Thomas P. Hughes, *Human-Built World: How To Think About Technology And Culture*, Chicago and London: University of Chicago Press, 2004. Pp. xii+223. ISBN 0-226-35933-6. £16.00, $22.50 (hardback).

This brief book (some 40,000 words) began as a series of lectures at the University of Virginia in 1995, and is a personal perspective gleaned from a career researching the history of technology. It must be absorbed in that spirit: as an extended lecture, directing the reader to other sources for justifications and confirmation. Its strength – portraying the dramatically different understandings of technology, especially over the past hundred years – is also its weakness. The book expounds the sweep of technological change and critique, necessarily punctuating its broad claims with particular cases and individuals. The result is an impressive overview with idiosyncratic, or at least unconventional, coverage.

The book marshals thirty-nine illustrations of people (moving from historians to engineers to architects), twentieth-century buildings (particularly modernist houses, department stores and factories and their successors), art (from medieval carvings to interwar representations of industry, and to the Art and Technology movement) and human-altered geography (notably lower Manhattan and the Kissimmee River channelisation). The reader is presented with paradigmatic thinkers, some well known, others less so (e.g. Thomas Jefferson, Ralph Waldo Emerson, Oswald Spengler, Lewis Mumford, Werner Sombart, Walther Rathenau, Charles Beard, Norbert Wiener, Walter Gropius, Siegfried Giedion, Raymond Loewy and John Cage).

The first two chapters, on the book's broad themes and transformation of the American landscape by technology, respectively, are bold sketches. Thus Goethe is said to have anticipated 'the behaviour of twentieth-century system builders engaged in totalitarian projects' [p. 20], particularly Soviet and Chinese dam-builders. At times the relationship between technology and culture is portrayed rather sweepingly, e.g. 'the tumultuous pace and the callous demands of a commercial culture overwhelmed some young men and women who drifted into the urban slums or into prostitution and petty crime' [p. 8]. German experiences are folded in, particularly later in the book, to illustrate a comparable revolution in mechanization but a more critical intellectual stance concerning it. Mixed messages are threaded throughout: expressions of national pride at inventiveness and mastery, combined with illustrations of how arrogance and naiveté concerning technology neglected nature and older cultural themes.

As these points suggest, this is an unabashedly Americo-centric book, which argues that 'living in a human-built urban world shaped American character' [p. 8], updating the claim of historian Frederick Jackson Turner, who argued in 1893 that the natural frontier was the defining influence for Americans.

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The United States as 'technology's nation' is a central theme expressed, for example, in the arguable assertion that 'the United States has established itself in the twenty-first century as the pre-eminent technological power' [p.58]. In his Introduction, Hughes cites his first degree in mechanical and electrical engineering as the source of his enthusiastic and sympathetic view of technology as a creative and positive force, but tempered by subsequent critiques from counterculture critics and environmental historians.

Nevertheless, the author paints an appealing picture. Chapters Three ('Technology as Machine') and Four ('Technology as Systems, Control and Information') are the most engaging, and closest to Hughes's own historical research. The solid introduction to industrialisation and early twentieth century systematisation leads on, though, to molecular biology and the information revolution, a rapid survey of inventions, inventors, entrepreneurs, critiques, appropriations, forecasts and media history. Chapter Five outlines the interactions of technology and culture by focusing on enthusiasts and critics during the machine era. Although rich in intriguing and supportable claims, not all are adequately discussed or evaluated to persuade the reader. Fortunately the 25-page bibliographic essay (one-eighth of the text) introduces and assesses the author's main sources.

This book is not directed at historians of technology, who will be able to relate Hughes's meticulous and compelling earlier studies to the overarching generalisations that he makes here. The final chapter is forward-looking, not in the derided sense of futurology or forecasting, but in proposing a cultural engagement with technology for the twenty-first century. This is a grand narrative with a purpose: to counsel wisdom in meshing technology with cultural needs, and especially for re-evaluating the role of technology in environmental terms. He argues for a socially responsible, technologically literate public that will adopt an activist stance, rejecting technological determinism for a view of technologies as socially constructed.

This panoramic view of technology eschews progressivism, and yet inevitably suggests a natural cultural evolution in our engagement with it: from medieval beginnings to nineteenth- and early twentieth-century industrialisation, later perceptions of technological errors and recent considerations of environmental consequences and appropriate technologies. This thesis/antithesis/synthesis account is satisfying as an overview but jostles with Hughes's own opening lines that technology is 'messy and complex' [p. 1] and may raise the hackles of historians toiling at micro-studies of particular cases. Nevertheless, this is a format that probably is inevitable for a book of this length and coverage. For the wider reading public, this book will be informative, interesting and inspirational.

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