

Book reviews

Cognitive science in medicine: biomedical modeling reviewed by Dr Ken Gilhooly

Knowledge based management support systems reviewed by Mark Thomas

Causal AI models: steps toward application reviewed by Dr Enrico Coiera

Analysis for knowledge-based systems: a practical guide to the KADS methodology reviewed by Ian Neale

Abductive inference models for diagnostic problem-solving reviewed by Elpida Keravnou

HERMES and the golden thinking machine reviewed by Saki

Artificial intelligence – concepts and applications in engineering reviewed by Terri Lydiard

Envisioning information reviewed by D. Van Laar

Reasoning and revision in hybrid representation systems reviewed by Dr. Paul Refenes

KARDIO: a study in deep and qualitative knowledge for expert systems reviewed by Elpida Keravnou

Intelligent data handling reviewed by John Manley

An introduction to text processing reviewed by Professor Gerald Salton

Cognitive science in medicine: biomedical modeling edited by DA Evans and VL Patel 1989, MIT Press, Cambridge: MA, USA, pp 421, £31.50.

My prognosis is that this collection of papers by leading North American experts is certain to become required reading for all those interested in medical cognition, whether as a natural phenomenon to be understood, trained and improved, or as a target for AI efforts. Nine of the ten papers in this book are based on work supported by the Josiah Macy Jr, Foundation's "Cognitive Science in Medicine Program". Within a focus on modelling biomedical knowledge and behaviour a number of themes emerge. These are: (a) the nature and role of basic biomedical knowledge in diagnosis, (b) dialogue and interaction in medical problem solving and (c) issues of training. Some chapters focus squarely on one or other of these themes while others relate to more than one. Under the biomedical knowledge theme, there are chapters by Patel et al., Elstein et al. and Feltovich et al. Relating to the dialogue theme are chapters by Hammond et al., Evans and Gadd and Patel et al. Training issues are dealt with mainly by Rodolitz and Clancey and the chapters by Lesgold.

While all the chapters contain much to interest cognitive scientists, I would like to highlight some particularly striking results and observations. Feltovich et al. report a persuasive volume of evidence of persistent misconceptions among even advanced medical students regarding the biomedical basis of heart failure. Many of these misconceptions involve oversimplifications and use of misleading analogies which derive from teaching practices and from a pervasive cognitive bias toward simplifying the complex. The implications of the various misconceptions for diagnosis and medical practice remain to be assessed; but on the face of it, such results are rather worrying! Possibly such misconceptions will have little practical consequence in view of Patel et al.'s findings that basic biomedical knowledge seems to play little part in experts' diagnostic processes. This finding is supported by Hammond et al.'s separate study in this volume and also is supported by results reported elsewhere by the Limburg research group in The Netherlands. It appears then that clinical experience rather than theoretical understanding is the major factor in determining clinical skill. Lesgold argues that connectionist approaches may be applicable to modelling the expert's diagnosis-without-reasoning. However, since experts can usually justify their diagnoses, if required, he also sees a need for a serial symbolic level to back up the faster parallel distributed system.

To be critical, it is a pity that there is little cross-referring between chapters. Also, there is little or no reference to European or UK work. It has to be said that, as is quite often true in empirical

cognitive science, some of the results reported here appear a little fragile, often being based on small subject samples and on only a very few experimental tasks.

However, my overall view is that this is a very worthwhile collection which deserves close reading by all students and researchers concerned with medical cognition in particular and expert cognition in general.

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Knowledge based management support systems edited by GI Doukidis, F Land and G Miller. Ellis Horwood Ltd, Chichester 1989, pp 356, £39.95.

The stated aim of Georgios Doukidis, Frank Land and Gordon Miller, the editors of this book, is to explain to business managers throughout the world of commerce and industry, key concepts of and relationships between knowledge-based systems and decision support systems. A knowledge-based or expert system can be loosely defined as a computer system which stores and uses problem solving expertise to support the solution of a well-defined, well-understood, recurrent business problem which would otherwise have required the intervention of a human expert. A decision support system, by contrast, is concerned with the facilitating of a decision-making process, which may not be repeated, often by modelling the principal factors influencing the decision and their interactions rather than by modelling the human approach to solution. The techniques of operational research are often used to underpin the construction of decision support systems: this is seldom the case with expert systems.

The book itself is a collection of 22 papers, mainly from a conference held in 1987 at the London Business School, though papers from other sources are also present. There are three sections of which the first covers Knowledge Based Management Support Systems (KBMS)—the result of combining DSS and expert systems; the second, DSS; and the third, expert systems.

The section dealing with KBMS has perhaps the most difficult task, since its subject matter is a type of system of which few examples exist. Nevertheless, there is some interesting work here: a paper by Rick Hayes demonstrates (though does not appear to recognize) the economic infeasibility of using protocol analysis as a knowledge acquisition technique for any but the most intractable problems; Dian Kjaergaard's paper, despite its title, is a fairly pragmatic analysis of the interaction between business, theoretical and political issues which complicate the assessment of commercial customer accounts at an anonymous Danish Bank; while Sandra Brown provides a detailed case-study of an organization's first use of expert systems.

Section 2, dealing with DSS, argues that it is important to consider not merely the relationship of DSS to decision-maker, but the more complex interaction between business problems and wider business context, decision makers and decision making process, and DSS. Papers by Colin Eden and Fran Ackerman—describing the use of computers to assist in the development and management of strategic vision—and Lawrence Phillips, on group decision support, make this point especially clearly. The last paper in this section, by Chris Martin, has a different slant: it analyses the use of DSS by top management and the reasons for lack of such use.

The final section of the book is devoted to expert systems. The first paper, by Anthony Wensley, lists a number of possible research directions for expert systems; while those suggested are clearly valid, there are many less fundamental—but in the short term more important—issues for research which are not listed: for example, the serious business issue of how to estimate the costs of an expert system. Hamish Stevenson provides an excellent analysis of the hype which has surrounded expert systems for the last 5 years; the second part of his paper, in which he attempts to explain this hype, however, reveals a lack of understanding of the business problems of expert systems developers: he criticizes expert systems groups for spending their time on investment appraisals instead of the development of technical prototypes. The truth is that a bit more time spent analysing business benefits, and rather less on unfocused building of prototypes would have prevented many of the