represented internally to that processing system. It is the job of the text production system to convey the internally represented answer to a human reader in an appropriate manner. And it is this choice of what is appropriate that consumes the energies of researchers: what is the most appropriate sentence structure to use; which word best captures the concept the system trying to impart; what has been said before, or can be assumed; and before too long you are looking at intention, motivation, and so on.

Kathleen McKeown's book describes the text generation method used in a system called TEXT, which responds to queries made to a military database. The basis of structuring texts in TEXT is schemata, derived from the psychological-cognitive approach to text understanding. As such, TEXT, is often considered the first comprehensive system of its kind. Which brings us to an important issue for prospective readers of this book. The first publication of this book was 1985, nearly a decade ago, and McKeown has developed (and written about) more sophisticated text production systems since then (the COMET system in 1990). Most of the references in the book are before 1980, and consequently there is a musty air to the whole description of the work. So, it is a work that is really only of academic interest now, and this does rather beg the question of why it was republished recently (1992) in its original form. Reprinting it in paperback form rather suggests that the imprint is being aimed at a wider audience than the original—students, perhaps. In which case, I think the least that a publisher should do is provide the author with the chance to add a foreword or additional section that highlights where the work sits in current research (I can't believe that an author would turn down the opportunity to provide references to their more recent work).

The book itself is very clearly written, with a pleasant mix of theoretical background and technical detail; it is a model for a postdoctoral thesis. The weaknesses of the TEXT system, such as its limited inference facilities and hand-crafted knowledge base, are discussed as well as its innovative (at the time) aspects. The content of the database with which the system operates may not be to everyones taste—it can be disconcerting to be faced with knowledge base descriptions such as "FREE-FALLING DESTRUCTIVE-DEVICE (non-restrictive FUNCTION LETHAL-KILL)" in our peace-loving (but not always peace-doing) 1990s. Essentially, the book has three sections, about 80 pages addressing introductory and theoretical issues of discourse structure and focus constraints, followed by about the same number of pages describing the implementation of the TEXT system. The final 50 pages cover discourse history—how responses can be improved in the light of previous responses—related work and sample program output.

Elements of the implementation are a bit sad (but honestly reported), such as the way in which queries are made. A user makes queries by calling one of three LISP functions: information, definition and differense (the latter spelled so that it doesn't conflict with the built-in LISP function). However, in the context of a historical piece of work, this should not put the prospective reader off. The essential idea that TEXT embodies is that text production needs to be able to make use of discourse and focus in order to generate coherent responses, and these issues still apply today. The fact that researchers active in this field still refer to this book and the TEXT system indicates that it is a stepping stone in the evolution of text production systems. As such, this book contains a lucid account of this work.

Reviewed by Paul Holmes-Higgin, AI Group, Department of Mathematical and Computing Sciences, University of Surrey, UK

Integrated distributed intelligent systems in manufacturing by M. Rao, Q. Wang and J. Cha, Chapman & Hall, London, 1993, pp 324, £35.00, ISBN 0-412-54370-2.

The book first gives a convincing introduction to manufacturing history, what is involved in CIM (Computer-Integrated Manufacturing), the need for AI in manufacturing and issues in Integrated Distributed Intelligent Systems (IDIS) in manufacturing. The authors pay particular attention to

two important aspects of integration: one related to manufacturing activities and the other to computational functions. As a result, computational support for design, operation, control, planning and maintenance should be coherently integrated. In other words, knowledge-based symbolic reasoning systems should be effectively coupled with numerical packages, neural networks and graphical packages. Such coupling can be controlled at a meta-level of computing which manages the selection, co-ordination, operation and communication of the separate systems.

The second chapter presents a meta-level control architecture for a manufacturing IDIS. The meta-level sub-system has the following functions: coordination of various types of computation, distribution of knowledge into separate sub-systems, interface management between the sub-systems, resolution of conflicts among the systems, management of possible parallel processing, and the management of communication with the outside physical world such as sensors and actuators.

One particular implementation of the meta-system in an object-oriented style is presented in chapter 3. The choice of such an implementation paradigm is perhaps quite natural given the nature of the domain. Production rules, frame-based and method-based knowledge representation and inference are supported. Control of the different types of inference functions is also implemented. However, it appears from chapters 2 and 3 that the content of meta-level control knowledge depends on specific application domains as well as how domain knowledge is organized and distributed into separate computational sub-systems. In other words, the book fails to present a body of reasonably generic control knowledge that can be applied to more than one manufacturing domain.

Chapters 4 and 5 present systems for two individual aspects of manufacturing: conceptual design of mechanical parts and simulation. However, why the systems are "distributed" and "integrated" is not clear, as they only deal with individual aspects of manufacturing and there is no apparent distribution of knowledge in the systems. The system presented in chapter 6 for gear design, manufacturing and testing is a much better example of IDIS as defined in chapter 1. Chapters 7 and 8 again describe separate, individual systems for two different, unrelated applications, i.e. process start-up automation and operation support for chemical pulping. Apart from the fact that qualitative symbolic knowledge and quantitative algorithmic knowledge for the individual application domains are separated, neither of the systems is a typical example of IDIS.

The book assumes that all the sub-systems are under the control of a meta-level system, and it does not explain how to co-ordinate loosely-coupled or completely autonomous systems.

On the whole, the book gives a clear and convincing definition of integrated distributed intelligent systems for manufacturing. Unfortunately, a consistent example of such a system is not given throughout the book. Although it presents individual intelligent systems for different applications, it fails to explain the integration and distribution aspects in detail. It would be more desirable to use one consistent application example, only briefly explain the individual sub-systems of an IDIS for the application, and elaborate in detail on the distribution, integration and control of the sub-systems at the meta-level. A conclusions chapter at the end of the book would also have been useful.

Reviewed by Jun Huang, Department of Computing, University of Central Lancashire, Preston, UK

Essays on law and artificial intelligence by Richard Susskind, Complex 7/93, Norwegian Research Centre for Computers and Law, Tano, Oslo, 1993, pp 107, ISBN 82-518-3210-1.

One of the things that makes the domain of law so interesting as a place to investigate the use of knowledge-based systems techniques is that there is a considerable body of legal theory—jurisprudence—which articulates the nature of the law and legal reasoning. This means that there is