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The nature of technological knowledge

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Nothing like a 1956 Wurlitzer jukebox, an espresso machine, or street-wise music machine. Not even anything like "Lego" or the Moulton bicycle. For inclusion in this book everything has to be timeless, universal, and permanent. Perhaps Plato was on the selection committee.

And Herbert Gans's essay? This is the real gem in the book. Gans approaches design not in terms of aesthetic prejudices but through sociocultural analysis. "*Design since 1945*," he writes, "is for this sociologist, a treasure trove of progressive upper-middle culture and a collection of its more typical artefacts" (p. 32). His short but hard-hitting essay on the relationship of taste to class says more about design in society than could a whole brace of fashionable designers at a Philadelphia museum symposium. The piece should leave a large proportion of the "design-conscious" community squirming uncomfortably, for objects the *Design since 1945* way, objects elevated literally and metaphorically onto pedestals, become "good design" and "good taste"—a professional-class way of parading aesthetic prejudices as if they were superior habits of mind. Design is cut adrift from its social, technical, and cultural roots and becomes another form of fine art. The objects and designs included in *Design since 1945* may indirectly tell us something about the notion of design in upper-middle culture, but the book as a whole contributes little to our knowledge and understanding of recent design. Don't buy it—but do borrow it to read Gans's essay.

NIGEL WHITELEY*

The Nature of Technological Knowledge: Are Models of Scientific Change Relevant? Edited by Rachel Laudan. Dordrecht: D. Reidel, 1984. Pp. vii + 145; notes, index. Dfl 65.00; $24.95; £16.50. Available from Kluwer Academic Publishers, 190 Old Derby Street, Hingham, Massachusetts 02043.

This book is one of several promising signs of the growing attention to the study of technology within the disciplines of sociology and philosophy of science. The papers are revised versions of presentations made at a workshop in 1981 where historians, sociologists, and philosophers examined the relevance of recent results of science studies for the analysis of technology. It is a valuable collection which provides new analytical frameworks and fresh research questions regarding theoretical explanations of technological development.

In the introduction, which also offers an extensive list of references, Rachel Laudan sets out the main objectives of the volume: it is directed toward the construction of theoretical models, and it concentrates on

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technology as knowledge. Moreover, the various papers share two assumptions: that it is appropriate to explore the analogies between change in scientific knowledge and in technological knowledge, and that historical studies of technology provide an important base for understanding technological change.

Having observed that technological and scientific practices exhibit major similarities, in the first paper Edward Constant explores some differences between science and technology by concentrating on the communities of practice and the respective traditions of practice. Technological practice has, in his view, a hierarchical structure: designs usually are "decomposable into sub-problems" (p. 33). While this offers an advantage for improving the total system by manipulating only a subsystem, the "interface constraints" within a system are so rigorous that an "intensive intercommunity interaction" is required. This does not seem to be true in science, where intracommunity concerns appear to come first. Related to these different structures are "different modes of satisfying": what counts as "good enough" is defined differently in science and technology. Constant distinguishes technology as knowledge, located in the communities of practitioners, and technology as function, located in organizations. He uses this distinction to suggest an integrated approach toward the description of social and technical "anomalies" in technology.

Two authors focus on the relation between science and technology rather than on the differences between the two. Gary Gutting first compares two models of technological change (by Constant and David Wojick) with Kuhn's model of scientific change. One of his conclusions is that it is unfortunate that Constant and Wojick neglect Kuhn's concept of an exemplar (p. 56). Then Gutting applies his analysis to the question of the relation of science and technology. Derek de Solla Price, in a posthumous paper, emphasized the role of "instrumentality": the technical craft of experimental science. The history of new instrumentalities is the missing link between the history of science and the history of technology. "Science and technology move in linked but independent ways, related like a pair of dancers" (p. 113), and what keeps them linked is the music of new instrumentalities.

Rachel Laudan and Peter Weingart both offer new frameworks for the analysis of technological change. Laudan focuses on technology as problem solving. First, she gives a taxonomy of the different kinds of problems that technologists face. Here, her observation that many technologies are implemented as much because they are needed as because they work successfully (e.g., some medical technologies) adds to the fruitfulness of Constant's idea of functional failure as a source for technological problems (p. 85). Then she discusses the selection of problems and stresses the perceived solubility of a problem as an important requirement for selection. Finally, the concept "technological tradition" is used to clarify the role of problem-solving heuristics and the ways in which the assessment of solutions are carried out.

Weingart argues for the development of a sociology of technology and proposes a theory of action as a rather classical approach. He views the social activity of producing technological knowledge as structured by multidimensional orientation complexes. Weingart discusses the various institutionalizations of the economic, political, cultural, and cognitive orientation complexes.

Norman Hummon offers a potentially fruitful perspective on technology as an organizational activity: technology is both a cause and a consequence of social organization. He combines the works of Arthur Stinchcombe and Alfred Chandler into a new hypothesis about the relation of technological change and organizational change. His argument is illustrated with some case histories.

As a whole, this volume addresses important themes and suggests interesting ways of approaching them. Unfortunately, the papers do not have much of a common direction or argument; they do not relate much to each other. Another drawback is the lack of more empirically founded studies, which is contrary to the authors' own assumption about the need for a basis in historical research. However, perhaps this would be asking too much from such a pioneering effort. Indeed, the book raises far more questions than it answers, but regarding the embryonic state of the field and the stimulating character of the questions, that is a good thing to do.

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Philosophy and Technology. Edited by Paul T. Durbin and Friedrich Rapp. Dordrecht: D. Reidel, 1983. Pp. xiv + 343; notes, index. Dfl 135.00; $59.00. Available from Kluwer Academic Publishers, 190 Old Derby Road, Hingham, Massachusetts 02043.

Editors Paul Durbin and Friedrich Rapp have provided both professional philosophers and the inquisitive public with a thought-provoking, well-edited collection of nearly two dozen papers presented at a joint West German–North American conference held in Europe in 1981. The book, which Durbin introduces, is of a five-part structure paralleling that of the conference itself. Two of the conference symposia apply philosophy to questions surrounding the regulation and assessment of technology; one develops the theme of human responsibility toward nature, thereby contributing to environmental ethics; and another concerns the unfolding of philosophy of technology as an international discipline and intellectual movement. The fifth sympo-