

evolution, genetics and molecular biology) and, until the final chapter, dwell on pre-twentieth-century work. Although some of the sections on more recent work may interest scientists, Magner fails to show how ideas, practices and individual approaches to research give way to each other. There is little sense of the forces of change or of how the pieces and players interrelate.

Magner believes that the recent attempt at the social construction of science is unlikely to inspire scientists. So she leans toward an "old-fashioned" historical approach, which, she feels, does a better job of including the science while encouraging young readers to pursue a life in science. Unfortunately, her attempt does not really succeed.

I agree that social construction and rhetorical analysis will not get us far without a clear sense of scientific ideas, methodologies and approaches (recently termed 'practice' by the trend-conscious); but, despite her preferences, Magner does not include enough science. For example, the nine pages on Darwin tell us a lot about his health, family and friends but not much about the idea of evolution by natural selection or how Darwin laboriously put together the vast array of evidence in support of his theory.

The lack of any conclusion reinforces the sense of vignettes all in a row. The final pages point to the Human Genome Project but end abruptly with: "it might be useful to establish a new version of the central dogma, which will simply remind us that 'Knowledge is not equivalent to Wisdom'". Precisely my point about Magner's volume: it provides many useful and enjoyable bits of what can reasonably count as 'knowledge' but it does not move us far toward 'wisdom'. □

Jane Maienschein is in the Departments of Philosophy and Zoology, Arizona State University, Tempe, Arizona 85287-2004, USA.

New in neuroscience

Three books on the brain have recently been published (see also the review of *Images of Mind* on this page):

Localization and Neuroimaging in Neuropsychology edited by Andrew Kertesz, a "comprehensive and thoroughly current review of theory and methodology". Aimed at a specialist audience. Academic Press, pp. 662, \$89.95.

Neural Activity and the Growth of the Brain by Dale Purves, which arises from a lecture series (1992 Lezioni Lincee) intended for a broad audience. Cambridge University Press, pp. 108, £24.95, \$37.95 (hbk), £11.95, \$15.95 (pbk).

Brain Activation by Per E. Roland, a "comprehensive analysis of the functional relationship between brain organization and human behaviour". Particularly suitable for neuroscientists and cognitive scientists. Wiley, pp. 589, \$84.95.

The measure of the mind

Patricia S. Goldman-Rakic

Images of Mind. By Michael I. Posner and Marcus E. Raichle. *Scientific American Library/W. H. Freeman: 1994. Pp. 257. \$32.95, £19.95.*

MUCH has been written about the revolution in molecular neurobiology and the remarkable noninvasive methods of imaging the human brain. But the coming together of neuroscience, cognitive psychology and computerized brain-imaging technology has also led to a revolution in techniques for measuring cognitive processes in humans and for relating them to specific neural systems. Two leading figures in these fields — Michael Posner, a cognitive psychologist, and Marcus Raichle, a neurologist and neuroscientist — have now collaborated to write a clear and beautifully illustrated review of this enticing and exciting multidisciplinary enterprise.

The bells and whistles of imaging methods are perhaps more widely appreciated than the power, simplicity and elegance of the behavioural tools that have enabled psychologists to unravel mental processes. The authors provide valuable examples of the use of simple reaction-time measurements (introduced already in the nineteenth century by F. C. Donders) to derive information about the complexity of the human mind. Other more modern analytical tools and brain-imaging techniques are also lucidly presented. As the authors point out: "Just as the trace of an invisible particle can be seen by the physicists by its effects on other particles, a mental operation becomes visible when it influences the time taken to respond to a specific probe question presented by the experimenter". They make it clear that the capacity to break down cognitive operations into algorithms and subroutines is an essential step toward localizing the structures that carry out the functions. "Without having analyzed beforehand what the components of higher cognitive processes are, there would be little hope of finding where any are located". The resolution of behavioural measurements may possibly supersede the resolution of brain images and associated neuronal structures.

The book is not a reference source and should not be regarded as a critical treatment of cognitive neuroscience. It is not meant for graduate students or research-

ers in the field. Although the selection of topics is generally illuminating and commendable, it reflects the authors' personal choices and experiences. More could have been made of the many anatomical and physiological findings from animal experimentation that form the basis of our knowledge about the neuroscience of sensory, motor and cognitive performance; the subject of memory is avoided (possibly because the area is in a state of flux); some topics (such as mental disorders) are viewed from an oversimplified neurobiological perspective; and the description of cortical layer-



Self-portraits made by the German artist Anton Räderscheidt in the 9 months following a stroke that damaged his right parietal lobe.

ing in development is mistaken, as shown in the figure on page 183.

For centuries humans have been interested in how their brain carries out its extraordinary intellectual and creative feats, but only now can we directly view our own at work. This book is a celebration of the foundation of cognitive neuroscience, its premises, tools and promise. For the general public, it is more than a coffee-table book; it conveys the fascination and promise of an emerging field. It will be a valuable introduction to cognitive neuroscience for all biologists, neurologists and psychiatrists, as well as undergraduates and anyone interested in knowing how it has become possible to approach the study of mind, not on a philosophical level, but as an experimental science. □

Patricia S. Goldman-Rakic is in the Section of Neurobiology, Yale University School of Medicine, 333 Cedar Street, New Haven, Connecticut 06510, USA.