

oriented programming or function-based programming, ...” Besides being practical, he is also personal. The word “I” appears in the text from time to time, as the previous quote illustrates. There are a few places where I do not fully agree with his conclusion or relate well to his experience. For example, he writes that “Productivity in a good Lisp environment is a factor of 10 better than in any other environment—I get 10 times more work done per unit of effort than using any other set of tools”. No doubt, a programmer would be very productive if he was using a good Lisp environment that was familiar to him, but would he be better by a factor of 10 than in other environments? Besides, getting to know a Lisp environment well would take a substantial amount of time initially.

Having given a flavour of the style of the book, let us now consider its content. The main text is 306 pages thick with sixteen chapters. Chapter one gives a brief description of the motivation behind AI work, its derivative results and the promise that they hold. Chapter two contrasts the differences between human thinking. It ends with the assuring note that we do not want computers to compete with us, but want them to complement our skills so we can do our jobs better.

The next two chapters describe the results of AI research and applications in some details. Chapter three concentrates on different aspects of AI like natural language processing, robotics, vision, etc. Taylor’s assessment of the results is very down to earth. Chapter four describes thirteen successful applications mostly taken from engineering areas.

Chapters five and six introduce the programming language Lisp. Different aspects of a good software tool, using Lisp environment as an example, are described in Chapter seven. It emphasizes that a good software tool should support source code control, electronic mail and provide features that allow a user to debug, change, recompile and retest a program quickly. Chapter eight contrasts function-based programming, as in Lisp, with object-oriented and rule-based programming. This chapter gives particular attention to rule-based programming to prepare the reader for the next chapter on expert systems.

The chapter on expert systems begins with giving some reasons why people should consider building expert systems and then gives some hints on choosing problems for expert systems. Finally, some details of two well known expert systems, Mycin and R1, are described. The description is at a very high level and is not technical.

Chapters ten to thirteen are on logic programming, rule-based programming and Prolog. These are not there to teach one how to program but to explain the essential features and concepts of Prolog like unification and backtracking.

Chapter fourteen gives some practical help on how to get started in AI; it tells you where to buy your Lisp and Prolog systems and how to go about providing training for your staff. Chapter fifteen speculates about the future of AI and the influence that it may have on society. Chapter sixteen is about the Japanese—their fifth generation project and their culture. It is interesting but not entirely relevant.

In summary, *What every engineer should know about Artificial Intelligence* is a very useful book for anyone who wants to find out about the relevance of AI in practice.

Artificial intelligence and expert systems—case studies in the knowledge domain of archaeology* by J-C Gardin et al., Translated by Richard Ennals, Ellis Horwood Ltd, Chichester, 1988, pp 232, £29.95, ISBN: 0-7458-0431-4.

This is an interesting and potentially important book which is not, however, what the unwary purchaser might expect it to be. It is certainly not, for example, a general introduction to artificial intelligence and expert systems as its main title (in English) might suggest. Its extended title refers to case studies in the domain of archaeology and is more accurate though still somewhat misleading. In reality the book is: (a) a presentation of the method of “logicist analysis” for the humanities as

* Originally published in French under the title “Systems experts et sciences humains” 1987 Eyrolles, Paris.

developed over a period of some twenty five years by its senior author, Jean-Claude Gardin, a leading French archaeologist and information scientist, and (b) an examination (with six case studies all drawn from archaeology) of the convergence between this mode of analysis and the concept and practice of expert systems.

Logicist analysis, as formulated by Gardin, is concerned with the identification within scholarly texts ("scientific constructions") in the humanities of the structure of arguments linking empirical data to theses (explanations, theories, interpretations, commentaries) and the schematization of these arguments in terms of propositions and the acceptable linking operations (grounded in "discursive practices") between them. The formulation is sufficiently general to cover both empirico-inductive and hypothetico-deductive arguments. The motivation is to understand the particular nature of reasoning in the humanities and to refine written presentations away from distracting requirements of style and rhetoric towards clarity and soundness.

Some years ago Gardin and his research group, which includes both archaeologists and computer scientists, realized the relevance to logicist analysis of expert systems of the IF-THEN rule based variety, and began to explore the convergence between the two in some detail. The fruits of that exploration are presented in this book. Five detailed case studies are presented in which the arguments embodied in archaeological texts are converted via logicist analysis to rule bases for a particular expert system shell SNARK. Specifically, the studies concern: relations between Greece and Central Asia in the Hellenistic period; Bactrian metal-working in the Iron Age; the origins of prehistoric Cypriot figurines; medieval fortified gardens and their identification; and the interpretation of a carved stele from Seldjukid Anatolia. SNARK offers a range of facilities, including the use of meta-rules, but most of the studies make a relatively simple use of it. For example, only forward chaining is employed. A sixth study, concerning the origins of Roman amphorae, does not employ SNARK and, although interesting, is incomplete and somewhat tangential.

The authors are primarily interested to discover and to examine the problems that arise in the application of logicist analysis to the source texts and the further difficulties that arise in the construction of a SNARK rule base. They are less interested in any wider practical use of the rule bases so constructed, essentially being satisfied when SNARK recreates the original argument with a small element of generality. However, the study of Lagrange and Renaud (interpretation of a stele) goes further into a detailed consideration of how alternative rule sets from different experts may be pooled, and this leads them to some consideration of automatic generalization.

As all the authors clearly recognize, logicist analysis can be seen as a halfway house between texts and rule bases and therefore as, in knowledge engineering terms, a (conceptual) knowledge acquisition tool. However, Gardin argues that it is much more than that. His concern is "to give a sounder basis to our constructs in the humanities through methods in which expert systems certainly have their place, but without the computerization of our reasoning ever becoming our main objective" (p 219). The central question provoked by the book is therefore this, should Gardin's logicist analysis be dismissed as a curio of history, rendered irrelevant by cognitive science and artificial intelligence, or should it be seen as a (perhaps limited) conceptual tool for knowledge acquisition tuned to building expert system rule bases for the humanities, or is it more—a major method for acquiring insight into the nature of reasoning in the humanities? Readers will decide for themselves. But there is no doubt that Gardin's lucid presentation of his ideas and their context makes it easy to get to grips with the essentials.

The book is primarily targetted at computer scientists and humanities scholars and these two groups will react differently to it. Knowledge engineers will find nothing new as regards technical content (and may feel that the framework of logicist analysis is too narrowly rule oriented, and is weak on reasoning under uncertainty) but will, or should, find it thought provoking to read about their work, especially knowledge acquisition, from an unusual perspective. On the humanities side, the book is a must for archaeologists with an interest in expert systems. (There are a few such archaeologists. There should be more!). It reports the most sustained program of expert system work yet carried through in archaeology. However, the logicist setting in which the expert systems work is presented is not one which fits well with the current theoretical perspectives and goals of

archaeologists in the UK and USA. Beyond archaeologists, the book is surely of interest to all humanities scholars. This is ensured not only by its central concerns, but by Gardin's ability to move knowledgeably, insightfully and stylishly amongst the many worlds of the humanities and the information sciences.

Finally, a word about the translation. This reader found it unobtrusive and seemingly accurate. What more could one ask? But I began to notice the typos. . . .

Artificial intelligence—A handbook of professionalism by Blay Whitby, Ellis Horwood, Chichester, 1988, pp 194, £29.95, ISBN 0-7458-0350-4.

Artificial Intelligence has reached the level of maturity where issues of professional ethics are being considered. For some, this can be a useful smokescreen to protect the individual from considering the ethical aspects of his own actions, and from accepting personal responsibility. Others see the responsibilities of the professional as being in addition to those of the normal citizen.

These two camps were formed in the United Kingdom in 1985 when AI professionals were faced with the question of participation in the American Strategic Defense Initiative, accepting money to work on a project which was widely, if not universally, seen as technically infeasible, at least in the terms in which it was described by President Reagan. In December 1985 the British Computer Society held a meeting to discuss the professional aspects of participation in SDI, chaired by Professor Margaret Boden and with speakers including the present writer and Professor Bernard Williams, philosopher and at the time Provost of King's College Cambridge. The proceedings were reported in the IEE Software Engineering Review of March 1986. A series of similar meetings were held jointly by the British Computer Society and Institute of Physics, and later by the British Society for the Philosophy of Science.

Organizations have been established to support concerned AI professionals in these difficult issues. In the United States Computer Professionals for Social Responsibility has published bulletins and now a Journal. In the United Kingdom chapters of Computing and Social Responsibility have been founded, starting in Edinburgh in 1984, and then at Imperial College and Sussex University in 1985. The Journal of Artificial Intelligence and Society springs partly from these concerns, with the recently established Artificial Intelligence For Society Club as a visible focus for practical and socially useful activities.

Blay Whitby has made a valuable contribution to this field with his book "Artificial Intelligence: A Handbook of Professionalism". Whereas my own book "Star Wars: A Question of Initiative" (Ennals, 1986) was polemical and partisan, published during and as part of the controversy over participation in the Strategic Defence Initiative, and Allen Din's collection "Arms and Artificial Intelligence" (1987) focused on technical issues, Whitby's work is more detached, tentative and philosophical. His perspective derives from his own experience in the RAF, in industry and as a student of philosophy, and in research and research management in the SEAKE Centre at Brighton Polytechnic.

The strength of the book is that it sets out a range of questions to be addressed by the concerned AI professional. It is somewhat misleadingly described as a handbook, but cannot really be said to prepare the professional for the catalogue of complex moral and professional decisions that can face him, even within weeks of graduation. This is unsurprising, given the complexity of the issues which must be addressed.

Is Artificial Intelligence a coherent profession, or a chance collection of individuals sharing a common technology for different purposes? Do we define it in terms of the commercial exploitation of IT, seen as a set of products, or as a humane approach to the study of problems, making using of computer technology?