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Book Selection

Edited by JM Wilson

A Mathematical Kaleidoscope: Applications in Industry, Business and Science

B Connolly and S Vajda

Albion Publishing, Chichester, 1996. 266 pp, £14.95. ISBN 1 898563 21 7

This is a book for those who are both curious and mathematically sophisticated. I was excited by the title, always having had a fascination with the beauty and elegance of mathematics. But I was not prepared for the intensity of mathematical thought required to get through the text. This is not a book to lend friends to show them that mathematics can be interesting, because they would fall at the first formula! In fairness the intended audience is 'advanced undergraduates' (do these still exist?) and postgraduates.

The topics covered are varied and fascinating, from analysis of your chances of winning the football pools (depressingly small at one in 59 000) to likely times taken by committees to reach decisions (depressingly large in too many cases!).

The first thing that hit me about the style of the book is that it is packed full of equations. Whilst this might get pure mathematicians salivating at the thought, as a simple statistician or OR man I felt a little daunted at 70 formulae in the first 20 pages!

The narrative style, however, is good. The authors chat about interesting discussions they have had with various people and how the Bessel function naturally dropped out of a chat over hamburgers. I liked this approach and it gave me courage to wade through some of the more opaque mathematics.

My only concern here was a slight condescension in places. For instance a secretarial friend comments 'Perhaps you (the author) would like to make my otherwise depressing day more interesting by revealing your secret. Or would it be too complex for my admittedly microscopic brain?' I suspect in reality much of this is tongue in cheek.

I would have liked to see the text more clearly signposted, and ideally some of the formulae stuck in appendices. More diagrams would have helped, and perhaps 'So What?' summaries at the end of chapters, showing how what has been discussed, could be used.

But if there are any REAL mathematicians in the OR Society, they will find this book broad in interest and full of examples of mathematical analysis being applied to life situations. The rest of us will have to rely on Ian Stewart to make them easier to understand!

J Lowther

Go With the Flow: A Systems Approach to Healthcare Planning

PH Millard and IS McLean (Eds)

Royal Society of Medicine Press, London, 1996. ix + 138 pp, £15.00. ISBN 1 85315 277 3

At first sight this book appears to be authored by Millard and McLean rather than edited by them, as there is nothing on the covers to indicate that it is an edited text. The book is a collection of fifteen papers, split into four parts: Why Model?; Modelling Clinical Care; Modelling Hospital and Community Services; Modelling Bed Occupancy. The papers are derived from two conferences. They provide a fairly-readable mix of management science approaches to healthcare planning, and will be of interest to operational researchers concerned with this area.

The sub-title is somewhat misleading if potential readers think that they are going to get a group of papers which are based on the human activity system tradition. Ideally, a book which is sub-titled 'a systems approach to healthcare

planning' ought to indicate to the reader fairly early on what is meant by a 'systems approach'. Chapter Two does provide a brief overview of systems and the concept of human activity systems, and the same chapter also states that 'Healthcare systems . . . are clearly *human activity systems*'. Having provided this overview and an idea of what is meant by systems, and the systems approach, one would expect that the papers which followed would utilise these concepts. This is not the case. Each individual paper is just that—individual. There is no systems theme running through the book that can be detected easily. If such a theme exists, it would help the reader if the first chapter outlined the idea of a systems approach, and if the papers related to this explicitly.

In summary, the text provides a collection of brief papers which outline diverse health care planning interventions. These papers do not appear to have a systems theme to link them.

Luton University B Lehaney

Handbook of Organisation Studies

RS Clegg, C Hardy and RW Nord (Eds)

Sage Publications, London, 1996. 760 pp, £65.00. ISBN 0 7619 5132 6

Although the price of books continues to rise it seems a little alarming to be recommending purchase of a book costing £65, but this particular book is good. It is well crafted: the editors have done a thoroughly excellent job, and they have managed their contributing authors so they in turn express their theses clearly. I recommend this handbook to all who have to grapple with the 'study' of an organisation.

The book has three parts (i) Frameworks for Analyses, (ii) Current Issues in Organisational Studies and (iii) Reflections on Research, Theory and Practice: these are preceded by the editors' groundwork chapter which sets the scene for the readers. In itself the first chapter is a revelation: the editors reflect carefully on the chapters following so as to allow the reader every chance to balance what may sometimes be conflicting arguments in one followed by another section written by a different author. The editors are forever sympathetic, but they pinpoint accurately the acute differences in opinions held by their authors. This is very useful as it tempts and guides readers to sample from the chapters without being overwhelmed by one voice in particular or puzzled overly by the many arguments.

Passing to Part One of the handbook. The authors identify many contemporary forms of theoretical practices. For instance, contingency theory (which is so widely embedded in many studies), organisational ecology (which draws upon biological and ecological theories to 'explain' organisations, though oddly they do not mention cybernetic models), psychology, economics, institutional theory, critical theory and feminism are all given well deserved space. These chapters also offer a historical base drawn upon while the authors develop their theses relating to their perceptions of contemporary issues. These backgrounds are useful for general readers allowing them a better understanding of subsequent chapters.

In Part Two there are more specific insights given upon topics like, strategy, leadership, decision making, cognition, groups, communication, organisational learning, technology, innovation and so on. Certain of these topics have been long established, but others are newer, such as organisational learning, diversity, and globalisation. On these topics there is only now a body of knowledge that is becoming more clear, the authors express this well, and relate them to broader organisational issues.

Part Three is more reflective. It draws together the bases and the action-points from Parts One and Two and derives from them future strands of research. The authors question the generality and nature of their data, its validity and reliability in relation to the dynamics of the firm.

Finally I must quote from the editors' preface . . . (page xxiv).

Ideally our *handbook* should pass the 'Desert Island Disks' test. 'Desert Island Disks' is the name of a long-running BBC Radio programme. Each week a 'castaway', usually a moderately famous person is asked to choose eight records and one book they would want if marooned on a desert island. We think of the *handbook* in these terms. Cast into the 'field' to do research, marooned without other resources, we would want it to function as an invaluable guide, an indispensable resource to steer the way, to find out where one 'is', where one might be going, to identify and interpret salient features of an organisational landscape. Accordingly the *handbook* consists of a series of co-ordinates of the terrain of organisational studies which revolves round: organisations as empirical objects; organisations as theoretical discourse; and organisations as a social process. Hence our metaphor of mapping the terrain, one which acknowledges existing landmarks as well as envisioning possible futures.

I believe the editors' words to be exactly those I wish to say to you all—please read this handbook.

Aston University J Kidd

Interior Point Methods of Mathematical Programming

T Tarlaky (Ed.)

Kluwer Academic Publishers, London, 1996. xxi + 528 pp, £109.00. ISBN 0 7923 4201 1

The popularisation of Interior Point Methods (IPM) was sparked off by the famous 1984 paper of Karmarkar, which

showed that for LP an IPM had good properties both theoretically and practically. This book succeeds admirably in its objective of 'providing an introduction to the current theory of Interior Point Methods in mathematical programming'. The reader should be warned, however, that the book goes well beyond the introductory level, and several of the chapters discuss open research questions.

There is now such a vast IPM literature that it is hard for a newcomer to the area to know where to start. This book addresses this gap in a well structured way, which belies the fact that multiple authors have contributed. The only feature it shares with those multi-author books that are really conference proceedings (and are generally to be avoided) is that there is no index, an annoying failing that should be addressed in a second edition.

The 13 chapters are divided into three main sections: LP, Convex Programming, and Applications. As is to be expected, the LP section is the largest. The first LP chapter provides an introduction to the theory of IPMs, presents the fundamental notion of the central path, and gives a nice self-contained IPM-based treatment of duality. The last section of the chapter, which focuses on post-optimal analyses is clearly a hobby-horse of the authors and looks slightly out of place. But one should perhaps indulge editors.

Chapter 2 presents affine scaling algorithms, first studied by Dikin, forgotten, and rediscovered after the Karmarkar paper. This is an excellent state-of-the-art rather than introductory presentation. Chapter 3 moves on to target following methods, presenting a new framework for the analysis of primal, dual and primal-dual methods, currently the most favoured practical IPM methods for LP. Karmarkar introduced the idea of potential reduction methods as a tool for analysing complexity, and Chapter 4 is an elegant presentation of potential reduction algorithms. This chapter is indeed introductory, and is, like the other chapters, written by a leading researcher in the area. Finding an initial interior feasible solution to an LP is non-trivial in practice, and Chapter 5 covers infeasible IPMs. The iterates are kept feasible in the positive orthant, with the equality constraints not necessarily satisfied. This topic is of course important in practice.

To the reviewer, Chapter 6, Implementation Issues, is the most interesting. Here the practical details of how to make IPM software solve big problems fast is addressed. IPMs would be of little interest if they only showed that solving LPs can be done in polynomial time. It is their effectiveness in solving large LPs in practice that should interest OR practitioners. The most important implementation issues are discussed, including presolving and crossing over from an interior solution to a basic solution.

The section on Convex Programming is probably less accessible to the typical OR reader. The chapters cover IPMs for classes of convex programs, complementarity problems, the important emerging field of semi-definite programming (discussing the elegant ideas of self-concordancy), and implementation issues for non-linear programming IPMs.

The third major section, Applications, is a bit thinner than the other two The first chapter surveys the applicability of IPMs in solving combinatorial problems, and to solving network and multi-commodity flow problems. The penultimate chapter, IPMs for Global Optimization, covers potential reduction and affine scaling methods for general non-convex quadratic programming problems. The final chapter, perhaps rather out of place in the book, looks at the application of IPMs in VLSI design.

Overall the book is a fine survey of current theory and practice in IPM. It is written by the top people in the field, and is clear and authoritative. It shows a few signs of hasty production (some obvious typos and at times 'interesting' English) but this is a price well worthwhile paying for the volume's immediacy. The editor will have a big problem in keeping the contents current in such a fast moving field, but has achieved a very impressive and weighty volume.

This book is to be recommended to those interested in exploring more deeply the ideas underlying some of the best large scale optimisation ideas.

Dash Associates and
University of Buckingham
RC Daniel

Statistics for Management and Economics (4th Edn)

G Keller and B Warwick

Duxbury Press, Belmont, CA, 1996. xxviii + 107 pp, $74.95. ISBN 0 534 51584 3

This book is a breath of fresh air in the teaching of statistics to non-statisticians, and could teach us a lot about teaching statisticians!

Finally students are to be taught the why' and 'what' of statistics, rather than endless detail of the 'how'. The authors want students to be able to select the most appropriate statistical methods for their situation, and they accept that 99.9% of the time the detailed calculations are done at the touch of a computer package button. The skill is pressing the right button with the right data! They put a lot of emphasis on interpreting results, which is most welcome.

The course also now teaches students how to make appropriate use of statistical functions in Excel and Minitab, including the useful inclusion of two disks of example data and useful add-ins. SAS output and instructions are available separately, which only leaves SPSS to be covered in a future edition!

For teachers, the course is well resourced. The edition I saw had annotated notes to remind you what needs to be stressed to students at each stage. There's also a resource

manual with OHP masters and some extension material; a complete solutions manual for all the exercise test items with computerised testing under Windows; a Web site with extra support; Powerpoint slides to customise presentations; student solution books and study guides.

The book is nicely presented, clearly signposted and well laid out. There are lots of examples (mainly from real world data) and some graphics. As well as giving students an excellent start in statistics, this book will give seasoned statisticians a clear resource book and a very helpful key to explaining our approach to managers.

When I completed my first degree in statistics almost ten years ago, it seemed anomalous that we were still being taught how to calculate results by manual integration whilst powerful PCs sat unused next door. My suspicion was that lecturers had not found time to update their material to account for the microchip. Ten years later in places little seems to have moved on. Hopefully this course will move us on—very highly recommended!

J Lowther

Visualization and Optimization

CV Jones

Kluwer Academic Publishers, London, 1996. xi + 434 pp, £92.50. ISBN 0 7923 9672 3

This is a really fascinating book published by Kluwer in a series dedicated to the interfaces between Operations Research and Computer Science. I started this review with the word 'fascinating' because both the subject (how can visualisation techniques help optimisation and *vice versa*) and the way the subject has been treated by the author, Chris Jones, deserves such an attribute.

The subject is indeed very stimulating: how can we visualise (and what is the meaning of visualising) an algorithm; how can we represent points in higher dimensional space; how can we animate the execution of algorithms in order to teach them; and is this animation always a valid teaching help; and, in the opposite direction, how can we use optimisation theory to help visualising complex objects?

The author did really excellent work in putting together a huge quantity of material, all of which is first class, related to all the aspects of visualisation and optimisation. He displays an up-to-date and critical knowledge of the state of the art in both disciplines, and succeeds in presenting both, and their interface, in a clear, stimulating and informative way.

After a brief introduction, Jones presents a 'framework' for visualisation and optimisation, discussing in detail such diverse arguments as the perceptual and cognitive systems of human beings, the graphical aspects of text, tables, pictures (including animation), hypermedia and virtual reality. Then, in a chapter devoted to 'Visualisation and the Modeling Life-cycle' he discusses visualisation in a larger context than usual, including the art of modelling (and modelling languages) as part of the visualisation process. Finally, in a chapter on 'Visualisation for Optimisation' he introduces several techniques, and software, for dealing with hypertext, networks and graphs, multiple dimensions, animation, sound etc.

This book is indeed very well written, very deep, accurate and up-to-date. There are, in my opinion, very few defects, which I would like to list here for the sake of completeness. The first I noticed concerns the visualisation of the book itself: the graphics are very good and the paper of good quality. Maybe one might expect some colour graphics somewhere, but I understand that their inclusion might have raised the price of the book. One aspect I found curious, in a book dedicated to visualisation, is that, because of problems the author met in the use of LaTeX for such a complex (from a typographical point of view) book, most of the pages contain at least a sentence which is not right-justified, but goes beyond the right margin. Another possible defect of the book is the inevitable impossibility of being up-to-date: most of the references contain an electronic address, but unfortunately URLs change very frequently. It would be very interesting if the author could maintain a web site where the addresses he cited are collected and maintained, as well as new pointers added as necessary. The last observation I would like to make is that the book seems to be a little more biased towards visualisation than optimisation. In other words, the treatment of all the aspects of visualisation is very good and deep; on the other side the tools available for the optimisation community are very interesting but quite standard, perhaps I expected something more 'revolutionary'. But surely this is a problem of the optimisation community, not of Chris Jones' beautiful book.

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