Socioeconomic Transformations

The Control Revolution. Technological and Economic Origins of the Information Society. JAMES R. BENIGER. Harvard University Press, Cambridge, MA, 1986. xiv, 493 pp., illus. $25.

The Control Revolution seeks to explain the origins of what journalists sometimes call the information society. James R. Beniger, who teaches in the Annenberg School of Communications at the University of Southern California, traces that concept to the work almost three decades ago of the economist Fritz Machlup. Machlup summed employment and output in some 30 industries, including the activity of persons in "education, research and development, communications media, information machines (like computers), and information services (finance, insurance, real estate)" (p. 22). He found that about 30% of both the gross national product and the labor force in 1958 were accounted for by "the production and distribution of knowledge." Others have since extended Machlup's work and have placed it in historical perspective.

From the beginning of the 19th century, the labor force shifted first out of agriculture and into industry, then into the service sector, and most recently into the "information" sector. Beniger argues that the rise of that last sector was tied initially to the emergence of the railroad in the 1830s and then most significantly to a "crisis of control" in the 1870s and 1880s in the wake of "the Industrial Revolution." In the last couple of decades, he indicates, the computer has further extended the domain of the information sector. These changes constitute for Beniger a "control revolution." This is his personal terminology for a phenomenon pointed to by many others, including the popular writer Alvin Toffler, who called it the Third Wave, the first two being agricultural and then industrial society. In this new book Beniger emphasizes the long-term historical origins of the highly fashionable and highly vague concept perhaps best known as "postindustrial society."

Most of *The Control Revolution* consists of a synthesis of the work of historians, particularly those in American business and economic history. Beniger has been powerfully influenced by that literature, and above all by the work of Harvard's Pulitzer Prize–winning business historian Alfred D. Chandler, Jr. Many of the authors Beniger cites, such as Max Weber, Frederic C. Lane, and Fritz Redlich, were also important in shaping Chandler's ideas. Chandler's enormously influential 1977 magnum opus, *The Visible Hand: The Managerial Revolution in American Business*, casts long shadows over most of *The Control Revolution*. Beniger makes plain his debt to Chandler; indeed references to and quotations from Chandler's work seem almost omnipresent in the historical chapters of this book.

Beniger summarizes the economic and business history of the developed portions of the world, beginning with the rise of commercial capitalism in the late Middle Ages and the Renaissance. He follows the efforts of merchants and industrialists to speed the flow of trade and the production of goods and services, and especially their increasingly successful attempts to reduce risk and uncertainty in the economic life of the West. Over time, transportation and communications improved. At the same time, humankind worked out ever better commercial institutions to rationalize and "integrate the developing systems of technological and market control" (p. 167). Beniger emphasizes his belief that the great transformation of traditional into modern society was based not on ideological change but simply on the appearance of technical and social systems better able to control or influence human behavior. He defines control as "purposive influence toward a predetermined goal," the "essential property" recognizable in the "end-directedness or purpose of organization" (p. 35). Whenever more effective means of control (or organization) are developed, he indicates, they are adopted.

As goods and services were produced, marketed, and consumed at greater speeds in the 19th century, it became more difficult to coordinate and control economic processes. This brought about a "crisis of control" and "inspired a stream of innovations in information processing, bureaucratic control, and communications" (p. 221). Crises spread successively through transportation, manufacturing, distribution, and consumption. New technologies and innovations such as modern advertising, "scientific" management, and the modern corporation were all responses to crises of control. Beniger's control revolution is Chandler's visible hand. Television and the computer are thus only the latest in a series of technical and organizational responses to economic change, responses that make up a revolution now more than a century old.

When the book departs from its summary of the work of historians of business and technology it moves onto much shakier ground. Section 1 consists of two chapters entitled "Programming and control: the essential life process" and "Evolution and con-

"Rural free delivery in Lafayette, Indiana, c. 1898. With the U.S. Post Office's systematization of RFD in this year, big-city newspapers began to travel rural mail routes (more than a billion copies annually by 1911). By bringing more current news and advertising to isolated farmers, daily newspapers quickly supplanted country weeklies in areas with RFD." [From *The Control Revolution*; courtesy of Smithsonian Institution]

trol: culture and society." These are unfortunate attempts to integrate widely divergent ideas in biology, anthropology, physics, sociology, philosophy, linguistics, neurophysiology, and structuralism. Here Beniger argues that the essence of all life is information processing and that all life forms evolve toward ever more efficient forms of control. Chapter 3 even has an appendix entitled "What is life? an information perspective." It also has a table consisting of a time line of forms of control running from the formation of the earth and "molecular programming" to computers, microprocessors, and genetic programming technology. Information plays a crucial role in the past and present because of "the nature of all living systems [and] the relationship between information and control. Life itself implies purposive activity and hence control . . . in national economies no less than in individual organisms" (p. 434).

These efforts to tie the history of all life to "information and control" are well-intentioned but facile and ultimately unconvincing. Indeed, reading chapters 2 and 3 is the equivalent of attending about four dozen academic cocktail parties in a row. One of the favorite pastimes of professors in older and more established university departments is to sniff skeptically at the pretensions of fashionable new "disciplines" and departments, such as communications. Section 1 of *The Control Revolution* is not likely to help matters much. Beniger's concepts of information and control become so general and are pushed so far that they lose much of their meaning. It seems unlikely that social scientists will heed Beniger's call to unite under the information banner to strengthen our "knowledge of social structure and process" (p. 436).

This book is a welcome corrective to fashionable, present-minded notions that computers are entirely the harbingers of a new age. It is also further testimony to the power and the widespread application of the work of Alfred Chandler, perhaps America's most original and most influential living historian. Chandler's explication of the nature and evolution of the functional structure of organizations in relation to their strategies has shaped work not only in other areas of history (particularly the history of technology) but throughout the social sciences.

One of the central yet seldom acknowledged aspects of that body of work, including *The Control Revolution*, is its determinism. All technically advanced societies, whether Western or Eastern, have apparently evolved toward the use of roughly similar forms of business and economic organization. (This has become clearer in Chandler's

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"The Social Security Act of 1935 required that the U.S. government maintain employment records on twenty-six million people, a task that required the processing of a half-million punch cards per day. Conservative editorial opinion maintained that the system 'depersonalized' individuals by treating them as numbers." [From *The Control Revolution*; Courtesy of U.S. Social Security Administration]

work as he applies his analysis to the history of many nations.) Beniger's cheerful affirmation that humankind inevitably adopts anything that strengthens control (technologies and organizations need only be purposive, not purposive to any *particular* end) is a striking manifestation of this historical determinism. If one were a thoroughgoing and reflective determinist, the implications for the future of free societies and free individuals should prove troubling. The work of the political scientist Langdon Winner (*Autonomous Technology*, 1977, and *The Whale and the Reactor: A Search for Limits in an Age of High Technology*, 1986), for example, raises the specter of powerful organizations mindlessly employing out-of-control technics to engineer ever more efficient, more effectively controlled individuals and social systems.

The perspectives of history, however, provide some hope as well as some cause for despair. Despite the power of integrative technologies and organizational structures since the beginnings of what Beniger terms the control revolution, free societies have thus far survived. It also appears that, despite our vaunted organizations and technologies, we are as far from being the masters of our fate as we have ever been. In the Victorian era self-confident optimism reigned about the inevitability of progress based on science and on technology. More recently the horrors of the 20th century have led some to fear an authoritarian technology's power to destroy all life or virtually any life worth living. But we are never as good as we think. Perhaps it is that knowledge that has kept Chandler—if not his most enthusiastic followers—from embracing full-blown historical determinism.

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A Flow of Technology

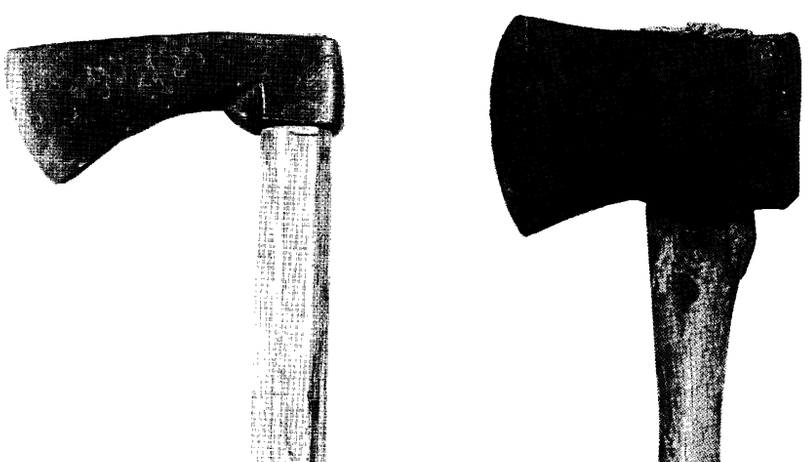
Engines of Change. The American Industrial Revolution, 1790–1860. BROOKE HINDLE and STEVEN LUBAR. Smithsonian Institution Press, Washington, DC, 1986. 309 pp., illus. $29.95; paper, $14.95.

This handsome book is designed to accompany an exhibit at the Smithsonian Institution's Museum of American History but stands alone on its own merit. Growing out of a concern for the interpretation of material culture (the physical objects on display in the exhibit), it uses artifacts to get at the shape and meaning of what the authors call the American Industrial Revolution. Addressed to the general museum-going public, the book represents at the same time a significant step forward for scholarship in the history of American technology, but a step taken to a different, and somewhat old-fashioned, drummer.

The story here told is a familiar one. The Industrial Revolution, arising in Great Britain in the 18th century, spread to the new United States in the years immediately after America's political revolution. Here the new machines, materials, and techniques, imported piecemeal and often in contravention of British laws, found a fertile ground for growth. An abundance of natural resources, an urge to grow, expand, and develop, and what was called a "want of hands" to do the work all pointed to a grateful acceptance of the new industrial technology. Indeed the ease and rapidity, appearing to us as a near inevitability, of the "transfer of technology" from the Old World to the New casts real doubt on contemporary attempts to prevent what the Reagan administration calls a hemorrhage but which may be only a natural flow of technology across the face of the earth.

The book is handsomely illustrated with maps, prints, and photographs of actual industrial sites and machines, many of the last taken from the Smithsonian's marvelous collection. More than most subjects, the history of technology needs well-selected illustrations, and these are used judiciously and effectively to explicate rather than simply supplement the text.

Hindle and Lubar's effort marks the first attempt by professional historians of technology in many years to provide a comprehensive narrative account of the development of American technology over a significant span of years. Furthermore, the authors make frequent mention of women, slaves, Native Americans, and others usually absent



European (left) and American (right) axes. "The best example of anonymous technology [that developed in America] may be the elegant American felling axe. Many different sorts of axes were imported from Europe, but the most critical change occurred in the felling axe, a crucial tool because of the vast effort required to clear woodlands. The American axe was unique in that the bit, or cutting edge . . . , was just about the same weight as the poll or flat edge . . . . In contrast, the European axe had a longer and narrower bit and hardly any poll at all. This difference permitted the American axe to be swung straight and clean, without . . . wavering. In addition, the wooden handle was given a length and curve precisely fitted to the height and swing of the axman. The result was remarkable. A practiced American axman could fell three times as many trees in the same time as a man using a European axe." [From *Engines of Change*]