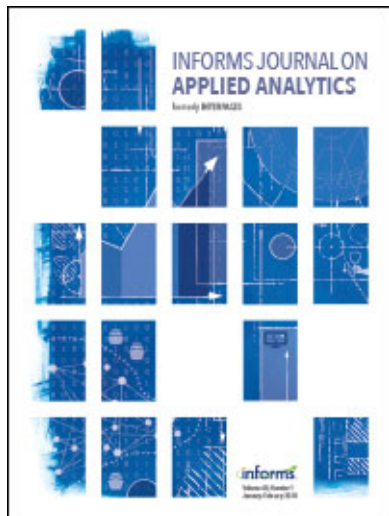




Interfaces

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

Book Reviews

Benjamin Lev, (Editor),

To cite this article:

Benjamin Lev, (Editor), (1989) Book Reviews. Interfaces 19(3):88-105. <https://doi.org/10.1287/inte.19.3.88>

Full terms and conditions of use: <https://pubsonline.informs.org/Publications/Librarians-Portal/PubsOnLine-Terms-and-Conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

© 1989 INFORMS

Please scroll down for article—it is on subsequent pages



With 12,500 members from nearly 90 countries, INFORMS is the largest international association of operations research (O.R.) and analytics professionals and students. INFORMS provides unique networking and learning opportunities for individual professionals, and organizations of all types and sizes, to better understand and use O.R. and analytics tools and methods to transform strategic visions and achieve better outcomes. For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>

Book Reviews

BENJAMIN LEV

Department of Management
Worcester Polytechnic Institute
Worcester, Massachusetts 01609

$$\frac{1}{\beta} \Gamma^{\alpha} \times \approx * \div - \beta \subset \mu = \epsilon \rho \setminus + \phi \sigma \cdot x \quad \mu \omega \epsilon \cdot \& \mu ? \lambda \uparrow \epsilon < \mu \Sigma \cap \phi \zeta \pi \wedge \rho$$

The range of books reviewed is wide, covering theory and applications in operations research, statistics, econometrics, mathematics, computers, and information systems. In addition, we include books in other fields that emphasize technical applications. Publishers who wish to have their books and proceedings reviewed should send them to Professor Benjamin Lev, Department of Management, Worcester Polytechnic Institute, Worcester, MA 01609. We list the books and proceedings received; not all books received can be reviewed because space and time are limited. Those who would like to review books are urged to send the editor their names, addresses, and specific areas of expertise. The editor commissions all reviews and does not accept unsolicited book reviews. Readers are encouraged to suggest books that might be reviewed or to ask publishers to send copies of such books to the editor.

CIAMPA, DAN 1988, *Manufacturing's New Mandate: The Tools for Leadership*, John Wiley & Sons, New York, 233 pp., \$22.95.

Dan Ciampa, as president and CEO of Rath and Strong, a management consulting firm, presents a framework for addressing total quality (TQ), just-in-time (JIT), and computer integrated manufacturing (CIM). Directed at top managers, this book reflects a consulting firm bias, for example, it recommends bringing in the outsider to develop and implement the manufacturing plan for the future.

The book joins several others in pointing out the importance of being competitive in a global society. Its focus is on how a leader (president, CEO, VP of manufacturing, and so forth) can address the challenges that the manufacturing concern faces and then move that company toward being a manufacturing leader.

After discussing the challenge facing CEO's in Chapter 1, Ciampa develops his modern integrated manufacturing (MIM) pyramid. This pyramid, which he also

Copyright © 1989, The Institute of Management Sciences
0091-2102/89/1903/0108\$01.25

INTERFACES 19: 3 May-June 1989 (pp. 88-105)

BOOK REVIEWS

refers to as a “package,” begins with an objective, including such considerations as margin, costs, and return on assets. Ciampa expresses sensitivity to the negative side of short-term profits as an objective. He focuses on long-term considerations, including market share and increased margins. Obviously, both short- and long-term profits must lead the list of objectives.

The MIM pyramid continues with implementation considerations, such as the organization’s people and culture. Tools and techniques, including TQ, JIT, and CIM constitute the next lower rung of his ladder-type pyramid. A serious omission here is that Ciampa fails to include Goldratt’s theory of constraints as a framework for thinking, either for the specific tools offered or as a philosophical foundation for his pyramid concept. He concludes this chapter with a reminder to the leader or CEO that there is a logical sequence that begins with TQ or JIT and must include teamwork, early paybacks, and a feeling of involvement by key personnel. CIM is suggested as last in this sequence.

Much of the remainder of the book, beginning with Chapter 3, is a replay of accepted tenets of management and organizational behavior. While these points are not new, the integration with the TQ/JIT/CIM theme is noteworthy. Under the label of “era management,” the author stresses the importance of developing a management strategy that is realistic for the next 18 to 36 months. This time frame is viewed as a realistically manageable period. Ciampa is probably correct here in that plans developed for

this time frame will be the most doable.

In Chapter 7, the author discusses his six-phase process for implementing the initial change to a TQ/JIT/CIM environment. Presumably this is the next era being addressed. This implementation approach consists of (1) Vision, (2) Strategy, (3) Organization, (4) Problem solving and training, (5) Formal education and (6) Codification. These last six chapters are quite good as a generic framework for implementation of an 18- to 36-month plan. In particular, the author’s sensitivity to the need to change measurements, for example, in the cost accounting arena, again championed in the theory of constraints, is quite appropriate.

In summary, *Manufacturing’s New Mandate* is a synthesis of generally accepted management theory applied to a current focus on TQ, JIT, and CIM. The MIM pyramid concept is neither new nor particularly rich in its discussion of the TQ, JIT, and CIM areas. Missing is Goldratt’s theory of constraints. However, the book should provide a good background for the new leader or CEO, particularly for someone who has risen to the top from a nonmanufacturing background.

E. C. “Ted” Weston, Jr.

Computer Information Systems Department,
Colorado State University, Fort Collins,
Colorado 80521

PIERCE, N., editor 1987, *Management Information Systems: The Technology Challenge*, Nichols Publishing Co., New York, 333 pp., \$39.50.

The basic premise of this book is that the new information technology will profoundly alter the structure of information

systems, the organizations they serve, and management practices. The book contains contributions by 13 British and American authors and consists of four sections that discuss (1) the social impact of the new information technology, (2) the applications of this technology in theory and (3) in practice, and (4) the strategic implications. Its unifying focus is the causes that underlie the gap between the potential of the new information technology and its actual application.

Land's contribution on the social aspects of information systems analyzes the problems that arise during information systems design and the difficulties experienced by the information system's beneficiaries. He argues that a design process that ignores social factors (that is, the traditional approach) forces users and designers into opposing camps and into behavior patterns that are counterproductive to information system success. Land develops an organizational framework for user participation that circumvents the inherent drawbacks of the traditional design process. The participative design approach is sometimes employed because of prevailing political conditions rather than out of choice. For example, government law in several Scandinavian countries requires trade union involvement in the decision to automate information systems and in systems analysis, design, and implementation.

Groves discusses the problems faced by British owned small companies that attempt to introduce microcomputer-based information systems. Because of their small size (50 percent have fewer than four employees), many companies lack

the financial resources and the technical knowledge of the hardware and software that are prerequisite to developing information systems. Therefore the implementation of the new information technology is directed by outside change agents, typically computer salespersons. Too often this results in an emphasis on hardware with little attention paid to transaction volume, system maintenance, and data integrity and security. The author draws parallels between the 1960s, when large companies introduced computer-based information systems, and the 1980s and the problems faced by small firms. What large firms learned then is of little value to the small business owner of today. Because the large companies developed information systems in-house, they could design them to fit their particular objectives and organizational structures. The small company of today implements commercial software that cannot be changed because no one in the firm has the necessary expertise. This implies that the small firm must adapt its organizational structure to the software.

The book's final section treats the concept of information as a competitive strategy. King argues that this strategy should be operationalized by planning and assessing information resources. Strategic planning for information resources maps business strategies into information resource requirements. Information resource assessment enables the firm to create and define new strategies that are based on data gathered as a result of the strategic information planning process. Using information as a competitive tool requires a match between the firm's

BOOK REVIEWS

business strategy and its information strategy.

The book's value lies in its broad and international focus on the impact that information technology has on organizations. I recommend the book as a complementary text of readings in an introductory MIS course at the graduate level.

Marius A. Janson

Department of Management Sciences and Information Systems, University of Missouri-St. Louis, St. Louis, Missouri 63121

KRUZE, R. and MEYER, K. D. 1987, *Statistics with Vague Data*, D. Reidel Publishing, Dordrecht, Holland, vii + 279 pp., \$59.00.

Way back in the late 1960s, I was present when L. Zadeh gave a seminar in the statistics department at Berkeley on fuzzy sets. The material presented was technical with little or no recognition as to its applicability, and I suspect that many in the audience considered the subject matter merely another academic exercise for mathematicians. Twenty years have since elapsed, and now I find myself asked to review a monograph on a related subject. Based on the title of the book, I anticipated reading about some serious examples of vague data that actually had appeared in scientific environments, plus statistical analysis of some of that real vague data. In other words, I wanted to see discussions of what kind of statistical methodology would not be appropriate for this type of data, and what would be appropriate. Unfortunately, this is not what this book delivers.

The authors state that their book "is intended to be a tutorial research

compendium" (p. vii), and it is mainly the doctoral thesis of the first author.

Stated prerequisites include "a standard knowledge of mathematical logic, measure theory, probability theory, and mathematical statistics," and the book is aimed at "students in applied mathematics, engineering sciences, and mathematical statistics" (p. 1).

There are 12 chapters in the book. Chapter 1 is a one-page introduction. Chapter 2 introduces the concepts of vague data, L-sets, and fuzzy sets. Chapter 3 considers classes of fuzzy sets on the real line, including the notion of a convex hull of a fuzzy set. Chapter 4 deals with algebraic operations on fuzzy sets, such as unions, intersections, complements, extremes; also Zadeh's extension principle. Chapter 5 shows how vague data can be represented in a digital computer and presents efficient algorithms for operating with such data. Chapter 6 discusses topological properties of vague data and their representations. Chapter 7 introduces the theory of random sets and fuzzy random variables. Chapter 8 (60 pages) is the longest chapter in the book and studies descriptive statistics for vague data, including expected value, variance, and empirical distribution function. Chapter 9 goes on to define distribution functions and iid sequences of fuzzy random variables and fuzzy random vectors. Chapter 10 is another lengthy chapter (50 pages), and proves a number of limit theorems, including the strong law of large numbers, consistency for estimators in the finite case, and the Glivenko-Cantelli theorem. Chapter 11 develops a theory of statistical inference for vague data,

including parametric point estimation, confidence intervals, and testing of hypotheses. Finally, Chapter 12 presents a software tool for the statistical analysis of vague data. A list of 220 references are given followed by a list of symbols used in the text (and there are a lot!), and a subject index.

This monograph is dense with mathematics, much of it in the theorem-proof mold. It did nothing to convince me that the last 20 years has seen great strides in the application of fuzzy sets and vague data. I'm sure there must be some people who use this stuff, but information as to who they are and what they use it for will not be obtained from this book. Although some examples are touched upon in this book, almost in passing, it still appears as if my 20-year-old feelings on the subject were correct (assuming that this book is representative of the field). The title of the book is somewhat misleading and should emphasize that the contents are completely theoretical.

Alan Julian Izenman

Department of Statistics, Temple University,
Philadelphia, Pennsylvania 19122

MAHAJAN, VIJAY and WIND,
YORAM, editors 1986, *Innovation Diffusion
Models of New Product Acceptance*, Ballinger
Publishing, Cambridge, Massachusetts,
336 pp., \$34.95.

In their opening words in the preface, the editors describe this book as the result of a conference on advances in innovation diffusion models held in October 1983 at Harvard. Since the conference was cosponsored by the Marketing Science Institute, the Edwin L. Cox School

of Business at Southern Methodist University, and the Wharton School at the University of Pennsylvania, the book enjoys an impressive pedigree. It is published as Volume 5 of the Ballinger Series on econometrics and management sciences.

The purpose of the conference was to bring together diffusion model-builders and industry users to evaluate and reflect upon the current state of the art in the field. The book, therefore, essentially consists of a sequence of review articles on various aspects of the field by a number of very distinguished contributors (including its editors). Because it is based upon a set of conference presentations, the book is difficult to review in detail. One could question some points in most of the contributions. However, such questioning is more the responsibility of a referee than a reviewer, and detailed comments on each article would generate a review of unreasonable length.

The book is divided into five parts. Part 1 consists of an overview chapter on the topic by the editors, followed by a commentary by Frank Bass. The chapter begins with Bass's basic diffusion model and then critically examines subsequent developments and defines a set of key problems and opportunities for future work. Bass comments in a teasingly short chapter, mentioning a number of Fortune 500 companies among the dozens of real-world applications of his model that have not been publicized. It would have been helpful if he had been less modest and provided more details on these applications and the model-building and the implementation lessons that could be

BOOK REVIEWS

learned from them.

Part 2 concerns the behavioral foundations of diffusion models. Chapter 3 (Gatignon and Robertson) concentrates on the lack of integration between the more general, mainly qualitative consumer diffusion "theories" and mathematical diffusion "models." The authors condemn this lack of integration and suggest some directions for further work to remedy the situation. Chapter 4 (Bayus, Carroll, and Rao) discusses (with two real-world applications) the power of word-of-mouth communications in new product diffusion. They conclude with recommendations for further research and specify a variant on the Bass model that incorporates word-of-mouth influences. Part 3 reviews three classes of diffusion models. Chapter 5 (Kalish and Sen) concentrates on modeling the marketing mix for a single new product launch. In contrast, Chapter 6 (Dolan, Jueland, and Muller) examines dynamic competitive models while Chapter 7 (Eliashberg and Chatterjee) focuses on stochastic aspects of the modeling process.

Parts 4 and 5 each contain one chapter. Chapter 8 (Mahajan, Mason, and Srinivasan) could be viewed as the most important one in the book, since it deals with the issue of parameter estimation. It evaluates four alternative approaches (ordinary least squares, maximum likelihood, nonlinear least squares, and algebraic) to estimating the critical parameters in diffusion models. The authors conclude that each method has its advantages and disadvantages, but that nonlinear least squares appears to be the best general estimation approach. I found the

final chapter, Chapter 9 (Kalish and Lilien), on applications to be the most interesting in the book, since its authors sought to review the utility of diffusion models within the broader context of the new product development process and the problems of usefully applying them in practice. Moreover, their conceptual approach really applies to the role of all mathematical modeling in the management sciences. They discuss five illustrative applications and suggest the desired features of any practically useful model.

My preference for that final chapter reflects one sin of omission committed by the editors of the book. To be effective, diffusion models should be developed within the overall context of the innovation process. Studies on this process emphasize that the major determinants of new product success or failure are user and adopter oriented. Although this issue was touched upon, it could have received more attention. I think that a final chapter that suggested lines of research to link diffusion models with the characteristics of user or adopter organizations could have been useful. Such a discussion would certainly be relevant to our current pressing need to encourage the adoption of new technology as a competitive weapon.

Despite this reservation, this book certainly fulfills its primary objective, that is, to review the state of the art in new product diffusion modeling. I recommend it as a very useful source book for marketing and management scientists (in either academia or business) who are working in this field. For neophytes about to enter the field, it should provide a useful

introduction to the literature and the problems they will face. It should also appear on the reading-list for students taking more advanced marketing science courses. The book is of less interest to marketing managers (who would find its mathematical content too heavy going) and management scientists working outside the field.

Michael J. C. Martin

School of Business Administration, Dalhousie University, Halifax, Canada B3H 1Z5

OLIFF, MICHAEL D., editor 1988, *Expert Systems and Intelligent Manufacturing*, North-Holland, New York, 479 pp., \$80.00.

This book contains the conference proceedings of the Second International Conference on Expert Systems and the Leading Edge in Production Planning and Control held in 1988 and chaired by the book's editor. The book consists of 30 papers that are between 7 and 27 pages long, averaging about 16 pages. The book needs a subtitle to inform prospective buyers that it indeed is the proceedings of a conference.

By nature, this book has the advantages and shortcomings of any conference proceedings. It offers a glimpse of current research projects in the applications of AI and expert systems in production management. For a reader interested in research topics in this area, this book offers excellent ideas. By the same token, the papers are incomplete and, in some cases, hastily written. The reported applications are in prototype stage. Papers discussing general principles of AI applications in production management are at the developmental stage. A reader

who searches for completed work and polished papers will be disappointed. As with most proceedings, once the authors have completed their work and published their results in full, the book will quickly become outdated.

The organization of the book would tax any reader. It is not divided into sections and has neither an introduction outlining the content of the papers nor a subject index to give a clue of the topics covered. The sequence of papers follows no clear logic. Thus, the reader has to read all the papers to organize the book into some topical groups. Since I have gone through this process, it may be helpful if I share my ad hoc grouping. Since the papers are not numbered in the book, one should first number them sequentially from 1 to 30.

(1) The general principles of AI applications in production management are covered in papers 3, 13, 22, 23, 27, 29. These papers do not address any particular application, rather they discuss ideas (such as planning islands in 3, system life cycles for knowledge management in 13, visions of the future in 22 and 23, knowledge acquisition issues in 27, and problems with AI tools in 29).

(2) The second set of papers describe applications of AI and expert systems to various aspects of production management:

- Scheduling: papers 1, 4, 5, 6;
- Process planning and development: papers 7, 9, 30;
- Trouble shooting: paper 8;
- Material manufacturing: papers 10, 11;
- Logistics: paper 12;
- Flexible manufacturing: papers 14, 15,

BOOK REVIEWS

- 16;
- Integrated manufacturing systems: papers 17, 18;
- Design: papers 19, 25; and
- Planning: papers 24, 28.

Almost all reported applications are at the design and prototype stage, and the papers on them vary greatly in details and in style. In many cases, they give very little information on the impact of the implementation of a prototype and emphasize the programming and software commands used in prototyping. This shows that these projects are indeed at an early stage of development.

(3) The third set of papers are related neither to expert systems nor to intelligent systems in manufacturing: papers 2, 20, 21, and 26. Paper 2 discusses information systems in manufacturing. Paper 20 describes an optimization model for aggregate production planning. Paper 21 discusses a new heuristic approach for lot-sizing problems. Paper 26 discusses complexity reduction in manufacturing. While they may be interesting in their own rights, these papers have no relevance to the topic of the book, unless we assume that the book's editor categorizes MIS, MS/OR modeling, and manufacturing philosophy under expert systems and intelligent systems. I have great difficulty with such a categorization.

Although the book has an editor, he seems to have paid little attention to copy editing. Here are examples that could have benefited from some editing: "Generally, the software implementing the control algorithms and heuristics is too rigid versus the evolution needs (p. 250)." "Something important to note is that at

the routing level, no one physical resource is assigned or reserved. This is to keep the maximum degree of freedom to delay the real load application as late as possible. This feature is very important in real time decision making to take into account the unavoidable perturbation in workshop environment (p. 259)."

It seems that the authors were responsible for editing and typesetting their papers. The unavoidable results are unedited text, numerous spelling errors, missing figures, poor page layout (for example, section heads on the last line of the page), and figures and print of varying quality. One may forgive such defects in low-priced, paperback proceedings published in house. But such low publication quality is unacceptable in a book that does not carry the title of proceedings, is published in cloth by North-Holland, and has a price tag of \$80.00.

Fatemeh Zahedi

Management Sciences Department, University of Massachusetts/Boston, Boston, Massachusetts 02125

TAYLOR, STEPHEN 1986, *Modelling Financial Time Series*, John Wiley and Sons, New York, 268 + xvi pp., \$47.95.

According to the preface, the purpose of this book is to describe, statistically, the behavior of financial asset prices. Taylor claims his is the first such undertaking since the publication in 1970 of the work of Granger and Morgenstern, and of Labys and Granger. The book consists of 10 chapters and an appendix containing a computer program. About half of Chapter 1 is an introduction to the book, and the other half describes elementary facts

about stochastic processes. The author chooses for his study 15 stock prices plus the *Financial Times* 30-share index, seven commodity spot prices and one spot exchange rate, five futures' commodity prices, three futures' exchange rates, and a futures' treasury bond price. He discusses the characteristics of these series in Chapter 2. Most series end in 1981, and no series extend beyond July 1983. The main point of Chapter 3 is that, while the unconditional variances of financial returns may be constant, the conditional variances (given information up to the point $t-1$) are not. Therefore, the study of these returns requires nonlinear models. The author also makes clear his dislike for the ARCH model proposed by Robert Engle. Thus, there is a need to estimate the variance. Chapter 4 discusses several ways of estimating the changing conditional variance of financial series. Chapter 5 is devoted to an examination of the accuracy of autocorrelation estimates.

The heart of the book is Chapters 6 and 8. In Chapter 6, Taylor tests the random walk hypothesis for the series in his sample. He reports the results of 11 different tests. In the case of stock prices (including the index), depending on the test, the random walk hypothesis is rejected for all, some, or none of the series at the five percent level of significance. The author argues that the first autocorrelation test that rejects the hypothesis in all cases is the most appropriate. According to a simulation, the power of this test (the probability to reject the wrong hypothesis) is low — about $\frac{1}{3}$. Therefore, given the author's argument that this is the appropriate test, there seems to be

some evidence against the random walk hypothesis. However, it seems to me that the author did not provide convincing evidence as to why this is the right test. In the case of 15 commodity and currency spot prices, the most powerful tests reject the random walk hypothesis. Here, the author is on firmer ground.

If the returns show autocorrelation, it may be possible to model price trends and improve on the forecasts made on the basis of random walk hypothesis. Chapter 7 is devoted to this purpose; in this chapter, both linear and nonlinear models are explained. Chapter 8 (the second important chapter in the book) offers evidence that trading rules can be devised for futures' markets that can beat buy-and-hold strategies. The author reports net excess returns of up to 27 percent over a buy-and-hold strategy in a simulated series of transactions for different years prior to 1982. This is taken as an evidence for the inefficiency of futures' markets. Of course, the reader can wonder (along with this reviewer) why, if indeed the author knew of such a strategy, he published it in a book?

Chapter 9 describes formulas for valuing options, and Chapter 10 contains the concluding remarks.

The book as a whole is useful, although the author has cannibalized his published papers. Moreover, the contents of these papers have dictated the combination and arrangement of the book's chapters, making it quite choppy. I have two further problems with the book.

First, the title is a misnomer. It is not a book on how to model financial returns. Many aspects of financial modeling are

BOOK REVIEWS

left out of the discussion. Nor is it on the time series methods applicable to financial data. As I pointed out above, the author argues three points: (1) financial returns have varying conditional variance and, therefore, nonlinear models are appropriate; (2) financial returns do not follow a random walk; and (3) futures' markets are inefficient.

Second, the book is not well written. The author has not decided for whom he is writing the book. In Chapter 1, he defines elementary concepts such as Gaussian or white noise. In the same and later chapters, he assumes the reader knows spectral analysis. In Chapter 3, the mathematical appendix makes clear what the cryptic text of the chapter has supposedly described. Formulas are thrown in without proof, or even motivation. A lot of material is crammed into each chapter, and one must take extensive notes to keep track of the cast of characters.

If the author had started from scratch and better organized his material, he might have written a nice supplementary text for advanced finance courses.

References

- Engle, R. F. 1982, "Autoregressive conditional heteroskedasticity with estimates of the variance of United Kingdom inflation," *Econometrica*, Vol. 50, No. 4, pp. 987-1007.
- Granger, C. W. J. and Morgenstern, O. 1970, *Predictability of Stock Market Prices*, Heath, Lexington, Massachusetts.
- Labys, W. C. and Granger, C. W. J. 1970, *Speculation, Hedging and Commodity Price Forecasts*, Heath, Lexington, Massachusetts.
- Kamran M. Dadkhah
Department of Economics, Northeastern University, Boston, Massachusetts 02115

*This book review was processed by the previous book review editor, Marion Sobel

GRIBIK, PAUL R. and KORTANEK, KENNETH O. 1985, *Extremal Methods of Operations Research*, Marcel Dekker, Inc., New York, 328 pp. \$37.50.

This is an interesting book on linear optimization models which approaches the subject in an unusual way. It proceeds from the specific to the general in contrast to most other books which proceed the opposite way. The book has only three chapters: the Distribution-Transportation Problem, Introduction to Network Models, and Linear Programming, in that order.

In Chapter 1, the authors introduce the notations of "tour" and "list" which provide an intuitive basis for explaining the concepts of linear networks (Chapter 2) and arbitrary linear programs (Chapter 3).

Chapter 2 introduces graph terminology and then extends the concepts of tours and lists to general networks, which include the transshipment problem.

All these concepts are further generalized in Chapter 3 to linear programs in standard form. The simplex method is developed within this framework as are the concepts of sensitivity and duality.

These chapters also give an added insight which reinforces the algebra associated with the simplex method, duality, and sensitivity analysis.

The book's lucid explanation of all these topics seems to benefit from working from the specific (transportation model) through increasingly more complex models to arbitrary linear programs.

A strong feature of the book is an ample set of problems with full solutions. This should make it useful for self study.

I think the book would be most useful for upper division undergraduate or beginning graduate students in engineering, mathematics, or computer science as an introduction to linear optimization models with an algorithmic flavor.

I personally found the title "Extremal Methods of Operations Research" a little misleading since the term *extremal* conjures up images in my mind of geodesics in the calculus of variations. However, the book is restricted to basic linear optimization to the total neglect of the more complicated structure of nonlinear or dynamic structure. In summary, the book provides a novel approach to some basic areas of optimization, and it is easy to read and digest.

Soheila Jorjani

Management Sciences Department, University of Massachusetts/Boston, Harbor Campus, Boston, Massachusetts 02125

*This book review was processed by previous book editor, Marion Sobol

JÜNGER, MICHAEL 1985, *Polyhedral Combinatorics and the Acyclic Subdigraph Problem*, Heldermann Verlag Berlin, Berlin, Federal Republic of Germany, 128 pp., \$36.00.

This book, which is essentially the author's thesis, is a concise survey of the field of polyhedral combinatorics, with emphasis on recent advances in finding classes of facet-inducing cuts for NP-hard problems. The methods surveyed are then applied to the acyclic subdigraph problem.

The survey is in two parts. The first covers the relevant mathematical background, giving the necessary facts in linear algebra, linear programming theory,

graph theory, matroids and independence systems, and computational complexity. The material is presented with minimal or no proofs and at a good pace for someone who needs only a reminder of the concepts. However, this is no textbook. Someone who is just learning these areas would best look elsewhere, for example, Nemhauser and Wolsey's new book *Integer and Combinatorial Optimization*.

The second part of the survey covers integer programming and polyhedral combinatorics. Here Jünger covers cutting planes in general, facet-inducing cuts, the equivalence between separation and optimization, total unimodularity, and total dual integrality. Somewhat more proofs are given here, though the treatment still falls short of textbook level. One interesting result is that to prove that $a'x \leq \alpha$ is facet-inducing, it suffices to show that if the face F induced by $a'x \leq \alpha$ is contained in another face $\bar{F}$ defined by $b'x \leq \beta$, then a and b essentially differ only by a scalar multiple. This is geometrically clear, but the author uses it to good effect later on, and it is a refreshing change from the usual style of a facet-inducing proof.

The book then turns to the specific acyclic subdigraph problem (ASP): Given a digraph $D = (V, A)$, $B \subseteq A$ is acyclic (a feedback arc set) if B contains no directed cycles (hits every directed cycle). Then if $c \in R^A$ is a set of arc costs, ASP is the problem of finding a highest-cost acyclic arc set (Feedback Arc Set Problem [FASP] wants a lowest-cost feedback arc set). Clearly B solves ASP if and only if $A \setminus B$ solves FASP. FASP is one of the original NP-complete problems appearing in Karp's seminal paper. The book reviews

BOOK REVIEWS

five practical problems that are closely related to ASP, chiefly the linear ordering problem (LOP): Maximize over all permutations σ the sum $\sum \sigma_{(i)} < \sigma_{(j)} c_{ij}$ for a given cost matrix C . Variants of LOP are useful in analyzing economic input-output tables, certain scheduling problems, and some ranking problems.

Thus motivated to solve ASP, the book then develops classes of facet-inducing cuts for its polyhedral description. The most important class is called Möbius ladders, which are induced by a ring of an odd number of directed cycles where adjacent pairs intersect in directed paths; the oddness means that the ring must be twisted like a Möbius strip. Unfortunately, the formal definition is quite complicated, as it entails knowing the feedback arc number of the ladder, which is the problem we are trying to solve anyway. Thus no polynomial algorithm is given to identify Möbius ladders, and no heuristic is given either. This is disappointing since the cuts evidently have been used in some computational studies with Grötschel and Reinelt. It would have made the book much more valuable to have included such details. Specializations of Möbius ladders called wheels and webs and another class of facet-inducing cuts called fences are also covered.

Some special cases of ASP that are easy to solve are considered. In particular, the connections between directed cycles and directed cuts through planar duality are mentioned. This leads to the well-known result from Lucchesi and Younger that ASP can be solved for planar digraphs. Some further results are reported in identifying the class of weakly acyclic digraphs,

those whose ASP polytope can be described in a particularly simple way, and a class that includes planar digraphs.

The book is written in quite good English considering that it comes from a German source, although the spelling is poor. It is regrettable that a book whose text was evidently computer-generated was not run through a spelling checker at some point.

In sum, this is quite a pleasant book that is useful for a limited audience. It makes a nice case study of how one might go about thinking of and proving facet-inducing cuts for an NP-hard problem. However, it lacks any nontrivial separation algorithm for any class of cuts (as can be seen in the traveling salesman book edited by Lawler, et al.), and it has no details on how cuts can be incorporated into a practical algorithm.

References:

- Lawler, E. L. et al. 1985, *The Traveling Salesman Problem: A Guided Tour of Combinatorial Optimization*, John Wiley and Sons, New York.
 - Lucchesi, C. L. and Younger, D. H. 1978, "A minimax relation for directed graphs," *Journal of the London Mathematical Society*, Vol. 2, No. 17, pp. 369-374.
 - Nemhauser, George L. and Wolsey, Laurence A. 1988, *Integer and Combinatorial Optimization*, John Wiley and Sons, New York.
 - Younger, M. G. M. and Reinelt, G. 1983, "A cutting plane algorithm for the linear ordering problem," preprint No. 8, Mathematisches Institut, Universität Augsburg, to appear in *Operations Research*.
 - Younger, M. G. M. and Reinelt, G. 1983, "Optimal triangulation of large real world input-output matrices," preprint No. 9, Mathematisches Institut, Universität Augsburg.
- S. Thomas McCormick
IE/OR Department, Columbia University,
New York, NY 10027 USA

*This book review was processed by previous book editor,
Marion Sobel

ADAIR, JAMES 1988, *Computer Organization and Architecture with Business Applications*, Scott, Foresman and Company, Glenview, Illinois, 381 pp., \$23.96.

This book is designed as an introduction to computer organization and architecture for use in training business applications programmers. In the author's words "... it becomes increasingly important for Computer Information Systems professionals to have a thorough understanding of how computers work and why they work as they do. It is essential to have a clear explanation of what is going on behind the screen."

To achieve this aim, the author attempts to survey the field and provide the reader with the basic concepts upon which to build an understanding. While the book is well organized and the presentation of most material is logical and clear, the results are spotty.

The first seven chapters, which deal with basic hardware, operating systems, communications, and networks, are well written and quite understandable. They are at the level of the novice, the beginning student, and do not go deeper than surface considerations. As such, they certainly do not provide the thorough understanding that the author deems necessary. They do, however, form a good foundation for further study. As an example these chapters would provide a good beginning for a study of operating systems that relied on a text like *Operating Systems, A Systematic View* by William S. Davis [1983].

The last four chapters, which are devoted to software, future directions, and the selection of hardware, are particularly

weak. They are a quick run-through of key words. The material does not fit the stated aim of the text and adds little. The pages devoted to these chapters could have been more appropriately used for expanding the first seven chapters.

In fairness to the author, any book of this sort can easily be criticized as to its breadth and depth. Getting any agreement on what would satisfy everyone is certainly difficult, if not impossible. For readers who desire a survey with breadth and minimal depth, the book is quite useable. The first seven chapters offer this and do provide the basis for deeper analysis.

Reference

Davis, William S. 1983, *Operating Systems, A Systematic View*, second edition, Addison Wesley, New York

Leonard J. Garrett

Department of Computer and Information Sciences, Temple University, Philadelphia, Pennsylvania 19122

*This book review was processed by previous book review editor, Marion Sobol

COHEN, S. S. 1985, *Operational Research*, Edward Arnold, 3 East Read Street, Baltimore, Maryland 21202, 245 pp., \$16.95.

Cohen has tried to write a book that will introduce the nonmathematical reader to the operations research field. He argues that "there is, however, a lack of (operations research) textbooks which are suitable for nonmathematicians in this area and so, as a lecturer experienced in and sympathetic with the needs of such students, I have attempted to provide one." I agree that there is a need for such books; however, in my opinion, this effort falls short on many levels.

Many factors must be considered in

BOOK REVIEWS

selecting a textbook for an operations research course. Some important characteristics include readability, breadth and depth of coverage, software availability, substantive errors in the material, and providing the student with indications of future developments in the field.

For the most part, this book is well written and does achieve its objective of providing a nonmathematical introduction to operations research. As an example, when introducing the concept of a linear relationship, Cohen states that "Points on a graph are specified by quoting their *coordinates*. These are distances along the x and y axes and are written as a pair of numbers inside brackets, separated by a comma. For example, the point (3,5) is 3 units along the x axis and 5 units along the y axis. A curve is a set of points whose x and y coordinates bear some mathematical relationship to each other."

After a brief introductory chapter, the book is divided into two parts: deterministic models and stochastic models. Part 1 consists of four chapters. Chapter 2 covers linear and integer programming as well as the simplex method. Chapter 3 presents the standard transportation problem, while also discussing unbalanced and degenerate problems. Chapter 4 addresses the minimal spanning tree, traveling salesman, and shortest route problems. Chapter 5 combines project management (PERT/CPM) with job sequencing and the assignment problem. (In my opinion, combining this material is awkward.)

Part 2 consists of eight chapters, the first three of which are essentially a review of basic probability and statistical

topics. The material includes probability, expectation, simulation, compound trials, and the binomial, Poisson, and normal distributions. (These chapters could either be eliminated or easily condensed. For example, the Poisson discussion could be included in the chapter on queuing [Chapter 10].) Chapter 9 covers inventory decisions when demand is deterministic or stochastic, while Chapter 10 addresses queuing theory. Chapter 11 consists of replacement, maintenance, and reliability, and Chapter 12 presents different forecasting methods. The last chapter of the book discusses the impact of computers on operations research.

Cohen has chosen to provide a listing of one computer program at the end of each chapter; however, the programs are quite limited in their ability. For example, the linear programming code can only solve maximization problems having two variables and two "less than or equal to" constraints. Since many operations research textbooks provide a diskette with numerous and more general programs, this software has limited value.

I found only a few minor errors in the book. For example, when discussing the solution approach for integer linear programming problems, Cohen states that "the general theorem that optimal values of the objective function occur at vertices of the feasible region still holds."

Cohen has written a book that should probably be considered for use only in an introductory undergraduate operations research course. The reason is that, in general, he addresses only the *hows* of operations research and not necessarily the *whys*. He has placed little emphasis

on using operations research to help improve the decision-making process. For example, in the linear programming chapter, sensitivity analysis is discussed only briefly in the chapter summary; however, the simplex method is presented. Decision theory is relegated to a four-page discussion of expected value, while the concept of risk analysis is ignored. In the coverage of project management, only one paragraph is devoted to crashing activity times. A branch-and-bound optimization algorithm is presented for the traveling salesman problem; however, heuristics are never discussed. More recent developments, including the analytic hierarchy process and expert systems, have not been presented.

In summary, this book could be used for an introductory undergraduate operations research course if the objective was to teach how the operations research models work, although, Hesse and Woolsey [1980] serves much the same purpose and is more enjoyable to read. If the managerial implications associated with modeling are important, then possibly a book like Anderson, Sweeney, and Williams [1988] should be considered.

References

- Anderson, David R.; Sweeney, Dennis J.; and Williams, Thomas S. 1988, *An Introduction to Management Science*, fifth edition, West Publishing Company, St. Paul, Minnesota.
- Hesse, Rick and Woolsey, Gene 1980, *Applied Management Science*, Science Research Associates, Chicago, Illinois.

Robert L. Nydick, Jr.
College of Commerce and Finance, Department
of Management, Villanova University,
Villanova, Pennsylvania 19085

WRIGHT, GEORGE and AYTON, PETER, editors, 1987, *Judgmental Forecasting*, John Wiley and Sons, New York, 293 pp., \$59.95.

Judgmental Forecasting, edited by George Wright and Peter Ayton, is a timely, in-depth analysis of how judgmental forecasts can be improved and implemented.

The editors have brought together over 20 contributing authors from around the world. An important strength of the book is that 14 chapters reflect breadth of coverage, including the psychology of individual judgment, judgment from groups of individuals, modeling techniques, scenarios, and implementation of forecasts. A couple of chapters, however, appear to be only tangentially relevant to forecasting. With further development, these chapters could have made a more positive contribution to the text. For example, in Chapter 10, the author concludes, "There is no reason why [methods derived from social judgment theory] should not be similarly useful for problems of judgmental forecasting" (p. 213), but he does not demonstrate in any detail how this might be so. In Chapter 11, the author should have expanded on the point that "decisions can be made on the basis of objective analysis (of past data) coupled with judgment (regarding future trends)" (p. 226). Nevertheless, the depth of coverage of *Judgmental Forecasting* makes it an excellent introduction to the field for both researchers and practitioners. The editors clearly set out to produce a state-of-the-art text. They have achieved that objective. Each chapter provides a detailed literature review as well as tutorial-type material on a specific topic. For

BOOK REVIEWS

example, the chapter "Delphi Inquiry Systems" by Frederick J. Parente and Janet K. Anderson Parente is an extremely thorough analysis of the Delphi method, covering historical development, variations of Delphi, a research review, implementation, and future developments and applications.

Most chapters are highly readable, easy to understand, and use a nontechnical approach. These characteristics, along with the book's breadth and depth of coverage, make *Judgmental Forecasting* of interest to a wide interdisciplinary audience of practitioners and researchers. Some knowledge of probability theory and regression is required. This book would be a good supplementary text in graduate courses in forecasting and decision theory. It is also a valuable addition to the forecasting manager's bookshelf.

Wright and Ayton have insured that their book contains contrasting points of view. For example, with reference to the performance of human judgment, Jonathan St. B. T. Evans focuses on the problems of biases that may arise from the way forecasts are generated. On the other hand, Lee Roy Beach, Jay Christensen-Szalanski, and Valerie Barnes contend that "major issues concerning the quality of human judgment are far from settled, and ... many of the most widely accepted negative conclusions are, in fact, not supported by convincing data" (p. 50).

There is an emphasis in the book on the limitations of empirical work on judgment. Most work involved laboratory experiments using student subjects. The validity of this work is questioned in

several chapters. George A. Geistauts and Ted G. Eschenbach focus, in particular, on validity, as they consider the implementation of judgmental forecasts. Their chapter has a particular practical value, with checklists for developing a forecasting strategy. Andy Lock, in "Integrating Group Judgments in Subjective Forecasts," also emphasizes the social and operational contexts of forecasts and decisions. This theme is continued by Charles Vlek and Wilma Otten in Chapter 14.

The text contains much illustrative material which enhances its suitability for a class text or manager's reference guide. From the researcher's viewpoint, it includes descriptions of several empirical studies. Examples are the use of role playing to forecast the outcome of conflict situations (J. Scott Armstrong); a case study of forecasting at the UK Central Electricity Generating Board (Derek Bunn); and an evaluation of energy scenarios in the Netherlands (Vlek and Otten). In addition, all of the contributing authors provide suggestions for future research needs. Wright and Ayton have produced a book that is a significant contribution to the forecasting literature.

Essam Mahmoud

College of Business Administration, University of North Texas, PO Box 13677, Denton, Texas 76203

*This book review was processed by previous book review editor, Marion Sobol.

Books Received for Review

Ahituv, Niv and Berman, Oded 1988, *Operations Management of Distributed Service Networks: A Practical Quantitative Approach*, Plenum, New York, 293 pp., \$59.50.

Beckmann, Martin J. 1988, *Tinbergen Lectures on Or-*

- ganization Theory, Springer-Verlag, New York, 252 pp., \$29.50.
- Bober, Stanley 1988, *Modern Macroeconomics: A Post-Keynesian Perspective*, Croom Helm, New York, 271 pp., \$59.90.
- Burst, Ardis and Schlesinger, Leonard A. 1988, *The Management Game*, Penguin Books, New York, 274 pp., \$8.95.
- Cafferata, Patricia and Tybout, Alice 1989, *Cognitive and Affective Responses to Advertising*, Lexington Books, Lexington, Massachusetts, 401 pp., \$59.00.
- Carrie, Allan 1988, *Simulation of Manufacturing Systems*, John Wiley and Sons, New York, 418 pp., \$69.95.
- DeKeyser, Véronique; Qvale, Thoralf; Wilpert, Bernhard; and Quintanilla, S. Antonio Ruiz 1988, *The Meaning of Work and Technological Options*, John Wiley and Sons, New York, 228 pp., \$69.95.
- Derigs, Ulrich 1988, *Lecture Notes in Economics and Mathematical Systems: Programming in Networks and Graphs*, Springer-Verlag, New York, 298 pp., \$35.80.
- Dogramaci, Ali and Färe, Rolf 1988, *Applications of Modern Production Theory*, Kluwer Academic, Norwell, Massachusetts, 268 pp., \$59.95.
- Driessen, Theo 1988, *Cooperative Games, Solutions, and Applications*, Kluwer Academic, Norwell, Massachusetts, 217 pp., \$74.00.
- Fallik, Fred 1988, *Managing Organizational Change*, Taylor and Francis, New York, 155 pp., \$31.00.
- Frasca, Winger 1989, *Personal Finance*, Merrill, Columbus, Ohio, 669 pp., \$38.95.
- Gaul, Wolfgang and Schader, Martin 1988, *Data, Expert Knowledge and Decisions*, Springer-Verlag, New York, 380 pp., \$59.40.
- Gratus, Jack 1988, *Successful Interviewing*, Penguin Books, New York, 92 pp., \$5.95.
- Grove, Andrew S. 1988, *One-on-One With Andy Grove*, Penguin Books, New York, 235 pp., \$7.95.
- Grupe, Fritz H. 1989, *Microcomputer Applications*, William C. Brown, Dubuque, Iowa, 382 pp., \$30.60.
- Guaspari, John 1988, *The Customer Connection: Quality for the Rest of Us*, AMACOM Books, New York, 225 pp., \$18.95.
- Hagedoorn, J.; Kalff, P.; and Korpel, J. 1988, *Technological Development as an Evolutionary Process*, Elsevier, New York, 220 pp., \$94.75.
- Hayen, John C. 1988, *Emergency Management Concepts for Industry and Business*, Todd Publications, West Nyack, New York, 150 pp., \$95.00.
- Johnson, D. and King, M. 1988, *Basic Forecasting Techniques*, Butterworths, Stoneham, Massachusetts, 140 pp., \$16.95.
- Katz, Donald R. 1988, *The Big Store*, Penguin Books, New York, 597 pp., \$9.95.
- Kurzhanski, A.; Neumann, K.; and Pallaschke, D. 1988, *Lecture Notes in Economics and Mathematical Systems: Optimization, Parallel Processing and Applications*, Springer-Verlag, New York, 289 pp., \$35.80.
- Kusiak, A. 1987, *Artificial Intelligence: Implications for CIM*, Springer-Verlag, New York, 527 pp., \$89.00.
- Lapin, Lawrence 1988, *Quantitative Methods For Business Decisions With Cases*, Harcourt Brace Jovanovich, San Diego, California, 837 pp., \$30.00.
- Lewis, P. A. W. and Orav, E. J. 1988, *Simulation Methodology for Statisticians, Engineers, and Operations Analysts*, Wadsworth and Brooks/Cole, Laguna Hills, California, 416 pp., \$49.95.
- Luck, Mike and Walsham, Geoff 1987, *Operational Research Applications in Development Management*, Commonwealth Secretariat, London, England, 99 pp., £3.00.
- Mendez, R. H. and Orszag, S. A. 1988, *Lecture Notes in Engineering: Japanese Supercomputing*, Springer-Verlag, New York, 161 pp., \$27.40.
- Mennes, L. B. M. and Kol, Jacob 1988, *European Trade Policies and Developing Countries*, 368 pp., \$65.00.
- Morgan, Gareth 1988, *Riding the Waves of Change*, Jossey-Bass Inc., San Francisco, California, 208 pp., \$19.95.
- Myers, Martha A. and Talarico, Susette M. 1988, *The Social Contexts of Criminal Sentencing*, Springer-Verlag, New York, 225 pp., \$74.00.
- Nemhauser, George L. and Wolsey, Laurence A. 1988, *Integer and Combinatorial Optimization*, John Wiley and Sons, New York, 720 pp., \$79.95.
- Papalambros, Panos Y. and Wilde, Douglass J. 1988, *Principles of Optimal Design*, Cambridge University Press, New York, 399 pp., \$49.50.
- Pearl, Judea 1988, *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*, Morgan Kaufmann, San Mateo, California, 552 pp., \$39.95.
- Pervozvanskii, A. A. and Gaitsgori, V. G. 1988, *Theory of Suboptimal Decisions*, Kluwer Academic, Norwell, Massachusetts, 384 pp., \$99.00.
- Pierce, John G. and Conolly, Brian 1988, *Information Mechanics*, John Wiley and Sons, New York, 170 pp., \$44.95.
- Quinn, Robert E. 1988, *Beyond Rational Management*, Jossey-Bass, San Francisco, California, 199 pp., \$21.95.

BOOK REVIEWS

- Radford, K. J. 1988, *Strategic and Tactical Decisions*, Springer-Verlag, New York, 174 pp., \$42.00.
- Ratschek, H. and Rokne, J. 1988, *New Computer Methods for Global Optimization*, John Wiley and Sons, New York, 227 pp., \$49.95.
- Rastogi, P. N. 1987, *Intelligent Management Systems*, East-West Press, New Delhi, India, 244 pp., \$40.00.
- Salter, Liora 1988, *Mandated Science*, Kluwer Academic, Norwell, Massachusetts, 221 pp., \$64.00.
- Schellhaas, H.; Beek, P.; Isermann, H.; Schmidt, R.; and Zijlstra, M. 1988, *Operations Research Proceedings 1987 DGOR/NSOR* (half the book is in German), Springer-Verlag, New York, 651 pp., \$89.70.
- Schmidt, Peter and Witte, Ann Dryden 1987, *Predicting Recidivism Using Survival Models*, Springer-Verlag, New York, 174 pp., \$39.00.
- Shingo, Shigeo 1988, *Non-Stock Production: The Shingo System for Continuous Improvement*, Productivity Press, Cambridge, Massachusetts, 454 pp., \$75.00.
- Seo, Fumiko and Sakawa, Masatoshi 1987, *Multiple Criteria Decision Analysis in Regional Planning*, Kluwer Academic, Norwell, Massachusetts, 538 pp., \$59.00.
- Tietz, R.; Albers, W.; and Selten, R. 1988, *Lecture Notes in Economics and Mathematical Systems: Bounded Rational Behavior in Experimental Games and Markets*, Springer-Verlag, New York, 368 pp., \$38.90.
- Turban, E. and Watkins, P. R. 1988, *Applied Expert Systems*, Elsevier, New York, 270 pp., \$100.00.
- Walthall, Wylie A. and Wirth, Michael J. 1988, *Getting Into Business*, Harper and Row, New York, 434 pp., \$21.50.
- Young, Lawrence F. 1988, *Decision Support and Idea Processing Systems*, William C. Brown, Dubuque, Iowa, 406 pp., \$40.60.