

Reviews

P. HARMON and D. KING
Expert Systems. Artificial Intelligence in Business
 Wiley, New York, 1985, 284 pages.

TEXAS INSTRUMENTS INCORPORATED
Understanding Artificial Intelligence
 Texas Incorporated, Dallas, TX, 1986.

M.J. COOMBS (ed.)
Developments in Experts Systems
 Academic Press/Harcourt Brace Jovanovich,
 London/New York, 1984, 251 pages.

Expert Systems by Harmon and King may be the best basic text to learn the fundamentals of these subjects. It is very well written and presented. In the Introduction, the authors give an historical account of the development of these computer tools and the relationship of Applied AI (Artificial Intelligence) to Natural Language Processing, Robotics, Expert Systems and Knowledge Engineering. The authors speculate about the impact of AI and ES (Expert Systems) on business and industry by venturing the opinion that these developments promise to provide large, hybrid systems that will truly rival human systems. Supplemented by sophisticated natural language interfaces they will be used throughout business and industry by the late 1980's. AI programming techniques will change the way conventional data processing departments approach complex programming tasks. However, they warn that this wave of advances cannot begin to rise until several preconditions are met: (1) major breakthroughs in machine learning must occur; (2) more knowledge engineers and much friendlier system building tools will need to be developed; (3) personal workstations will need to become more powerful and much cheaper; and (4) large corporations will need to experiment and figure out how and where to use the new techniques more effectively. Two trends are visible: one leading toward large expert

systems and which will produce programs that cannot be easily built using conventional techniques and another, leading toward small knowledge systems which will consist of programs that can be built by users rather than programmers.

Expert Systems covers the Basic Concepts and Techniques (Part I), Languages, Tools and Systems (Part II), How to Develop Expert Systems (Part III), and the ES Market (Part IV).

Part I is devoted to give readers a good understanding of what an ES is all about. The authors use MYCIN to describe what a knowledge system does and later how it works. We recall that MYCIN was the first large ES to perform at the level of a human expert and to provide users with an explanation of its reasoning. Far from being strictly a 'cook-book', the authors have tried to present an interesting and challenging text where thought-provoking subjects such as a discussion of human information processing, problem-solving strategies, the nature of expertise, the representation of knowledge, semantic networks, the drawing of inferences and logic, and the like are presented.

In Section II, the book turns to a treatment of the general characteristics of AI languages and the different tools that are used to develop knowledge systems. We learn about levels of software, the various available AI languages and their respective environments, commercial software, early as well as recent systems such as XCON(R1), XCEL developed by Carnegie-Mellon University and Digital Equipment Corp., GENESIS (by IntelliCorp), DELTA/CATS-1 (by General Electric), DRILLING ADVISOR (by Teknowledge Inc. and Elf-Aquitaine), and a microprocessor-based electrophoresis interpreter (by Rutgers University and Helena Laboratories).

In Section III, the authors explain how to build a small knowledge system. They warn that the development of the most trivial expert system might take someone about a month of work on the part of a nonprogrammer. Whereas, this text will go a long way to exorcise the mysteries of AI and Expert Systems, we also warn the prospective readers that reading it will not convert you in an

EES, i.e., 'expert in expert systems'. To accomplish this feat will require more specialized training in programming and in the use of specialized languages such as PROLOG. However, of all the books available in the market, it is one of the most readable. Executives and corporate managers will find it handy, well presented and pitched at a level at which they can understand, enjoy and easily learn the fundamentals of this fascinating field.

Understanding Artificial Intelligence is a book copyrighted by Texas Instruments. It is an inexpensive paperback which can be purchased at Radio Shack stores for less than \$5.00 Dollars. While the author or editors do not appear on the cover, we learn inside, that the book was written and edited by H.C. Michkoff, Staff Consultant of the Texas Instruments Information Publishing Center. It contains contributions and interviews with important people in AI such as E.A. Feigenbaum, B.G. Buchanan, H. Tenant and the like. While deceptively affordable and not much publicized, this book covers the same ground as Harmon and King's more expensive text and complements it admirably. In simple and understandable language it explains what is Artificial Intelligence, the history of the field, a survey of Expert Systems, natural language processing, the amplification of human capabilities through the development of expert systems, symbolic processing and other AI applications. The book pagination is awful (I mean the way that pages are numbered by chapters, instead of consecutively). However, this small technical inconvenience should not deter anyone from buying this small gem. It even covers esoteric material such as speech recognition, computer vision and robotics. This is a good investment no matter how you look at it. What can you buy these days for \$3.95? Certainly not very many books of this caliber.

Coomb's *Developments in Experts Systems* contains articles which appeared previously in the *International Journal of Man-Machine Studies*. If you follow the contents of this journal, you may consider skipping this text. On the other hand, I found it valuable even after recognizing material which I had read before. The editor (Coombs) selected articles which are worth keeping.

In particular, I am referring to the five articles which discuss the role of diagnostic expert systems

and the one which explains how an expert consultation system can be configured. The latter (by Langlotz and Shortliffe) presents a way to avoid the objections of patients to thus overcome this barrier to system acceptance. The authors propose the use of a *critique* which outlines the differences between the plan that would have been proposed by the expert system and the plan proposed by the user. The critique provides a computer-assisted consultation which satisfies both practitioner and user alike.

The editor was wise to also select articles for this anthology which treats the problems of design of expert systems from an epistemological point of view. Thus we find a discussion of the reasoning principles in electronic trouble-shooting, Riesbeck's contribution on Knowledge Reorganization and Reasoning Style and the article by Kolodner, which I enjoyed when I first read it, on the role of experience in the process by which novices become experts. This topic has been sorely neglected as can be witnessed by our inability to design complex technological systems that run without substantial failures. Coombs and Alty collaborate in a discussion of a the next generation of expert systems where instead of solving well-defined problems, they will be expected to act as advisors rather than merely to direct the interaction. Of course, this has always been the ultimate objective of AI and the author's implementation of an 'intelligent machine based advisor to judge the user's effectiveness and advise on strategy' is very timely. The articles by Jackson and Lefrere, by Zarri, by Lambird, Lavine and Kanal, and finally one by Basden illustrate recent applications of expert systems to such diverse fields as search systems for knowledge-based cartographic feature extraction systems, biographical data management systems and the like. An article by Zimmer presents a model for the interpretation of verbal prediction.

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What is Total Quality Control? The Japanese Way
 Prentice-Hall, Englewood Cliffs, NJ, 1985.

What is Total Quality Control? The Japanese Way is interesting reading on many levels. The book gives a history of quality control in Japan, it provides a glimpse of Japanese cultural feeling toward the West, and is on its most fundamental level a collection of management pointers for achieving 'Total Quality Control'. Dr. Ishikawa is one of the world's leading experts on quality control and provides in this book a summary of almost forty years experience in teaching, preaching and expanding upon the virtues of Total Quality Control. As an interested novice in the field I was impressed by Dr. Ishikawa's almost obnoxious self-righteousness and superiority on the subject. There is a stream of such obvious smugness running throughout the book that I found myself actually talking back to Dr. Ishikawa. It is not often that a book on this subject will inspire such instantaneous response.

Dr. Ishikawa begins the book by detailing his 'Encounter With Quality Control'. His history in quality control is tied closely with Japan's industrial history beginning from Dr. Deming's visit and lectures. The first two chapters are an interesting, yet brief, outline of Dr. Ishikawa's, Dr. Shewhart's, Dr. Deming's, and Dr. Juran's contributions to quality control. In addition, a brief history of QC circles is given. Ishikawa shares with the readers his hope and prayer: 'That Quality Control and QC circle activities be spread everywhere in the world, that quality all over the world be improved, that cost be lowered, that productivity be increased, that raw materials and energy be saved, that peoples all over the world be happy, and that the world prosper and be peaceful.'

Dr. Ishikawa also shares with us his prejudices toward western cultures. This book was written for a Japanese audience and thus it pulls no punches in its belief that Eastern cultures are superior for fostering QC circle activities. Chapter Two includes a listing of fourteen points to help in understanding Japanese QC versus western management methods. Among these fourteen points are: the more difficult Japanese writing system, the homogeneity of race and language in Japan, education and high aptitude for mathematics. And, perhaps the most interesting, religion. Confucianism and Buddhism teach that man is by nature good. Ishikawa states that on the other hand, 'The basic teachings of Christianity

appear to say that man is by nature evil.' QC is dependent on assuming the goodness of man's nature and is thus foreign to western beliefs. He at no point in the book lets down any of his strong beliefs in these concepts but does admit that if properly educated QC can work in the West despite our inherent handicaps.

The remainder of the book is then given over to comparably less controversial issues such as defining and implementing a Total Quality Control program. It is so easy when reading management books to sneer at them for stating the obvious facts of management. There is nothing inherently complicated or revolutionary about Ishikawa's definition of quality control: 'To practice quality control is to develop, design, produce and service a quality product which is most economical, most useful, and always satisfactory to the customer.' It is making all the pieces of an organization work toward this practice of quality control that is challenging. Dr. Ishikawa simply and clearly states what management must do to make this system work. And, although quality control is not complicated it should be a revolution. Quality Control must be the basis of all good management practices and procedures.

Dr. Ishikawa outlines some very important steps to beginning a TQC program. Not only does he define quality but he explains quality analysis and gives pointers on expressing quality and establishing QC circles. The Control Circle of 'plan-to-check-action' is discussed as well as what he calls the Cause and Effect Diagram but what is commonly referred to as the Ishikawa Fishbone diagram.

This is not a book of theory and stories. The steps are listed as to what a manager must do to implement a TQC program. This is what makes the book so valuable as a learning tool. Quality Assurance Tools are discussed as part of new product development using step-by-step advice and methods. One section is titled: 'How to deal with complaints when poor products are shipped.' This is practical and valuable advice for managers.

The use of statistical methods is highlighted as the most important aspect of QC without ever getting into them. Without becoming technical, Ishikawa proceeds through theory, philosophy and implementation without ever really missing a beat. This book is as valuable in describing TQC as a 'thought revolution' as it is in giving hints in

'Quality Control for subcontracting and purchasing'. Dr. Ishikawa writes that: 'Quality Control can be a theory, but at the same time it is a practical discipline. I urge people who are connected with QC not to become mere theorists or mere practitioners. They must become experts as both.' This book is an exposure to both and that is the key to its interest. I feel it is a book I need to keep on my desk for a long time and will continually refresh myself with it to keep my management skills sharp. I would recommend all managers interested in Quality Control to do the same.

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Jean Louis LE MOIGNE (ed.)

Sciences de l'Intelligence. Sciences de l'Artificiel
 Presses Universitaires de Lyon, Lyon, 1986, 774
 pages
 (in French).

Intelligence des Mécanismes, Mécanismes de l'Intelligence
 Fondation Diderot, Fayard, Paris, 1986, 367 pages
 (in French).

We are happy and fortunate to feature the work of one of our Board of Editors members. Le Moigne is a tireless worker who does not cease to produce important texts in the disciplines which interest our readers. Before plunging in the details of the above two works, it is worthwhile to mention the *Proceedings of the International Conference on Economics and Artificial Intelligence*, Aix-en-Provence, France, September 1986 (AFCET, Paris). Le Moigne chaired the conference and thus was instrumental in organizing and coordinating the contents of the papers which were presented. The Proceedings spell the Who is Who in Economics and Artificial Intelligence today, starting by the Preface written by Professor Herbert A. Simon to whom the Proceedings were dedicated. The keynote address was given by Francisco J. Varela who charted the current state of Cognitive Science with special emphasis on the implication for the technologies of knowledge. According to Varela: 'Cognitive Science (CS)

stands at the center of intersection of five disciplines: neuroscience, linguistics, artificial intelligence, cognitive psychology and epistemology'. Indeed Cognitive Science (In French: *Sciences de la Cognition*) stands with Artificial Intelligence as the disciplines in the limelight of the texts reviewed here. Another member of *HSM*'s Board of Editors and Policy Coordinator, Milan Zeleny [5] contributed an interesting paper to the conference which dealt with the impact of AI on socio-economic processes, in particular 'reverse' or perverse [my word] effects. He argues that AI can be conceived as a form of 'high technology' which is embedded in an increasingly knowledge-oriented society. Zeleny points to the inevitable slowdown and ultimate reversal of the process of division of labor and division of knowledge due to AI's reintegrative impacts on human labor and knowledge and the mutual and circular interdependency between AI and the very processes which bring it about.

In the first and last chapters of *Intelligence des Mécanismes, Mécanismes de l'Intelligence*, Le Moigne provides an indispensable historical reviews of how these disciplines came into being in the last 30 years. AI appeared in 1956 after maturing for a century: 'G. Boole (logic) and C. Babbage (calculus) prepared the ground to be exploited, subsequently, by Turing (Computation Theory) and C. Shannon (Theory of Communication), followed by N. Wiener (Cybernetics) and J. von Neumann (Theory of Automata)'. As the last chapter of this book, Le Moigne provides an interesting chronology of all events which took place between 1956 and 1981. He chose 1956 as the official date of birth of the AI discipline which was marked by the so-called Darmouth Summer Seminar during which A. Newell and H.A. Simon presented the first expert system to function effectively (the Logic Theorist) and introduced IPL, while M. Minsky presented the first version of an article which spelled the first stages of AI and J. McCarthy began his work on LISP. The chronology closes in 1981, with the publication of E. Feigenbaum and P. McCurdock's book concerning The Fifth Generation of the Information Age and the coming of age of PROLOG as the language of choice of expert systems. The chronology closes with the question: 'AI matured in 25 years, can we expect the same of Cognitive Science?'

Le Moigne's bias for the work of H.A. Simon is pretty obvious in all the publications reviewed here. We, on this side of the Atlantic, who have known Simon's work for 25 years cannot but ask ourselves whether such infatuation is just the result of the lag which such recognition took to cross the pond or whether, as Le Moigne tries to point out, the fact that we may have missed the extent of his message. Regardless of who is correct, we are grateful to rediscover Simon and learn again about the meaning of his 'Sciences of the Artificial' which, of late, have regained renewed importance when referring to the epistemology of management information systems [1,2,3,4].

Sciences de l'Intelligence. Sciences de l'Artificiel is really the compilation of papers presented at the interdisciplinary seminar held in France (at la Grande-Motte, near Montpellier) in February 1984 with the presence of H.A. Simon and the most prestigious French scholars in the field. The subjects treated are very similar to the other text reviewed above: the emerging paradigm of management information systems, theories of computation and of AI, theories of problem solving, theories of knowledge representation, cognitive theory, theories of social communication, theories of organizations, architecture of complexity, economics of complexity, etc. As Simon stated in his inaugural address: '(...) In the future, the theory of symbols or of information manipulation will play a central role in the social sciences (...) just as the computer, the new artifact, processor of symbols, will play its role as an intelligent system alongside the human brain.'

It is worth mentioning that the volume *Intelligence des Mécanismes, Mécanismes de l'Intelligence* is one of the first volumes of a new encyclopedia which was launched by the Fondation Diderot under the name of *Nouvelle Encyclopédie des Sciences et des Techniques*. Eventually, 200 volumes will be produced which will cover the important subjects of our times. The Fondation Diderot also promises to publish a yearbook to cover the progress of Science and to sponsor a *Dictionnaire Télématique* to be accessible on microcomputers.

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- [5] Zeleny, M., The A.I. impacts on the process of the division of labor, *Proceedings of the Int. Conference on Economics and Artificial Intelligence, Aix-en Provence, France, September 1986*.

Other new books received and available for review:

John B. CLARK
Marketing Today, Successes, Failures and Turnarounds
Prentice-Hall, Englewood Cliffs, NJ.

D.D. DAVIS and Associates (eds.)
Managing Technological Innovation
Jossey-Bass, San Francisco, CA, 1986, 302 pages.

D. BRITTON MILLER
Managing Professionals in Research and Development:
A Guide for Improving Productivity and Organizational Effectiveness
Jossey-Bass, San Francisco, CA, 1986, 403 pages.

Clark KERR and P.D. STAUDOCHAR (eds.)
Industrial Relations in a New Age:
Economic, Social and Managerial Perspectives
Jossey-Bass, San Francisco, CA 1986, 419 pages.

Clark KERR and P.D. STAUDOCHAR (eds.)
Economics of Labor in Industrial Society
Jossey-Bass, San Francisco, CA, 1986, 420 pages.

V. GEORGE and W.E. HEMBREE
Breakthroughs in Health-Care Management. Employer and Union Initiatives
Pergamon Press, New York/Oxford, 1986, 213 pages.

A. DEMAILLY and J.L. LE MOIGNE (eds.)
with contributions by Herbert A. Simon
Sciences de l'Intelligence. Sciences de l'Artificiel

Presses Universitaires de Lyon, Lyon, 1986, 773
pages
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