call for new evidence and new interpretations to remedy our disoriented state.

In this regard I would suggest that we supplement Goodman's New Reformation with what may be a more appropriate historical analogy, the scientific revolution. In the sixteenth and seventeenth centuries, after hundreds of years of relatively stable scientific belief, the realm of nature was suddenly cast open to question. The discoveries of Copernicus, Galileo, Kepler, Vesalius, and others placed all of God's creations in a new and surprising light—a light that inspired generations of inquiry into natural phenomena and resulted in a totally new conception of the physical universe and man's place within it. As Thomasso Campanella poignantly expressed it, "If Galilei's conclusions are right . . . we shall have to philosophize in a new way."<sup>8</sup>

In much the same manner the realm of technology has become an open question for the present age. After centuries in which technical artifice was of little interest outside the confines of its own development and practice, the nature of man's own creations has now emerged as a source of genuine perplexity. The technological world that the scientific revolution helped bring into being has itself become a focus of new inquiry. The crucial insight which occasions this new awakening

is nothing so profound as the disclosure of Copernicus's *De Revolutionibus* that the earth revolves around the sun rather than vice versa. It is instead roughly equivalent to the realization that the sun rises in the morning and sets in the evening; for the astonishing fact that one thinker after another has stumbled upon is merely this: technology in its various manifestations is a significant part of the human world. Its structures, processes, and alterations enter into and become part of the structures, processes, and alterations of human consciousness, society, and politics. The remarkable impact of Marshall McLuhan and Jacques Ellul rests on their ability to sensitize modern audiences to something they had overlooked: we are surrounded on all sides (possibly even the inner side) by a myriad of techniques and technologies. Apparently these influences had become so much a part of everyday life that they had become virtually invisible. The changes and disruptions that an evolving technology repeatedly caused in modern life were accepted as given or inevitable simply because no one bothered to ask whether there were other possibilities. It is for this reason that the discussion about the place of technology in human existence requires much more than facile talk about how well or how poorly technology accords with "human values."<sup>9</sup> One can paraphrase Campanella in saying that if the observations of Ellul, McLuhan, Marcuse, Mumford, Sypher, Galbraith, and others are correct, we shall have to do at least some of the work of social science and political theory in a new way.

The analogy here, like most other analogies, is valid only if taken in moderation. In mentioning the scientific revolution in the same breath as our present questions about technology, I am not asking the reader to trace out all conceivable similarities between a science of nature and a science of artifice. In particular, I am not suggesting that the issues here are solely "empirical" ones that can be handled through improved social scientific methodology. The tendency in research of that kind is to define all problems as those of "change" and to gather data relevant to selected correlations. While such work is sometimes interesting, I have never been convinced that the crucial questions at hand are best studied in terms of "change." If there were never another technological

breakthrough, innovation, or advance, and never another social, ecological, or political consequence, we would still face a host of problems about the meaning of technology in the life of man. Much of social scientific research in this area amounts to a triumph of instrumentation—virtuosity in measuring and comparing quantifiable variables—rather than an earnest effort to advance our understanding.

But it is not clear that we would know what to do with the new models and data even if we had them. Where does one encounter a rich and lively discussion about the practical, moral, and political context in which these findings make sense? Almost nowhere. The hope is that a new study of technological affairs would bring together the relevant spheres of knowledge, judgment, and action in a way that might point to more intelligent choices. Technology, after all, is inherently pragmatic. It deals with establishing what one wants and how one wants to pursue it. But in almost every book or article on the subject the discussion stalls on the same sterile conclusion: "We have demonstrated the relationship between Technology X and social changes A, B, and C. Obviously, Technology X has implications for astounding good or evil. It is now up to mankind to decide which the case will be."

Poor mankind. Although freshly equipped with the best findings of social science, it is still left holding the bag. At this point the fact-value distinction, considered as a moral imperative, has its most lethal effects. The social scientist, presumably the person who knows most about the issues at hand, ceases to inquire into the practical implications of his own work. To go further, he believes, is to tread on the soil of "values," an area that he holds to be little more than a tortuous field of personal preferences, prejudice, and half-brained moralism. The idea that there could be a reasonable basis upon which one could arrive at general conclusions about wise or unwise choices for political society is totally foreign to him. After he explains the relationships found in the data, his contribution ends.

The truth of the matter is that our deficiency does not lie in the want of well-verified "facts." What we lack is our bearings. The contemporary experience of things technological has repeatedly confounded

our vision, our expectations, and our capacity to make intelligent judgments. Categories, arguments, conclusions, and choices that would have been entirely obvious in earlier times are obvious no longer. Patterns of perceptive thinking that were entirely reliable in the past now lead us systematically astray. Many of our standard conceptions of technology reveal a disorientation that borders on dissociation from reality. And as long as we lack the ability to make our situation intelligible, all of the "data" in the world will make no difference.

A good illustration of this state of disorientation can be seen in the peculiar way in which the word *technology* appears in academic and everyday speech. In past decades the term had a very specific, limited, and unproblematic meaning. Persons who employed the term spoke of a "practical art," "the study of the practical arts," or "the practical arts collectively." In the literature of the eighteenth and nineteenth centuries, such meanings were clear and were not the occasion for deliberation or analysis. *Technology*, in fact, was not an important term in descriptions of that part of the world we would now call technological. Most people spoke directly of machines, tools, factories, industry, crafts, and engineering and did not worry about "technology" as a distinctive phenomenon.

In the twentieth century, however, the linguistic convention has gradually changed. *Technology* has expanded rapidly in both its denotative and connotative meanings. It is now widely used in ordinary and academic speech to talk about an unbelievably diverse collection of phenomena—tools, instruments, machines, organizations, methods, techniques, systems, and the totality of all these and similar things in our experience. The shift in meaning from something relatively precise, limited, and unimportant to something vague, expansive, and highly significant can be traced through the definitions in Webster's unabridged dictionary. In *Webster's Second International* (1909) the word is said to mean "industrial science, the science or systematic knowledge of the industrial arts, especially of the more important manufactures." In *Webster's Third New International* (1961), however, the definition blossomed into the following: "the totality of means employed by a

people to provide itself with the objects of material culture." Today, even this definition seems too narrow, for if we notice how the word is actually employed, it certainly covers much more than just the material objects of culture. Some of the most intriguing new technologies have to do with the alteration of psychological or spiritual states.

Many persons find it uncomfortable to leave the meaning of *technology* in this form. Social scientists usually insist that a precise, manageable operational definition be hammered out. From their point of view, if this is not done we will surely find ourselves in the position of Jacques Ellul who defines his central concept, *la technique*, as "the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity."<sup>10</sup> Such a definition, Ellul's critics complain, is overly broad and does not approach the meaning of our word *technology*. I disagree. While Ellul's addition of "absolute efficiency" may cause us difficulties, his notion of *technique* as the totality of rational methods closely corresponds to the term *technology* as now used in everyday English. Ellul's *la technique* and our *technology* both point to a vast, diverse, ubiquitous totality that stands at the center of modern culture. Both include a substantial portion of what we make and what we do.

There is, of course, nothing unusual in the discovery that an important term is ambiguous or imprecise or that it covers a wide diversity of situations. Wittgenstein's discussion of "language games" and "family resemblances" in *Philosophical Investigations* illustrates how frequently this occurs in ordinary language. For many of our most important concepts, it is futile to look for a common element in the phenomena to which the concept refers. "Look and see whether there is anything common to all.—For if you look at them you will not see something that is common to all, but similarities, relationships, and a whole series of them at that."<sup>11</sup>

What is interesting in this case, however, is that a concept that was once very specific in the way it was used has now become amorphous in the extreme. There is a tendency among those who write or talk about technology in our time to conclude that technology is everything and

everything is technology. In a dialectic of concepts that Hegel would have appreciated, the word has come to mean everything and anything; it therefore threatens to mean nothing.

For those who would listen to language rather than perform elaborate operations on it, this annoying symptom will not be taken as an occasion to impose an arbitrary definition. It should be seen as an interesting sign. What does this chaotic use of the term *technology* indicate to us?

An answer to this question is that while the sphere of technics one wishes to talk about has grown rapidly, the linguistic resources of public discourse have changed little at all. Specialists in the various subdivisions of technology have developed concepts to make their own sphere of activity intelligible to them; but for the most part these concepts remain foreign and even mysterious to the nonspecialist or the specialist of another field. The same concepts useful in building and maintaining a given technology are not those useful in understanding its broader implications for the human community. In this sense the confusion surrounding the concept "technology" is an indication of a kind of lag in public language, that is, a failure of both ordinary speech and social scientific discourse to keep pace with the reality that needs to be discussed. "Technology," therefore, is applied haphazardly to a staggering collection of phenomena, many of which are recent additions to our world. One feels that there must be a better way of expressing oneself about these developments, but at present our concepts fail us.

One consequence of this state of affairs is that discussions of the political implications of advanced technology have a tendency to slide into a polarity of good versus evil. Because there is no middle ground for talking about such things, statements often end up being expressions of total affirmation or total denial. One either hates technology or loves it. In my own attempts to speak with scientists, engineers, and managers over the years, I have again and again run into responses that refuse to tolerate any ambiguity on this cherished, threadbare dichotomy. I have tried to point out that America has for too long

substituted technical solutions for problems that were either political or moral in nature. I have suggested that there might be some desirable alternatives to the ways in which we now employ various kinds of technology—for example, other ways of structuring the use of television than our present nationwide, corporate-owned networks. As innocuous as these views are, they are often taken as a threat. Any criticism of sociotechnical practice could only be vile opposition. "You're just using technology as a whipping boy," the response comes back. "You just want to stop progress and send us back to the Middle Ages with peasants dancing on the green."

A typical response of engineers, for example, is to announce that they are merely problem solvers. "Tell us the problem," they demand. "We will find a solution. That's our job. But you may not presume to question the nature of our solution. You are not a member of a technical profession and, therefore, know nothing of relevance. If you insist on raising questions about the appropriateness of the means we devise, we can only conclude that you are antitechnology."

It soon becomes clear that in this enlightened age there is almost no middle ground of rational discourse, no available common language with which persons of differing backgrounds can discuss matters of technology in thoughtful, critical terms. Conversations gravitate toward warring polarities and choosing sides. One source of fascination in my inquiries has been that existing discussions are often thoroughly nervous, even hysterical. When intelligent persons can become so upset over such ostensibly mundane matters, there is something peculiar going on.

It is not possible to clear up the inadequacies in our speech habits with a single stroke. But I shall offer some basic distinctions that I will be using in my writing here.

First I want to note the class of objects we normally refer to as technological—tools, instruments, machines, appliances, weapons, gadgets—which are used in accomplishing a wide variety of tasks. In speaking of objects of this sort I shall employ the term *apparatus*. For many persons, "technology" actually means apparatus, that is, the physical devices of technical performance.

I also want to mark the whole body of technical activities—skills, methods, procedures, routines—that people engage in to accomplish tasks and include such activities under the rubric *technique*. The root of this word is the Greek *technē* (“art,” “craft,” or “skill”), which linguists have further traced to the Indo-European root *teks-* (“to weave or fabricate”). From the earliest times, technique has been distinguished from other modes of human action by its purposive, rational step-by-step way of doing things.

In addition “technology” frequently refers to some (but not all) varieties of social organization—factories, workshops, bureaucracies, armies, research and development teams, and the like. For my uses here, the term *organization* will signify all varieties of technical (rational-productive) social arrangements. Another closely related term—*network*—will mark those large-scale systems that combine people and apparatus linked across great distances.

I am not a lexicographer and do not wish to legislate usage. These distinctions represent a modest attempt to bring a measure of order to a conversation that has lacked order so far, an attempt the rest of the book will continue. With this preliminary groundwork taken care of, let us turn to the central theme guiding our inquiries.