

gramming computers in ways that, if observed in human beings, would be regarded as intelligence". This clashes resoundingly with Elaine Rich's definition within the body of the book, under the heading "Artificial Intelligence": "AI is the study of ways in which computers can be made to perform cognitive tasks at which, at present, people are better". The one speaks of human performance as an accomplished achievement within AI, while the other sees it as a target. The one suggests that AI technology is related to human mechanisms, while the other sees the similarity as being in the task rather than the method.

It was therefore courageous of Stuart Shapiro to have rounded up some of the busiest people in computer science and faced them with the problem of explaining, in a non-partisan way, the key components of AI. The result is somewhat patchy, reaching heights of excellence in some of the contributions and the limits of superficiality in others. For example, having heard that PROLOG is a good language for AI work, a browser will discover only six lines on the subject. These increase the reader's curiosity by confirming that the language is important, having been adopted as the standard for the Japanese Fifth Generation programme. The entry then gives no further details. This can be contrasted with the 16 or so pages that are devoted to LISP: older but American-invented, where PROLOG is distinctly European in origin.

Altogether, this is virtually an all-American affair: of the 200 contributors only nine come from outside the United States, none from Japan. Two of the non-

Americans (colleagues from Britain) write extensively about logic programming, putting right some of the neglect of PROLOG. (This points to a general problem: you have to know where to look to find the appropriate reference.) The entry on logic programming is also the only place in the *Encyclopedia* where the substantial work done in the British Alvey project is mentioned. We labour this point not out of patriotic fervour, but from a belief that a one-nation outlook cannot be complete in a subject that many of the leading industrial nations of the world have singled out for special support. The sins of omission are numerous, discussion of AI architectures being particularly unbalanced. Sweden's successful pyramidal vision systems get no mention and neither do various array and adaptive systems developed in Britain.

Despite the chauvinism, there is much in the *Encyclopedia* that is excellent. We put ourselves in the position of a researcher at the beginning of a trawl of the AI literature. As an example of a somewhat neglected area of research, we chose "Language Acquisition" and found an excellent survey. The choice of references is appropriate, not padded and thoughtfully divided into the specific and the general. Particularly impressive is the reference to connectionist models of language acquisition which are drawn from a revival of research in neural networks that is growing with astonishing rapidity in the United States.

Doing things the neural way has become fashionable only in the past few years, so the *Encyclopedia* is up to date, at least in this area. Looking up "Con-

nectionism" in its own right provides an informative article on this topic describing some of the hopes that AI researchers have for attacking experiential as opposed to rule-dominated knowledge. But it fails to refer to the origins of the revival: the work of John Hopfield at the University of California at San Diego. It also fails to point out that interest in this field has only been *rediscovered* recently, but may be traced right back to the work of McCulloch and Pitts in 1943.

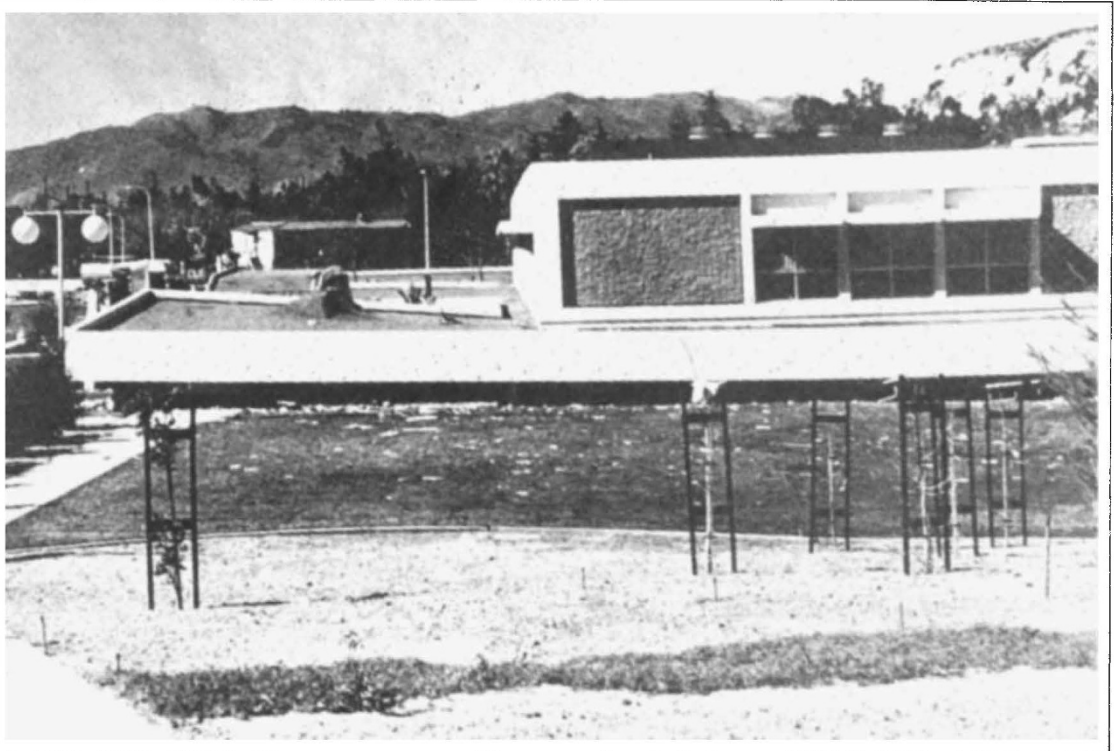
Unfortunately, not all entries are equally up to date. A look at the now well-trodden area of expert systems reveals a description that refers mainly to systems built in laboratories and that could well have been written some years ago. It fails to discuss the rapid recent development of empty systems, or 'shells', which those who are building their own expert systems find so helpful.

Despite the weaknesses and the poor cross-referencing, this is an essential piece of equipment for any AI laboratory. In particular, the budding PhD student will find most useful the ready-made literature searches and the potted statements about important directions for development. But were we to buy these rather expensive books, we would like the assurance of some kind of an updating service. In a rapidly changing field such as this, the gaps and changes of emphasis must grow exponentially with time. □

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Down to earth—the Psychiatric Clinic at the Community Hospital, Olive View, California, after the 1971 San Fernando earthquake. The building, made of reinforced concrete, was originally two storeys high, but the ground floor collapsed completely and the first floor here rests upon the debris. No one was seriously hurt in the incident.

The picture is taken from the timely revised edition of Bruce A. Bolt's popular book Earthquakes, just published by W. H. Freeman. Price is hbk \$25.95, £22.50; pbk \$13.95, £12.50.



Bruce A. Bolt