

machines might carry out) put so many axiological and metaphysical issues at stake for so many people.

Thus AI is a field which inevitably arouses controversy. The nature of these controversies is explored in the chapter by S.G. Shanker ("AI at the Crossroads"). Shanker argues that AI promotes a "mechanist metaphor" for human cognition. Those in the human sciences who refuse to accept the model that humans are thinking machines, are branded by proponents of the mechanist metaphor as "paradigm reactionaries". The battle against these reactionaries no longer consists of the defensive manoeuvre of describing computer programs whose operation could be said to constitute intelligent behaviour; it has now blown up into a full-fledged imperialism in which the mechanist metaphor is infiltrated throughout the biological and social sciences. In other words, it is becoming less acceptable to perform, say, psychology or genetics without employing computational metaphors for one's human subject matter.

Philip Leith discusses one of the more audacious sorties which AI practitioners have made into foreign territory: the attempt by Kowalski *et al.* to encode the British Nationality Act (1981) as a PROLOG program (PROLOG is an AI programming language based on predicate logic). Leith points out that this project was carried out by a team possessing next to no legal experience. He also makes an interesting case that this project was unwittingly merely the latest of many attempts (which are traceable back to 16th century Ramist logic) to fit the law into a logicist framework.

For those who are unfamiliar with the nature of AI and its commercial offshoot (so-called "expert systems") the paper which Harry Collins has contributed to this volume will make fine reading. Indeed, AI practitioners would also do well to read this paper. Since Collins lucidly demonstrates that an expert system - which is a program intended to perform at a level comparable to that of a human expert - operates not in a vacuum, but within some social context. It is becoming clear that programming a computer to function appropriately in any but the most rigid social context cannot easily be achieved with current techniques in AI. The deficiencies of expert systems are bypassed when skillful end-users apply tacit knowledge to their operation of the system.

Expert systems also allow us to test formal theories of human action, since the behaviour of an expert system operating under rules supplied by a formal theory allows a social scientist to see in practice the plausibility of these rules as a description of what the human does. In this way, Collins sees expert systems as a useful tool for social scientists to test their theories.

The final word should be given to Bloomfield, whose article makes an insightful analysis of the culture of AI. Bloomfield's description of AI research being guided by certain social norms would be abhorrent to those in the AI community who are committed to technological determinism. Bloomfield concludes:

...people who fear that one day we will be surrounded by intelligent machines are misplacing their concern; for instead of worrying about the future they might be better employed in considering the subtle ways in which we are becoming more like computers as people adopt (unwittingly or not) the ways of thinking and of speaking which are the hallmark of AI (p. 100).

This book will have a limited readership because of its scholarly orientation. In some places, it is not particularly easy reading. However, it contains many

insights which deserve to be diffused more widely before the (sometimes arrogant) assumptions made by the AI community are irreversibly assimilated into popular culture.

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Peter Slezak and W.R. Albury (eds.), *Computers, Brains and Minds: Essays in Cognitive Science*. [Australasian Studies in the History and Philosophy of Science, Vol. VII, ser. ed. R.W. Home] Dordrecht/Boston/London: Kluwer Academic Publishers, 1989. US\$67.00 (hb).

In a remarkably short time the digital computing machine has brought about a technological revolution unequalled since that caused by the invention of the internal combustion engine. In an equally remarkably short time it has brought about a revolution in the Philosophy of Mind. Gone are the debates of the sixties, influenced by names such as Ryle, Wittgenstein and Smart. At centre-stage now is the Computational Thesis: that the mind/brain is to be seen in terms of computer software/hardware. This volume is both a product of, and illustrates, the new Zeitgeist.

The book contains nine essays by philosophers from Australasia or with Australasian connections (due largely to the good offices of Peter Slezak's Centre for Cognitive Science). Of these, five are written within the paradigm, three reflect on it, and only one falls largely outside it. There is also a helpful introduction by Slezak himself, which introduces and comments on the articles.

Of the five essays within the paradigm, two take a largely top-down approach to the subject, centering on the mind/software aspect of the Computational Thesis. Jerry Fodor defends his well known thesis of the existence of a Language of Thought against a more thoroughgoing connectionism; and Philip Cam speculates on the role of consciousness with respect to the modular nature of the mind. Three of the articles take a more bottom-up approach, centering on the hardware/brain aspect of the Thesis. Michael Arbib's paper is a bottom-up attack on Fodor's view. Chris Mortensen investigates the connection between mental imagery, non-propositional beliefs and our neurological machinery. Finally, Slezak's own paper is a rather damning critique of Brand's book *Intending and Acting: Toward a Naturalised Action Theory*. This paper, more than any other in the book, highlights the recent revolution that has occurred in the Philosophy of Mind. It places Brand's book squarely in the older tradition, and argues that its lack of attention to modern neuroscience badly dates it.

Of the three papers reflecting on the Computational Thesis, that by Bernard Berofsky argues that it poses no threat to our view that individuals are (normally) morally responsible agents; Kim Sterelny gives a balanced discussion of some of its problems; and Hugh Mellor's paper is a forthright attack. The only paper not

closely connected with the Thesis is the one by Huw Price, which contains arguments against the Humean view that belief cannot move to action, and some of its modern analogues. In the context of the volume, Price's exception to the rule serves to highlight the hegemony of the Computational Thesis.

Altogether, the papers provide not only some interesting contributions to current debates, but also a useful sampler of those debates for those unfamiliar with contemporary Philosophy of Mind. A subject index (as well as the index of names) would have been a welcome addition to the book. There is also a rather large number of typographical errors. Many of these are, ironically, typical word-processing errors. Most will cause no problem for the reader.

It is now a familiar and correct theme in the history and sociology of science that the technology of the day has at least a partially determining influence on the content of theories. (Just how much, is, of course, a moot point.) Theories of the Mind do not escape this determination either. For example, the fluid pump and telephone switchboard have both, in their day, served as metaphors for cognitive functioning; the digital computer is the most recent piece of technology to play this role. Whether some other technology will replace it, time will tell. Current Philosophy of Mind will, however, provide future historians of ideas with a fascinating case study.

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BRIEF NOTES

Paul Feyerabend, *Against Method* (revised edition). London and New York, Verso, 1988, A\$29.95 (pb).

The revised version of Feyerabend's *Against Method* preserves the overall structure of the original 1975 edition, but excludes some material from the earlier version, interpolates some excerpts from *Science in a Free Society*, and adds new discussions of the trial of Galileo and the notion of reality. Feyerabend considers that these changes have "eliminated mistakes, shortened the argument wherever possible and freed it from some of its earlier idiosyncracies" (p. viii). The volume also includes (in English) the "Introduction to the Chinese Edition".

D.W. Hamlyn, *A History of Western Philosophy*. London and Harmondsworth: Penguin Books, 1988, A\$17.95 (pb).

Derek Gjersten, *Science and Philosophy, Past and Present*. London and Harmondsworth: Penguin Books, 1989, A\$16.99 (pb).

Hamlyn presents a brief survey of western philosophical thought from the Presocratics to "Hermeneutics and other recent movements"; the latter section

including references to the likes of Foucault, Derrida, Gadamer and Habermas. On the whole, however, the author's orientation is that of Anglo-American analytic philosophy. Some attention is given to the relations between scientific development and philosophical ideas in various periods, but the philosophy of science as such receives only passing mention. Gjersten, on the other hand, takes just such topics for his main focus. He argues that philosophy and science do not differ as much as is commonly believed and discusses the ways in which each endeavour can learn from the other. A concluding section on "Truth, Realism and Rationality" addresses recent debates in both the philosophy and the sociology of science.

Wiebe E. Bijker, Thomas F. Hughes and Trevor Pinch (eds.), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA and London: MIT Press, 1989, US\$12.95 (pb).

This volume makes available in paperback the influential collection of essays first issued by MIT Press in 1987. The thirteen essays are grouped into four sections, each with its own introduction: I. "Common Themes in Sociological and Historical Studies of Technology"; II. "Simplifying the Complexity"; III. "Strategic Research Sites"; and IV. "Technology and Beyond".

James Robert Brown, *The Rational and the Social*. London and New York: Routledge, 1989, Distributed in Australia by the Law Book Company Limited, A\$105.00 (hb).

Brown critically surveys recent literature in the sociology of scientific knowledge, together with a number of philosophical responses, and proposes an alternative approach which maintains the primacy of rationality in accounting for scientific development while making a significant advance on the older view which relegated sociology to dealing only with those "leftover" phenomena that appeared to have no rational explanation. In particular, feminist critiques of science are deployed to suggest that the sociology of knowledge can contribute in an integral way to the improvement of scientific rationality by the continual exposure of previously unacknowledged sources of bias.

Edward de Bono, *I Am Right — You Are Wrong: From This to the New Renaissance: from Rock Logic to Water Logic*. London: Viking, 1990, A\$29.99 (hb).

The inventor of the term "lateral thinking" develops an account of cognition which draws upon neural connectionist models of the mind, emphasizing perceptual reinterpretation and creativity (the flowing of "water logic") over logical analysis and problem solving (the rigidity of "rock logic"). Despite the blatant elements of commercial hype and self-promotion in the author's style of presentation, a number of his ideas have relevance for current discussions of the process of innovation in science and the rationality of scientific change.