



## Book selection

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### Computational Learning and Probabilistic Reasoning

A Gammerman (ed)

*John Wiley & Sons, Chichester, in association with UNICOM, 1996 xxv + 312 pp. £40.00 ISBN 0471 96279*

This book has arisen out of a conference on Applied Decision Technologies (ADT95) run by UNICOM Seminars and held in London in April 1995. There are eighteen research papers organised into four sections. This is not a book for the novice in this field but should provide an invaluable resource to the researcher. The editor has ensured that the material is largely well presented, with a uniform style and a good index. As is so often the case with such collections of research material, the lack of an introductory chapter and of a coherent theme throughout the book make it unapproachable as a single volume. The division into four sections is an attempt to make it more readable but it is sometimes difficult to follow the criteria used for such a partition.

The first section of the book describes several inductive principles and techniques used in computational learning. Vladimar Vapnik develops the structure of a statistical learning theory, discussing the problem of learning from examples using statistical techniques. Subsequent papers in this section cover stochastic complexity, MML inference of predictive trees, graphs and nets, the association between information compression and reasoning and two denotational learning models.

Section two of the book contains material on causal probabilistic models. The chapter by J Pearl provides a very readable summary of the recent advances in causal reason-

ing and causal graphs. In the subsequent chapter, VG Vovk develops some of Pearl's own ideas and proposes a new semantics for Pearl's action calculus. Although this provides quite demanding reading, this chapter contains some stimulating ideas. The remaining two chapters of the section have a more practical focus, one on efficient estimation and model selection in large graphical models and the other on the use of graphical models to solve some problems in multivariate statistical analysis.

It is Section Three though that provides the most practical material in the whole book. There is an interesting application of Bayesian belief networks to statistical modelling of offender profiling and another application of the same technique in medicine where the important problem of prediction of disease development is addressed. Two other chapters in this section use neural networks and genetic algorithms to enhance the performance of Bayesian networks.

The final section of the book purports to describe related theoretical work in the field of probabilistic reasoning. In practice it comprises five rather disparate but nevertheless interesting papers addressing a variety of issues arising in the field. There are papers concerning the relation of probabilistic reasoning and game theory, on dynamic programming and, concerning cluster analysis. In the final paper of the book, the stability of decision rules is discussed within the framework of a semiparametric model of elliptically contoured distributions.

This is not a book to read cover to cover; it is more a collection of largely well written, academic papers. In my view, these papers would have been better produced as one or more special editions of a research journal. At the very

least, to make a worthwhile book, each paper should have its own abstract and there should have been an introductory chapter covering the field and its practical importance. As it is, I feel very few members of the OR Society will gain much from this publication. It represents a lost opportunity being strictly for the experts.

University of East Anglia

VJ Rayward-Smith

### Creating Collaborative Advantage

C. Huxham

Sage, London, 1996. ix + 178 pp. £12.95

ISSBN 0 8039 7498 1

I cannot quite match the familiar, homely Prologue with which Chris Huxham begins her book: however I am able to see the sea, at Bournemouth, just after the Conservative party Congress. The town is windswept, the sea rough, and the visitors this week-end look frozen as the leaves fall: the weather is giving us an introduction to Winter. I cannot help wondering if there were any collaborations made last week at the Congress. In contrast to the interpersonal collaborations that may have arisen at that political Congress, this book is about the processes that support the collaboration of *organisations*, and the situations in which individuals therein find themselves when they initiate collaborations.

As Chris Huxham says in that Prologue—she could not help but be struck at the variety developed within her book stemming from the theses of her invited authors, yet all somehow attempted to collaborate—no doubt helped by her caring manner and editorial vigour. She goes on to explain a little of why she initiated the book—it was because (and I quote from pages 1, 2):

- Collaboration is happening:
  - right across the world, people are doing it, or rather, people are trying to, often unsuccessfully;
  - people are frequently being *required* (for example, by government mandate) to do it, also often unsuccessfully.
- Collaboration is valuable:
  - it can be a good way of achieving things that would be difficult, or impossible for an organisation to do on its own (the self-interest motivation);
  - it is the *only* way to tackle societal problems (the moral imperative).
- Collaboration is difficult:
  - it is non-trivial in practice because of a number of inherent hazards.

This justification leads her into first chapter where she lays the groundwork for the following authors. She puts to the reader succinct argument, frameworks and discussion

without taking away the story-lines in the subsequent chapters. It is as though she is offering an enticement to her audience to read on.

The chapters are grouped into five sections, with parts 1 and 5 being single chapters written by Chris (as an Introduction illustrating her frameworks, and as Closure). The second section continues to use the frameworks and is titled 'Rationales and Contexts for Collaboration', having three chapters covering, essentially, a theoretical base. But perhaps to say 'theory' is too strong since the basic support of the collaboration is based on soft systems approaches; or on cognitive mapping which utilises some neat software—Graphics COPE, for instance—which is used to illustrate the concepts expressed by stakeholders in a scenario. The third section, 'Collaboration in Practice: Key issues', also has three chapters looking at practice: in the lead chapter the problems of the *sustainability* of the collaboration are addressed. Such a difficult problem once the first flush of excitement has died away! Indeed each of these chapters deals with the issues surrounding the maintenance of the collaboration drawing on the stake-holder concepts discussed in the second section. The fourth part titled 'Intervention Processes for Collaboration' focuses on the workings of collaborative groups and how to facilitate this process. It grasps the vexing question of the degree to which facilitators might impress their feelings on the groups, or whether they have to be strictly neutral and allow the groups to generate their own insights through the act of facilitation.

The book is constructed well, and while, as Chris says, some of the chapters could have been placed in alternative sections, I found no false flow in the arguments. The tone is always considered and considerate of the reader; and through this mechanism, the reader comprehends that the facilitator has to be considerate of the groups who are struggling with learning to collaborate.

Who should read the book, or even buy the book? This is a difficult question. We know that inter-organisational alliances are very popular and take place for a myriad of reasons. Sometimes these collaborations work, but often they may seem to be a good idea, then flounder. With hindsight we would say the partners should have read the book well before entering into their negotiations. It is a worthwhile book to read in parallel with the more classic texts on Strategic Management (as taught in Business Schools), and because of its substantive content, it should be read by those involved in public sector management. The very difficult facilitation processes and arcane techniques which lead to deep and long-lasting collaboration are well described. Yet, although easy to read, I fear the book may be dismissed simply because the authors have taken pains to describe the difficulties in so clear a fashion. I wish it every success, it deserves it.

Aston Business School

J Kidd

**Elementary Linear Programming (2nd edition)**

B Kolman and RE Beck

*Academic Press, London, 1995. xxii + 449 pp. £24.95  
ISBN 0 12 417910 x***Linear Programming – Mathematics, Theory and Algorithms**

MJ Panik

*Kluwer Academic Publishers, London, 1996. x + 496 pp.  
£127.00 ISBN 0 7223 3782 4*

Although similarly titled covering similar ground, these two books offer a contrast. The book by Kolman and Beck is potentially the more promising as it has run to a second edition, so I will consider it first.

The fact that the book by Kolman and Beck has run to a second edition is a little curious in that fifteen years have elapsed since the first edition, so this is the first update for a long time. In their list of 'What is new in the second edition' the authors include many areas of clarification and extension and redirection, plus the inclusion of some computer software and an introduction to the Karmarkar algorithm (as an appendix). In a list of helpful journals to be consulted regarding OR matters, readers of this journal will be disappointed to see that 'Operational Research Quarterly' is still given as the title of this journal!

The book starts off with a six page prologue on what OR is (namely the steps of the model building process) and what mathematical modelling involves. There then follows an optional chapter of 44 pages on linear algebra. Then Chapters 1–3 form the heart of the book, covering nearly 250 pages of material on LP. The development is very carefully achieved, with lots of detail. There are many examples, plenty of pictures and little is left ambiguous. Sections have exercises at the end, for routine work on small problems and, in addition, a set of 'projects' is included from time to time. The projects are longer exercises where more 'vagueness' (and hence realism) has been introduced. The projects seem a useful feature. The LP material includes much detail on cycling, degeneracy, the 2-phase approach, 'big M' and so on, and all is painstakingly presented although more diagrams to illustrate sensitivity would be welcome. A good discussion of duality is presented. Throughout the requirement is for moderate skills in mathematics.

From LP the book moves into IP in Chapter 4 with Branch and Bound and Cutting Planes being the algorithms chosen for elaboration. Disappointingly, there is no mention of Branch and Cut, facets or any of the approaches to closing the integrality gap. After IP, a long chapter (100 pages) is devoted to special types of LP problems—transportation, assignment, network etc. Algorithms are described, but usually only traditional approaches, and no

mention is made of more recent attempts to speed up traditional algorithms such as assignment.

The book ends with a useful treatment in six pages of an interior point algorithm and then some brief details on micro computer software and use of the diskette provided. The software provided is suitable for very small problems only and is included so that the exercises in the book can be solved. It is fun to use but I found it quite easy to create unintentional errors that caused an exit from the system. This might be alarming for the novice user. For larger problems the authors recommend readers to use the LINDO<sup>1</sup> system. Disappointingly, the computer software orientation of the book is limited. Eta-vectors are introduced to form a link between simplex 'paper calculations' and software calculations but there is only an optional section on computer aspects (11 pages). No mention is made of non-USA software. One other drawback is the lack of references e.g. Land and Doig,<sup>2</sup> the standard reference on Branch and Bound is not mentioned.

The book by Kolman and Beck has some resemblance to the standard work on LP by Hadley.<sup>3</sup> The level of detail is similar to Hadley<sup>3</sup> and the book under review might be, favourably, considered as a modernised version with the addition of material on integer programming. For UK users the treatment would have to be regarded as too detailed and few lecturers could expect students to study all the topics of the book in the course of a module on LP. However, the book does provide an excellent source of reference material with excellent presentation of concepts, clear development and few misprints.

The second book is even more detailed, abstract and mathematical. The author, Panik, attempts to cover only linear programming but to provide a comprehensive treatment of both the simplex and the interior point families of algorithms. The book starts off with a heavy introduction and suggests that all required mathematics will be developed within the book. However, the level of mathematics required to commence reading should not be underestimated. Chapter 2 develops sixty pages of necessary maths. In Chapter 3, LP is introduced in various canonical forms leading into Chapter 4 on optimality and duality. Feasible solutions, bases and the Simplex algorithm are covered in Chapter 5 and this is followed up in Chapter 6 by discussion on the existence of optimality (Karush-Kuhn-Tucker conditions)—the treatment requiring a knowledge of partial derivatives.

Chapters 7–9 form a set, covering computational (but not computer) aspects of LP namely improvement of solution, Phase 1, Phase 2, interval LP and absolute valued functionals. Dual simplex, primal/dual and complementary pivot methods follow in Chapter 10. Next come two chapters on postoptimality, which are very heavy going. The notation is daunting here and the layout is off-putting, however, useful tables of upper and lower limits of coefficient or variable values are provided.

The final large chapter of this book is a ninety page treatment of different types of interior point methods, including projective, affine potential reduction, primal and affine scaling and path following. This is very much a tour-de-force and is almost a book in itself. It is followed by a shorter chapter on interior point methods for solving linear complementarity problems. And there the book ends—no conclusions, no exercises at chapter ends, but lots of carefully argued theorems backed up by examples to aid the reader understand the abstract material. At the end of the book there is a useful appendix covering steepest edge simplex methods.

The book's strengths seem to lie in the development of the interior point material. Recent research material is incorporated and clarified from the original papers to make it more palatable, which provides a useful service. However, the book remains one for the dedicated researcher, despite the author's claim to have used much of the material for lectures. I cannot imagine any module in a British university with the time or inclination to tackle the topics included in this book, despite it being so carefully written. Thus the book will have a very limited specialist market. Like the book by Kolman and Beck there are few misprints, but layout and fonts are more thesis-like and discouraging.

These two books seem more likely to find favour with a US audience than with a UK one. The topics they cover are not usually covered in such abstract detail in British Universities, and when covered in some level of detail, the link with applications and software is stronger. Thus the two texts might be regarded as traditional, or even old-fashioned, by readers of this journal, but the achievements of the authors should not be belittled.

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JM Wilson

## References

- 1 LINDO, Lindo Systems, 1415 North Dayton Avenue, Chicago 60622, USA.
- 2 Land AH and Doig AG (1960). An automatic method for solving discrete programming problems. *Econometrica* **28**: 497–520.
- 3 Hadley G (1962). *Linear Programming*. Addison-Wesley, London.

## Encyclopedia of Operations Research and Management Science

SI Gass and CM Harris (eds)

*Kluwer Academic, Boston, Dordrecht, London, 1996.*  
xxx + 753 pp. £248.50, \$350, Dfl 650. ISBN 0 7923 9590 5

To my knowledge this is the first ever single volume encyclopedia on the subject and as such it is to be welcomed. The book consists of about two hundred

commissioned articles each taking up a few large format (8 inch by 11 inch) pages, together with several hundred brief dictionary type entries. It has taken several years to produce and is promoted as having 'involved 200 contributors who are *the* authoritative figures in every area of operations research'. In fact the vast majority of the contributors are based in North America. This in itself may not be surprising since this is an American project, but had more contributors from the rest of the world been included certain omissions might have been avoided e.g. there is no entry that deals with outranking methods—these are aids to multiple criteria decision making which originated in Europe. Also, those wanting to find out about 'Soft O.R.' will not find it in the index; there is a two and a half page piece on problem structuring method but I feel that other related articles should have been included by those working in this area—such people tend to be based in the UK.

To their credit the editorial team have not restricted the coverage to those topics usually found in student textbooks, but have also included areas which are at the interfaces with other subjects, for example neural networks, econometrics, artificial intelligence. There are also articles devoted to sectors of application for example hospitals, agriculture, higher education, military, crime and justice, water resources, electric power systems, emergency services. On the other hand there are things which seem to have been forgotten, such as the teaching of OR, software for OR (although there is a forward-looking article on spreadsheets), OR on the Internet, performance indicators, compromise programming, constrained logic programming, timetabling (there is an article on scheduling and sequencing but this is devoted to machine scheduling). It is however pleasing to read in the preface that feedback on such shortcomings is welcomed, so presumably an even better second edition will appear. There may then be the problem of having too much to fit in a single volume. One could create some space by removing the 25 page table of contents which merely lists every entry in the same order as it appears in the book. The numerous entries which are merely cross-references could also be deleted as the index already provides this information.

The articles are intended to serve as initial sources of information for decision makers and problem solvers in business, industry, government and academia, with special emphasis to the needs of students. Flicking through the book one does not see huge chunks of mathematics, so most entries will not be too off-putting in this regard for those without a technical background. It is unfortunate that there are so few diagrams as these could have greatly aided understanding e.g. anyone explaining the term 'convex function' would draw a simple sketch, yet we are only given a verbal definition in terms of linear interpolation. Relevant applications are usually provided and a very useful feature is that each major article contains references to the literature.

My main recommendations for any future edition is that:

1. the references to the literature should include survey/review papers and monographs;
2. there should be a discussion of what software is available for the various techniques;
3. relevant World Wide Web pages be cited, together with pointers to other Internet resources.

Finally, the price of this book does nothing to recommend it; it is preposterous and unacceptable. I sincerely hope that a cheaper, possibly paperback, version be made available so that this major undertaking receives the recognition and wide acceptance it deserves.

University of Hertfordshire

C. Tofallis

### Foundation Quantitative Methods for Business

M Wisniewski and R Stead

Pitman Publishing, London, UK., 1996. IX + 499 pp. £17.99.  
ISBN 0 273 607655 0

If your mathematics have left you at the proverbial ordinary level and you suddenly feel an urge to follow a business course this is an excellent book to refresh your arithmetic and to lead you through the intricacies of elementary quantitative methods for business such as statistics, forecasting, probabilistic decision making or finance.

The book has various innovative features. It is clearly user friendly, particularly suited for the absolute ignoramuses. It assumes that the students have so far demonstrated no interest in quantitative methods whatsoever and that their attention span is minimal. The authors' only restriction set out early in the book is the ability to count, to perform simple arithmetic and to be familiar with common number systems (such as pounds sterling and pounds avoirdupois). It is not for dummies however, as the core of the material, elementary as it may be, is critical for successful business operations and has to be mastered eventually.

Each chapter presents its Learning Objectives allowing the student a quick evaluation of progress. Pre-requisites within chapters are not very strict allowing the student cheerful browsing. The book is full of examples and intelligent exercises, including Self-Review Questions. In most chapters there is a practical problem around which a solution is sought, drawing on theories and techniques just acquired.

In one phrase, this book is a textbook that administers the elementary business mathematics to the students in very careful doses. The style is fresh and quite discursive, approximating a teach-yourself course. For instance it even gives to the student the exact pronunciation of basic

constructs, or the transliteration from maths into English for example ' $dY/dX$  (pronounced 'dee Y by dee X)', ' $d^2P/dX^2$  (pronounced 'dee two P by dee X squared). These pronunciation guidelines lead occasionally to inadvertent wit, for example '*a priori* (pronounced 'a pry-or-eye)'; not a bad mnemonic rule after all.

Last, the book shows quite strongly how quantification might help to exert a firm grasp of the real world by presenting the appropriate excerpts from the *Financial Times* for every bit of arithmetic taught. This is a highly original innovation and the most positive contribution of the textbook. It should have a powerful impact on the students who can relate immediately to bits of business journalese so far incomprehensible to the uninitiated, but it may create a further clientele among journalists trying their hand in a financial environment.

The book is divided into 14 chapters, perhaps too many, going from simple arithmetic, through elementary algebra and analytic geometry onto statistics, forecasting and investment appraisal. In an indirect way the arrangement of chapters indicates the dominance of statistics in business as about two thirds of the chapters have a statistical twist. Statistical theory may not be gone into at great length, but the student is exposed to hypothesis testing and simple linear regression up to elementary time series analysis.

The chapters on uncertainty and on financial decisions are excellent, delivering rather complex concepts (expected value, discounting) with exemplary clarity. The chapter on non-linear functions is rather dense, with rather poor diagrams and restricted to quadratic functions. This is a pity as the authors could have profited from the teaching of economics on the topic. All elementary economic textbooks have adequate graphical/non-analytical presentations at an interesting level of generality.

Perhaps also a mild critique might be voiced on the emphasis shown in the book on formulae as opposed to derivations from first principles, a scheme which seemed a priori closer to the authors' teaching philosophy. Furthermore perhaps too much stress has been placed on the elementary mathematics that are easily accessible from any GCSE textbook. It is inconceivable that users may not know rounding, negative numbers, fractions or decimals etc.

The authors do not address the notion of optimisation as confronted in the typical OR problems. Actually the concept of OR does not appear in text, yet another proof of the conspiracy of silence about the discipline. This is a great pity as any OR application, say an elementary LP or an inventory control problem, would have given the business student a grasp of what optimisation is all about.

Last, the authors seem keen to deliver a rich quantitative methods vocabulary and accurate terminology. However, their index at the back of the book is sketchy and cannot be used effectively as a lexicon of business terms, thus defeating at implementation their interesting initial idea.

All in all the book achieves its goal to initiate students in business quantitative methods, but furthermore, I think it is also good for practising economic journalists, a professional class not famous for its quantitative skills. The authors are modest not to suggest their book for managers, but I dare say there are a few administrators promoted to their level of incompetence, or shifted horizontally to an area of ignorance that could profit from some belated mathematical fortification.

*Kifissia*

*S Kafandaris*

### Strategic Risk: A State Defined Approach

JM Collins and TW Ruefli

*Kluwer Academic Publishers, Norwell, MA, 1996. xv+218 pp. £57.75 ISBN 0 7923 9661 8*

The stated purpose of this book is provide a new approach to assessing risk. The book accomplishes this purpose, and more. The academic approaches from Von Neumann to the present treat risk as being represented by a real variable in order to take advantage of the analytical tools which are supported by real variables. This is done even though much of the data which is collected is ordinal, for example, a scale which rates something on a scale from 1–10. Stevens<sup>1</sup> in his handbook on psychological measurements points out the difference between numbering systems in the first chapter of this handbook. This is something that almost every analyst is guilty of during his career: assuming ordinal or 1–1 correspondence data is represented by the real number system. We do this almost without thinking when we incorporate rating scales and indicator variables (e.g. to indicate gender) in our regression equations. The use of Likert Scales in regression analysis is a common example of this type of analysis. This problem is avoided by the authors in their investigation of risk.

Risk is determined by the position of one organization in a matrix based upon their relative performance on some measure of interest. This method is refined further to consider changes in relative position to further refine their state defined approach. This covers the part that the book said it would provide, but does not consider its additional features. The methods discussed in this book transcend risk analysis. This same method can be used to sort out systems when comparing model runs using different inputs. In some of these instances systems swap places in their order with respect to performance measures. The methods shown in this book would work very nicely in solving some of the problems associated with determining which is the best system or even managerial approach.

To me this book is one of the more useful ones which I have read in a long time. I think the authors have hit upon something which is very useful. As a result, I highly recommend this book. It is only 200 pages and easy to read.

*University of Maryland*

*C Leake*

### Reference

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### Advanced Methods in Transportation Analysis

L Bianco and P Toth (Eds)

*Springer-Verlag, Heidelberg, 1966. xv+619 pp. DM 198.00. ISBN 3 540 61118 5*

This expensive, Springer book is a refereed selection of 27 papers from a June 1994, symposium (TRISTAN II) held in Capri, Italy. North American and EU authors were the sources of 23 papers with additional contributions from Israel (2), Japan (1) and Poland (1). Although many of the papers use, by any standard, 'Advanced Methods', several of them are accessible at a UK 'science undergraduate' level. There is much interesting, implemented work described which is accessible to students of, for example, simulation, mathematical programming and mathematical modelling.

The Italian editors were however content to classify the papers as Transportation Planning (14), Transportation Management (4) and Vehicle Management (9). In view of the real-time, decision making focus in many of the papers alternative classifications would have added value.

Almost all the refereed papers are free of important errors. The editors have also provided a useful six page Foreword, providing a summary of the book's contents.

The Transportation Planning papers cover: dynamic adjustment of estimated origin-destination matrices, equilibrium assignment with varying value of time for users, route guidance systems and demand management measures, integration of public and private transport sub-systems including parking problems, inter-city and rural traveller utility models including timetable effects, public transport zone pricing, multicriteria bus system design (ELECTRE) and a new heuristic approach to public transport route design.

The so-called Transportation Management papers cover: network representation and data management, parallel computing algorithms for solving separable, convex

network problems, price regulation of near monopoly, freight transportation and profit sharing by freight carriers.

The Vehicle Management papers cover: predictive information in motorist route guidance systems including parking, public transport dispatch control tools, queueing optimisation at a single signalized intersection, real time network traffic simulation incorporating signal timing controls, dynamic vehicle assignment in fleet management, the vehicle routing problem with backhauls and a Genetic Algorithm approach to bus driver scheduling, included in A. Wren's IMPACS product.

*ECGD*

*I Calvert*

### **Linear Programming: A Modern Integrated Analysis**

R Saigal

*Kluwer Academic Publishers, London, 1995. xi+342 pp. £71.50 ISBN 0 7923 9622 7*

The most notable feature of this book is what it does not have. There are no diagrams, no numerical examples, no exercises, and minimal explanation as to the motivation, except mathematical curiosity, for the different algorithms. In the preface the author states that he has been teaching these ideas for several years at American Universities; as a lecturer myself I am amazed that the author is able to teach any mathematical programming without such aids. The content of this book is a mathematical presentation of algorithms for linear programming. The initial chapters contain necessary mathematical background, including the duality theorem and complimentary slackness. The fourth chapter presents three variants of the simplex method, the primal, dual and primal-dual algorithms. The fifth chapter, half the book, presents interior point methods, that is, primal and dual affine scaling methods, path following methods and a projective transformation method. The final chapter is concerned with implementation of the algorithms which any serious code writer would consider does not do justice to this art.

The algorithms are well presented, the steps clearly defined, the assumptions stated, and there is sufficient linking text so that the reader is not in doubt as to how the method will achieve its aim. If you have to teach the theory of interior point methods then this book would be worth considering. It gives the theory in a clear fashion leaving you to devise the numerical examples and draw the diagrams.

*London School of Economics*

*S Powell*

### **Making Sense of Management: A Critical Introduction**

M Alvesson and H Willmott

*Sage Publications, London, 1996. x+246 pp. £13.95. ISBN 0 8039 8389 1*

The book is divided into three parts. The first part provides an introduction to Critical Theory (CT) and its relationship to modern society. The discussion then shifts to the power and limitations of science, concluding with a brief introduction to the history, tradition and critiques of CT.

The second part deals with management conceptualisations and specialisms. An examination of conventional metaphors is presented (for example organizations as machines) and of their use in management, followed by a discussion of CT's counter-conceptualisations and the introduction of alternative metaphors (for example management as mystification). Next a 'critical' discussion of selective management specialisms is undertaken based on the premise that some of them are concerned with the softer (organization theory, marketing and strategic management) side of management, whereas others deal with the harder (accounting, information systems and OR) concerns of quantification and objective forms of measurement.

The final part of the book attempts an integration of CT and management. It starts with a recasting of emancipation in management, moving through a brief presentation of CT's critiques (for example intellectualism, essentialism), to a re-conceptualization of emancipation. A model summarizing types and foci of emancipation is provided and the chapter concludes with an illustration of the possibilities for micro-emancipation in management. The book ends with an attempt to bring CT into management practice suggesting some ideas for more reflective work methods, inspirations for working life and an endeavour to locate critical management theory (CMT) in the context of management education and research.

As is the case with any book, it has some good and bad points. The bad points relate to the claims that are made concerning criticality and the notion of criticism. The book provides an exaggerated feel of something new. It does not deliver, however: there is a regurgitation of ideas that simply reflect old ideas about rationalities and their comparison. Even the title of the book is somewhat misleading, since in many places the book appears as an introduction to CMT rather than a critical introduction to management.

Another difficulty concerns the book's targeted audience, which I interpreted as being mainly final year and post-graduate students. I think that readers lacking university education, will find the presentation rather difficult. On the other hand readers familiar with the CMT discourse probably will find the conceptual contribution of the book of limited interest (due to its introductory character). I also feel that a lot of the authors' ammunition is often targeted

at straw men and sitting ducks. For example challenging the early mechanistic conceptions of BPR, or its stereotypical top/down nature appears rather unfruitful, especially when considering that BPR, despite some success, is not a complete piece of work.

Extensive pigeon-holing is also in operation: Soft Systems Methodology and Total System Intervention are presented as soft and critical OR respectively. Apart from being disturbing and uninformative, this does not seem to serve any further purpose in the book.

A similar feeling of lack of point takes place when Popper is referred to as an uncritical positivist. Any reading of Popper's writings makes it clear that he was a proponent of criticality in science and was critical himself. However, he did not need to embrace criticality to identify himself. What the authors do not come to grips with is the fact that there do exist procedures for being critical in a particular context and at a particular time, if there is a danger of not being sufficiently critical. They defend this possibility by taking arguments from the history of Western thought—which seems like shooting the proverbial mouse with a cannon. I had wished the authors to be a little bit more open, therefore, about the fact that one does not have to be uncritical if one does not embrace their espoused criticality. In fact, I would say that the reverse is the case. Contrary to what the authors seem to assume, not everyone wants to be emancipated regardless of time and context.

I also found some of the material used dated and uncritically attended to. A case in point is the presentation of the framework of the four sociological paradigms. The reader is informed that the authors' doubts are suspended to comment on the framework's heuristic value. This violation of the authors' espoused critical stance is not of much value, especially when considering the fate of this particular framework. It also suggests, contrary to the authors' intention, that there may be benefits to being uncritical.

This difficulty can be directly traced to the Enlightenment's assumption—rather uncritical itself although the authors do not appear to see any difficulty—that once high-quality knowledge is available, improved action will naturally follow. This obviously is not the case, nor is the reverse true: improved action does not appear to depend on the availability of high-quality knowledge.

Thus, the book falls short of its aim: to make clear what CMT actually contributes to management practice and education. Bearing also in mind the treatment of the 'critical theory' in which present day sciences have been embedded for some centuries now, the attempt to locate CMT in a research context can only be seen as over-enthusiastic and not entirely without danger.

I would like to close the review with the book's good points which mainly relate to the work the authors have done to collect and summarise their material. The book scores considerable points for its rather generous references to women issues, its extensive bibliography (21 pp), the

concentrated description of CTs development and its discussion of critical issues which should make a contribution to the indicated target audience's discourse.

*University of Lincolnshire and Humberside*      *D Tsagdis*

### **Network and Discrete Location: Models, Algorithms and Applications**

M Daskin

*John Wiley & Sons, Chichester, 1995. 498 pp. £70.00.*  
*ISBN 0 471 01897-X*

This is a text book on location analysis. To the best of my knowledge, this is the first book which is made readily available for teaching purposes. It covers most discrete areas of location (the continuous case is not treated). Detailed examples are used to illustrate all methods discussed in this book. Each chapter finishes with a set of exercises, some of which can be tackled using the software (SITUATION) which is attached to the book.

This book consists of nine chapters; the first three are introductory chapters on general key issues on location problems and models, the role of linear programming, duality theory and complexity analysis. The remaining chapters treat the following topics. The set covering problem and some basic extensions such as the maximum expected set covering problem are treated in Chapter 4. The solution approaches discussed are the greedy heuristic, Lagrangian relaxation heuristic and B&B. When the question is to minimise the maximum cover using a fixed number of facilities, the problem becomes the p-centre problem, and this is the content of Chapter 5. Polynomial time algorithms for the unweighted and weighted absolute 1-centre, absolute 2-centre and the vertex 1-centre problems on trees are presented. For the unweighted vertex p-centre problem on a general graph, an optimal iterative procedure based on set covering solutions is also outlined. The p-median problem is treated in Chapter 6. A linear time algorithm for the 1-median problem on trees is described. For a general network and when p is variable, heuristic approaches are presented. A constructive heuristic, a neighbourhood search, an exchange heuristic and a Lagrangian relaxation heuristic are described and supported by illustrative examples. Uncapacitated and capacitated fixed charge location problems are discussed in Chapter 7. For the uncapacitated case, constructive heuristics (add/drop/interchange). Lagrangian relaxation heuristics, and a dual based approach are treated in detail with examples. When the facilities have limited capacities, two alternative relaxations are produced and an application of Bender's decomposition is also outlined. Chapter 8 presents some mathematical formulations to deal with extensions of



the models described in previous chapters. Since most locational problems have conflicting objectives, a section on multi-objectives and specifically how to identify the non-inferior solutions is produced. Other issues such as hierarchical facility location problems including the possibility of interaction between facilities, the combined location routing problem, hub locations and location of undesirable facilities are discussed and their corresponding mathematical models are provided. The last chapter is more of a general methodology chapter and deals with the four phases of a planning process (defining the most cost effective problem, conducting a technical analysis, communicating the results in an effective way and finally implementing the selected actions and policies). It is interesting to see that the author has stressed highly the importance of phase 1 which is about addressing the *right* problem and not falling into the trap of tackling the simplified or the *wrong* problem simply because it is easier to do so.

Although this book is mostly designed for teaching purposes, given the detailed solutions of the illustrative examples and the exercise list at the end of each chapter, it does also emphasize, in places, the need for considering some interesting research issues which are supported by appropriate references. I am also impressed and pleased by the quantity of examples and exercises the author has managed to gather over the years. In my view, this book is a useful information pack to have, especially for lecturers giving a full or a part course in locational analysis for OR/MS postgraduate students or for those final year students doing combined Mathematics with Management or Operational Research.

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### Scheduling Theory and its Applications

P Chretienne, EG Coffman Jr., JK Lenstra and Z Liu (Eds)  
*John Wiley & Sons, Chichester, 1995. xv+365 pp. £40.00*  
*ISBN 0 471 94059 3*

This book is based on a workshop held in France in 1992. It contains 17 papers on a range of topics in scheduling theory with a particular emphasis on stochastic scheduling and related areas in queuing theory. Indeed some of the papers are purely queuing theory. Immediately noticeable is the high standard of presentation throughout the book. This is a pleasant surprise in a book of this type with multiple authors from nine countries. Most of the chapters have clearly explained introductions. Often the structure and methods of proofs and algorithms are described before the formal exposition. For me at least, this is always welcome in material of this kind. Referencing is excellent

throughout. Perhaps the clearly high standard of editing was responsible for the delay in the book being published.

The book contains informative reviews of stochastic scheduling by Weiss, cyclic scheduling by Hanen and Munier and an excellent and concise review of job shop scheduling theory by Pinson. Highlights for me included the opening paper by Lenstra and Schmoys on computing near-optimal schedules. The seemingly endless study of complexity in various branches of scheduling theory had appeared to me to be a fairly barren area for practical scheduling problems. However Lenstra and Schmoys demonstrate that complexity analysis can be important in determining the types of performance guarantees that might be attainable for polynomial-time heuristics and approximation schemes. I have only limited knowledge of parallel processing in computer science but the paper by Rayward-Smith, Burton and Janacek on the scheduling of parallel programs would seem to me have important implications in that domain. The computational performance reported in the paper by Herroelen and Demeulemeester on branch and bound procedures for resource constrained project scheduling was impressive.

Stochastic scheduling seems attractive from the point of view of real problems but has restrictive assumptions which did not seem to be addressed in this volume. The assumption of independent, identically distributed processing times, for instance, is difficult to justify in most real manufacturing environments. It was however interesting to read in the tutorial paper by Weiss, that a stochastic analysis shows that Johnson's rule, the mainstay of classical flow shop scheduling, underlying many heuristic approaches, has little effect for the two-machine case for a moderately large number of jobs.

It would have been useful to have included a paper in this volume which examined critically the connections between scheduling theory and queuing theory. However, my main criticism of this book is the misleading title. The book addresses a fairly narrow range of topics related to scheduling and the emphasis is most definitely on theory. It contains many lemmas, theorems, proofs, and conjectures. A mathematical background, particularly in stochastic processes and perhaps graph theory, is required to appreciate the detail. This is the type of book which could be used profitably by a theoretical computer scientist, mathematical operational research theorist or probabilist, to find new research directions. Indeed there are numerous conjectures throughout which are ripe for many future PhDs in these areas.

Most of the papers do claim to be motivated by applications in manufacturing, computer or communications systems. However in most cases this is as far as applications are considered. Where applications are given any consideration it is generally in the area of computer and communications systems rather than manufacturing or service sector problems. The paper by Gerasoulis and

Yang for instance describes a software tool that uses scheduling algorithms to generate parallel code for distributed memory parallel machines.

I would not recommend this book to a practitioner in the manufacturing or service sector with a real scheduling

problem. Overall this is a good book but it is a shame that the title is inappropriate.

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