

The Taming of Invention

American Genesis. A Century of Invention and Technological Enthusiasm, 1870–1970. THOMAS P. HUGHES. Viking, New York, 1989. xiv, 529 pp., illus. \$24.95.

In this essay in the history of technology Thomas P. Hughes is not just concerned with showing that technology belongs in the mainstream of American history. For him technology is the stream, “the technological torrent” (in words quoted from literary critic and historian Perry Miller) that swept America headlong into the present. Hughes depicts that torrent as slowing in the late 20th century into quiet, though still deep and dangerous, pools, and emerges from his plunge into it to redefine America and Americans. We are, he tells us “a nation of machine makers and system builders . . . imbued with a drive for order, system and control.”

His image of that era of technological enthusiasm “passing into history” is not the only thing that technology enthusiasts will dislike about this masterful and stimulating book. Others may speak of continuing acceleration, driven by the information revolution, genetic engineering, or space exploration. For Hughes, these are but details; the story is over.

He begins his account of that story with independent inventors of Edison’s generation, a historical cohort he depicts as being unique and as seminal as Periclean dramatists or Renaissance artists; passes on to the origins of modern industrial research; de-

fects the roots of today’s military-industrial complex in U.S. technological initiatives during World War I; observes how such masters of the factory as Frederick Winslow Taylor and Henry Ford shaped not only America but what Germans and Russians thought about America and themselves; notes how artists converted those thoughts into visions; and finally describes how such projects as the TVA and the Manhattan District brought systems thinking to new levels.

It is Hughes’s mastery of the history of technology that distinguishes this book from previous efforts to depict history as technology, such as Elting Morison’s *From Knowhow to Nowhere* and Daniel Boorstin’s *The Americans*. Consider, for example, the treatment of invention and industrial research. Even such sophisticated scholars as Morison and Boorstin swallowed whole the tale of Edisonan inventors as trial-and-error tinkerers, whose mantle passed to the more scientific-minded teams in the industrial research laboratories of circa 1910. They depicted those laboratories not only as corporate Edisons but also as happy bands of brothers in “purity halls” where serendipity and sunny dispositions coexisted with a university-style absorption in the mysteries of the universe.

It wasn’t so simple, Hughes informs us. The independent inventors were, and remain, a different breed from their corporate cousins: more likely to go for the radical change, less guided by the need to conserve

existing structures. And, drawing on the work of Leonard Reich, Stuart Leslie, David Hounshell, John Smith, and others, he demonstrates that the industrial laboratory was anything but a university in exile.

This taming of invention is, in Hughes’s view, just one symptom of a bigger theme. Heroes gave way to system builders. Edison, with his vision of electrifying America, was succeeded by utility magnate Samuel Insull, with his systems that build and diversify electrical load to lower cost. Inventor Henry Ford gave way to mass-production master Henry Ford. With success comes narrowing. Technological momentum, one of Hughes’s favorite concepts, not only moves mountains. It also digs ruts into which systems settle. Worse, it forecloses on the future: “Mature systems suffocate nascent ones.”

Hughes’s own momentum seems to lag a bit as he gets further from the era covered by his own primary research (which includes a biography of the turn-of-the-century inventor Elmer Sperry and a history of the evolution of electric power systems to 1930). The last development covered in detail is nuclear power. The electronics revolution is virtually ignored.

Hughes concludes that large-scale technological systems are now so deeply entrenched in the United States as to be virtually exempt from evolution. Systems may sometimes fade away, but only to be replaced by larger and more complex ones. The only hope Hughes offers is a “confluence of contingency, catastrophe and conversion that would break the technological momentum and socially construct a new style of technology.”

Technology enthusiasts will again object. Here this reviewer would agree. Though military technology does undoubtedly continue to weigh heavily on us, civilian technology is not demonstrably more complex and oppressive than in the past. The U.S. populist movement of the 1890s felt far more oppressed by the railroad and telegraph systems of its day than any substantial part of the public now feels put upon by our automobile-highway or telephone systems. To paraphrase the ecologist Garrett Hardin, the United States has tended to socialize systems (though through regulation and politicization rather than outright ownership) and capitalize components. This makes the systems more responsive to public pressure, and also counters the trend for powerful vested interests to lock themselves to existing systems. Instead, we see AT&T giving up its telephone monopoly, IBM moving to smaller and more powerful standalone computers rather than massive time-sharing systems, and GE ceasing to be the



“Thomas A. Edison (second from right) and the Naval Consulting Board proudly parade,” around 1915. [From *American Genesis*]



"Work and Savings in All Professions through Taylorism." [From *American Genesis*; artist, Pirchah]

electric company. The alleged inevitable move toward more complexity and more domination by a cabal of capitalists, militarists, and technology enthusiasts is not happening.

Disagreement with the book's conclusion does not, however, negate admiration for the overall achievement. Many people have deplored the lack of a single volume giving a coherent, well-written account of what has been learned since 1970 about the role of technology in American history since 1870. Thomas Hughes has done something about it.

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"Challenger fragment." [From *American Genesis*]

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