museum and research collection, or its abortive plan to acquire, in 1667–68, its own headquarters and to establish there a "philosophical college". A site was found, Christopher Wren designed a building and money was pledged. But the money promised was not enough, and the society had to wait until 1710 before it acquired its own premises.

It is well known that British science remained predominantly 'amateur' for more than two centuries after the foundation of the Royal Society. Hunter's volume demonstrates that a core of early fellows — Hooke, Boyle, Grew, Oldenburg — recognized that science needed more cultivators than merely those whose financial or social circumstances gave them leisure. They wanted election to the society to require more than casual interest and the means to pay an annual subscription. Many of the episodes recounted here have been neglected by historians because they led nowhere, but they reveal much about the values of those who created the society and help us to understand why the subsequent pursuit of science in England took the shape it did.

By contrast, the Royal Swedish Academy had the potential of other, continental role models, especially in the area of salaries for members which those in the French Académie des Sciences enjoyed. In fact, the Swedes adopted the English prototype, though the academy had official responsibilities in areas such as examining patent applications and an external income through the exclusive right — granted in 1747 — to publish the Swedish almanac. The academy lost this monopoly only in 1972 and with print runs of a staggering 294,000 as early as 1785, the profits were considerable. The ten essayists whom Frängsmyr has gathered recount a variety of the academy's principal activities, from funding scientific travel and exploration to running the Swedish Museum of Natural History and an astronomical observatory; from involvement in environmental protection research and campaigns to research institutes in mathematics, marine biology and astrophysics. Nor is the impact of the Nobel Foundation on the academy's fortunes and international standings neglected.

As is perhaps appropriate for a commemorative volume such as this, the authors write with affection for the institution they are describing. Not even they would argue that academicians could quite claim "*la science en Suède, c'est nous*". But so wide-ranging have the academy's activities been that the book's title seems entirely appropriate. □

W. F. Bynum is at the Wellcome Institute for the History of Medicine, 183 Euston Road, London NW1 2BP, UK.

Learning through practice

John A. Campbell

Computers and Thought: A Practical Introduction to Artificial Intelligence. By Mike Sharples, David Hogg, Chris Hutchison, Steve Torrance and David Young. *MIT Press: 1989. Pp.401. Hbk $25, £22.50; pbk £13.95.*

ARTIFICIAL intelligence (AI) is a subject now well served for introductory texts at various levels. But there is still a noticeable gap between popular accounts and presentations of basic AI techniques for an audience of specialists in computing. This is a gap that the authors of *Computers and Thought* aim to fill. Their explicit goal is to "introduce people with little or no computing background to AI and cognitive science". Their material has been developed from a regular ten-week course given to first-year arts undergraduates.

Knowledge representation and search are the two main pegs on which the book hangs a respectable amount of information about both the scientific perspective and the computing techniques of AI. In my biased opinion, this is the right choice of design. Readers of *Nature* who attempt the course should be able to learn what the simplest relevant techniques are and how to exploit them, because of the examples of programs that are presented. Most of these examples gain in coherence because they are solutions for parts of one problem: construction of a program to give tourists rather basic advice about entertainment and transport in central London.

This coherence may escape some of the original intended customers. The programming language used is POP-11, which need not frighten anyone with past exposure to Pascal or C. But it has been observed in more than one country that the most common reaction produced in arts students by even small chunks of Pascal is terror. It would have been interesting if the authors had revealed how they have managed to protect their own students from this effect.

Readers who have no difficulty with the conceptual details of the programming examples may have two other difficulties with the presentation. The first is at the nuts-and-bolts level: POP-11 arcana like the differences between x, ?x and ??x are inclined to turn up without real explanation. The second is more important. It is that, although the scope and ambitions of AI are described well in various parts of the text, and although the programming examples have to fall far short of those targets if the book is to do a good introductory job for non-specialists, there is no significant attempt to put a bridge in place between these two levels.

There is thus a risk that a reader who wants to know about the differences between introductory exercises and what it feels like to be on the research frontier of AI will finally ask: "is that all there is to AI in practice?". In isolated cases a proper answer is "yes"; in the others, it would have been helpful to have brief accounts of what the largest or most adventurous AI projects have needed, beyond just the basic techniques, to be successful. In an admittedly limited experiment, one scientist and two out of three arts graduates had varieties of this impression, unprompted, after looking at the book. (The third arts graduate was ambushed by ??s, despite being warned to stay out of the end-of-chapter appendices where most of the programs were lurking, and failed to stay the distance.)

People who are primarily looking for AI techniques and how to use some of them in programming will have no such problems, and will benefit from the clear explanations (in English rather than POP-11) that are given here. Because of the authors' own research interests, the book contains examples for which basic discussion is hard to find elsewhere: natural-language processing and vision, for example. A rewarding further example is the treatment of specific models of cognition — especially of erroneous cognition, for arithmetic and learning of tenses of verbs — as sets of rules that can be used in programs.

This last example, and an excellent chapter on the immediate philosophical issues raised by AI, may whet the reader's appetite to learn more about cognitive science. Appetites for this and other AI-related learning are provided for, at the end of the book, by an annotated list of further reading.

A diskette containing full programs for examples developed in the book is available separately, at a price in the United Kingdom of £14.25 (plus VAT). This should not be bought without careful inspection. On the copy that I was sent for review, about half the programs did not operate because auxiliary software that should have been present on the diskette could not be found when loading and compilation were attempted. Those programs that did run were time-limited, so that a user could work with them only for 10 minutes per session. This produced either undignified scrambles or sullen frustration, depending on the user's degree of computer literacy. As one of the arts volunteer testers said, "this is no way to run a business". □

John A. Campbell is in the Department of Computer Science, University College London, Gower Street, London WC1E 6BT, UK.