

is guaranteed an interesting career, for while unfettered anthropogenic climate change will certainly not turn out exactly like *The Day After Tomorrow*, it should still be a show worth watching — after *ER*, of course. ■

Myles Allen is in the Department of Physics, University of Oxford, Parks Road, Oxford OX1 3PU, UK.

## The second creation

### Human-built World: How to Think about Technology and Culture

by Thomas P. Hughes

University of Chicago Press: 2004. 224 pp. \$22.50, £16

#### Graham Farnelo

Five years ago, the US Army awarded a \$45-million contract to the University of Southern California to establish the Institute for Creative Technologies. The funding of this organization — a confluence of the interests of the military, academia and Hollywood — was a significant step in the history of American technology, from President Eisenhower's 'military-industrial complex' towards something quintessentially modern, a military-entertainment complex.

This development has not evoked much comment, probably because, as the distinguished historian Thomas Hughes laments, most people in the industrialized world have a simplistic view of technology. They think of it as merely being about computers and other gadgets, and as "a handmaiden of commercial capitalism and the military". Hughes seeks to put this right in *Human-built World*, in which he presents an accessible, multi-disciplinary review of modern technology.

Hughes concentrates on the development of technology in the United States, nodding only occasionally to Germany. In the first and best chapter, he describes how the European settlers viewed their transformation of the wilderness into a purpose-built environment as "a second creation". Technology was a gift from God. This religious perspective led the historian Lynn White Jr to note that the book of Genesis in the Bible has persuaded many Americans that God gave them a privileged dominion over nature, an observation that sheds a good deal of light on the environmental policies of the present US administration.

The deployment of new technology in the United States has not been without its critics. After generations of industrialists had enthusiastically followed Henry Ford's precepts for mass production ("system, system and more system"), a backlash was inevitable. Hughes vividly reports the opposition (which reached a peak during the Vietnam

#### Exhibition

### Scientific expressionism

In the mid-nineteenth century, Guillaume Duchenne, who described the form of muscular dystrophy that bears his name, documented in detail all the muscles of the human face and the facial expressions that they could convey.

Fear, joy, horror, disdain and disgust — Duchenne could reproduce any expression of emotion by direct electrical stimulation of the appropriate group of muscles. In doing so, and in recording his experiments photographically, he caused a sensation. At the time, our ability to convey subtle emotions on our faces was considered a divine manifestation of the inner consciousness that separated us from the beasts — not merely a matter of simple physiology.

An introverted man and an unconventional scientist, Duchenne was not shy of challenging the world. Using this series of facial shots, he argued that the ancient Greeks often got it wrong.

The facial expressions on their sculptures did not always accurately reflect the anatomy of the emotions that the artists intended to convey, he claimed.

Duchenne was one of the first scientists to use the new technology of photography as part of the scientific process. The image shown here is included in the exhibition "Photography and Painting in the Nineteenth Century", which runs until 18 July at the Kunsthalle der Hypo-Kulturstiftung in Munich, Germany.



The extensive exhibition describes how painters were influenced by the new way of seeing, and how scientists, engineers and architects used photography as a means of record-keeping — which also allowed them to see their own worlds differently. It emphasizes the unexpected dialogue between science and art, which were both confronted with this revolutionary new tool at the same time.

Alison Abbott

▶ <http://www.hypokunsthalle.de/newweb/index.html>

War) to the systems approach by humanists, public intellectuals and artists, who pointed to what they saw as the consequent erosions of personal freedom and deterioration of the environment.

In the light of this history of opposition, Hughes seems surprised by the wide-eyed reception that the public has given over the past two decades to the burgeoning of digital information technology. Even this technology has religious connections, he points out: George Gilder, the high-profile celebrant of the information age, has long highlighted the emerging 'revolution' in information technology as a kind of new religion.

We do not need to share Gilder's prophetic zeal to agree that information technology is the nearest thing we have seen in contemporary life to a technological revolution. For good or ill, it has substantially changed the way that huge numbers of people live in the industrialized world. Yet Hughes is sceptical about this, and dismisses the claims of its most passionate advocates, notably Nicholas Negroponte. The visionary contributions of Marshall McLuhan go unremarked.

Hughes' passion obviously lies elsewhere, in projects that seek to harmonize techno-

logical developments with the environment — the field of ecotechnological environmentalism (never has a human endeavour been in greater need of a new name). His conclusion, a lengthy panegyric to Florida's project to restore its Kissimmee River system, underlines his optimism. But one wonders what impact this project will have, compared with the environmental destruction that developers are currently inflicting on other parts of the state.

*Human-built World* is a rewarding if unsatisfying book, too dense to appeal to lay readers but too light to be of much use to scholars. It is, however, a virtuoso overview of the various relationships between technology, commerce, society, art and the military. To anyone who has read it, the emergence of a military-entertainment complex will appear as natural as it did to Milo Minderbinder in *Catch 22*: "Frankly, I'd like to see the government get out of war altogether and leave the whole field to private industry." One wonders whether similar thoughts have crossed the mind of Donald Rumsfeld in the past few weeks. ■

Graham Farnelo is senior research fellow at the Science Museum, London SW7 2DD, UK.