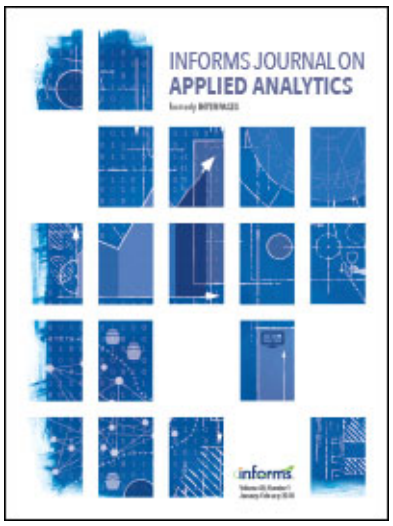


Interfaces

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

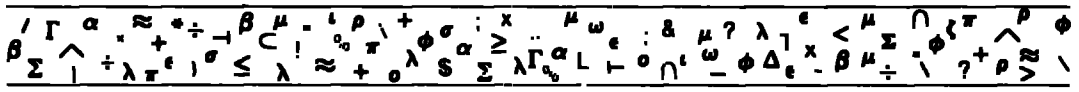
Book Reviews

To cite this article:
(1983) Book Reviews. Interfaces 13(3):93-100. https://doi.org/10.1287/inte.13.3.93

Book Reviews

MARION SOBOL

Edwin L. Cox School of Business
Southern Methodist University
Dallas, Texas 75275



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. 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.

DAYAL, RAM, *An Integrated System of World Models,* North Holland Publishing Company, New York, 1981, $42.50

World modeling has been a growth industry in recent years. Many readers will be familiar with such models as World Dynamics [Forrester 1973] and the Mesarovic-Pestel [1974] model. Such models tend to become highly aggregated and their results are usually controversial. The controversy stems from dissatisfaction with both the assumptions and the simplifications made by the modelers and it has spurred successive attempts at creating new world models that are improvements.

The present volume is another in this series of modeling efforts. The second generation of the Mesarovic-Pestel model, called the World Integrated Model (see, as examples, Hughes and Masarovic [1978]) began a trend toward disaggregating these models. Instead of attempting a single model, the modelers develop a

0092-2102/83/1303/0093$01.25

multiplicity of models each representing a different sector. The models are created (and presumably validated) individually and then are interconnected. Dayal presents such a set of models, which includes economic growth, population and labor force, energy, food and agriculture, machinery and equipment, and raw materials, all tied together through an input-output model. The first four of these models are described in this book; the last two, although advertised in the book's subtitle, are not included.

This set of models is based on the point of view of the economist. The book consists primarily of a presentation of the author's particular set of modeling relations and of historical input data. The models are presented as being suitable for use in long-range planning. Although there is an occasional discussion of computation, the main focus is on the definition of the quantitative relations within the models. These relations involve forecasts of the future value of trends. No applications of the models or computational results are given. No evidence of validation is presented.

The specific form of a modeling system depends to a large extent on the style and background of the modeler. For example, I feel uncomfortable with models that are trend-only models because major changes in the world often come from events (for example, technological breakthroughs, societal changes, or natural disasters) that affect and change trend values. Dayal implicitly acknowledges the effects of such events by stating: "For long-term projections and policy simulations, which is the main purpose of the present model, . . . it is necessary to make ad hoc changes in some of the input coefficients over time." There are models available that do take events and their impacts on trends into account, such as cross-impact models. However, few such models have been set up as world models (for example, Helmer [1980]).

The main use of this book is as a reference work for devising your own models and for the data it contains. It marks another step in the evolution of world models, but it is by no means the ultimate answer.

References

Forrester, J. W. 1973, *Urban Dynamics*, MIT Press, Cambridge, Massachusetts.

Helmer, O. 1979, "Cross-impact gaming applied to global planning" *Simulation*, Vol. 33, No. 3, pp. 73-86.

Hughes, B. B. and Mesarovic, M. D. 1978, "Population, weather, and resources up to the year 2000" *Futures*, Vol. 10, pp. 267-282.

Mesarovic, M. and Pestel, E. 1974, *Mankind at the Turning Point*, Dutton, New York.

Paul Gray
Southern Methodist University, Dallas, Texas 75275

FRENCH, SIMON, *Sequencing and Scheduling: An Introduction to the Mathematics of the Job-Shop*, John Wiley & Sons, New York, 1982, 245 pp., $49.95.

Simon French has written the third major scheduling textbook, following *Theory of Scheduling* [1967] and *Introduction to Sequencing and Scheduling* [1974]. His preface justifies his new entry: existing textbooks are somewhat out of date, but materials that are up-to-date are aimed primarily at researchers. French therefore seeks to bring a current view of scheduling concepts to the level of graduate or advanced undergraduate

students. I think he has done a fine job, although his book may not appeal to everybody.

The book's subtitle (*An Introduction to the Mathematics of the Job-Shop*) is an accurate description of its orientation. The material is organized according to mathematical technique (as opposed, say, to problem structure) and it builds nicely from constructive approaches to enumerative techniques to a treatment of computational complexity. Although the book is mathematical in outlook, French's style is informal and his exposition is very clear and readable. He sticks largely to elementary results, but in each chapter he carefully guides the reader to references on more advanced topics.

The introductory chapters utilize the job shop problem as a paradigm for scheduling. The example problem we meet on page 1 accompanies us throughout the book, helping us to understand notation, performance measures, solution techniques, and complexity. The continuity is refreshing, although the job-shop problem is not necessarily the simplest topic for a student to grasp. Chapters 3 and 4 cover the basic results in single-machine sequencing. The treatment includes Lawler's algorithm for minimizing the maximum cost and the bicriterion concept of Van Wassenhove and Gelders, to name two important contributions not presented in earlier texts. Chapter 5 covers the few constructive procedures known for flow shops and job shops. Chapters 6-8 cover dynamic programming, branch-and-bound, and integer programming. Most of this material is old, but the basic ideas are competently addressed. Chapters 9-11 introduce complexity, heuristic procedures, and worst-case analyses. This material shows how the scheduling field (at least its mathematical side) has been developing in recent years, and French does an admirable job of introducing the main concepts and results. These chapters may in fact represent the most readable introduction to complexity theory this side of Garey and Johnson. Finally, Chapter 12 contains a brief acknowledgement of the many related problems, models and techniques that the book has left largely untouched.

French has accomplished quite a bit in only about 200 pages: broad coverage of techniques, enthusiastic exposition of the latest theories, patient discussion of examples, helpful hints and solutions to go with end-of-chapter exercises, and a guide to the literature that could keep a student busy for at least another course. If the book has a drawback as a text, I think its weakness lies in its technique orientation. Thus, the reader meets the tardiness problem mostly as a means for studying dynamic programming, the flow shop model mostly for learning about branch-and-bound or about heuristics, and the parallel-processor model as a basis for understanding worst-case bounds. Somehow, the richness of the problem structures themselves seems untapped. Then, too, some favorite topics are not really covered: the traveling salesman problem, job-shop simulations, priority queues, project scheduling. However, these are the inevitable sacrifices that come with a mathematical orientation in a 200-page book. On balance, the book is a welcome addition to the field.

Finally, trivia buffs will enjoy the fact that Simon French was supported in preparing the manuscript by a secretary named K. Baker.

References

Baker, K. R. 1974, *Introduction to Sequencing and Scheduling*, John Wiley, New York.

Conway, R. W., Maxwell, W. L., Miller, L. W. 1967, *Theory of Scheduling*, Addison-Wesley, Reading, Massachusetts.

Garey, Michael R. and Johnson, David S. 1979, *Computers and Intractability: A Guide to the Theory of NP-Completeness*, W. H. Freeman, San Francisco.

K. Baker

Dartmouth College, Hanover, New Hampshire 03755

SCHULTZ, RANDALL L., editor, *Applications of Management Science*, JAI Press Inc., Greenwich, Connecticut, 1981, 388 pp. $21.25.

The central theme of this collection of papers is the improvement of organizational effectiveness. Although the book by no means provides a comprehensive overview of all the uses of management science in the organization, it does contain a number of insightful contributions which serve to demonstrate not only the substantial benefits that management science modelling and analysis brings with it, but also the breadth and depth of the field.

Although it is difficult to perceive any obvious structure in the organization of this book, the papers do fall, in a loose sense, into three groups: (1) strategic planning, (2) mathematical models and decision support systems, and (3) social choice and multicriteria decision making.

There are three papers in the first group. First, Emshoff and Freeman describe the use of stakeholder management which forces managers to explicitly recognize all the diverse groups who have a "stake" in the organization. They discuss the derivation of importance weights and the assignment of priorities to the various groups. The US Brewers Association is taken as a case illustration. Second, Leone and Wheelwright address the development and management of an effective forecasting system. To the extent that such a system is one of the driving forces behind marketing, finance and personnel planning decisions, it constitutes an important strategic tool. The final paper in this group, by Hax and Majluf, describes the conceptual framework a strategic model should possess. While strategic planning is clearly the capstone component in the effective management of any organization, it is not clear that a paper such as this belongs in a book on management science.

The second group of five papers has two subgroups. The first three papers relate to the use of mathematical programming models to deal with organizational problems. Kallberg and Ziemba present a stochastic programming model for the portfolio revision problem in finance. An algorithm and software are included along with a discussion on associated convergence properties. The second paper, by Pariente, uses integer programming to determine the optimal selection and timing of new energy technologies. The third paper, by Morton, examines the problem of planning and scheduling in a multi-time period environment, one of the most challenging industrial problems of the present day. While previous approaches

to the multiperiod problem used backward dynamic programming techniques, the author argues for the benefits of the forward approach. In the practical setting such forward methods are more acceptable to managers and more cognizant of the uncertainties of future periods.

The remaining two papers of the second group of papers deal with decision support systems. Bonczek et al. demonstrate how data base concepts and models can be integrated to provide an effective system to aid managers. Although an operations management example is used to illustrate the potential of this system, the concepts clearly apply to a wide range of problems in the organization. The second paper, by Reisman et al., describes a management-game type of support system for simulating the operation and management of a dental practice.

The final group of three papers addresses problems involving multiple criteria and social choice among alternatives when qualitative factors must be taken into account. First, Hanser et al. address the problem of designing a consumer-oriented transportation system. Models of consumer perceptions (based on surveys), feeling, preference and choice are linked together to allow the planner to select a system strategy. In the paper by Heising-Goodman the interesting and highly controversial issues surrounding plutonium nuclear policy are examined using classical decision theory. Finally, Zeleny presents a structure for examining the multicriterion problem using the ideal-point concept.

This collection of papers in many ways reflects the current tendency of management science to move away from the more theoretical problems and towards practical operational issues. In addition, a number of the papers attempt to look at broad macro problems in a systematic way, and to get away from micro analysis which most models, such as the linear programming variety, have dealt with in the past.

Wade Cook
Faculty of Administrative Studies, York University, Downsview, Ontario M3J 2R6, Canada

BHAT, B. R., *Modern Probability Theory: An Introductory Textbook*, Halstead Press, A Division of John Wiley & Sons, Inc., New York, 1981, 256 + xi pp., $14.95.
HAIGHT, FRANK A., *Applied Probability*, Plenum Press, New York, 1981, 290 + xi pp., $35.00.

Except for the common thread of the theory of probability these two books are dissimilar in every respect. The first is intended to be a textbook for a course in the fundamentals of probability theory for students with a minimum background of two years of calculus. The second is a textbook for a course in the application of probability theory for understanding probabilistic systems in various fields for students with some calculus background (specifically in the topics of differentiation and integration) and with "mathematical maturity."

Good teachers write good textbooks, and authors of good textbooks make good teachers. I was a student of Professor Bhat for two years several years ago, and his book confirms my opinion that he was one of my outstanding professors. Going

through the book has been like sitting once again through his lectures which were very illuminating and demanding.

Courses on probability theory are taught in mathematics, statistics and some operations research programs. Generally, textbooks for these courses can be divided into two classes depending on the assumed mathematical background. Most introductory books assume only about two years of calculus. The advanced ones require a working knowledge of real analysis, complex analysis and abstract measure theory. Thus only students who have graduated with a major in mathematics are in a position to use books on probability theory at the advanced level. For students in statistics and operations research who do not have a strong mathematics background but for whom a strong foundation in probability is essential, *Modern Probability Theory* by B. R. Bhat is an excellent text.

The book covers all the topics necessary in a course in probability theory in 13 chapters: (1) Sets and Classes of Events; (2) Random Variables; (3) Probability Space; (4) Distribution Functions; (5) Expectation and Moment; (6) Convergence of Random Variables; (7) Characteristic Functions; (8) Convergence of Distribution Functions; (9) Independence; (10) Law of Large Numbers; (11) Central Limit Theorem; (12) Conditioning; and (13) Finite Markov Chains. Without assuming any previous knowledge of measure theory, probability theory is developed in a self-contained manner in a measure theoretic language. As he notes in the introduction, this book can be considered an enlarged version (with enough details to help understanding) of the basic topics of probability theory from the classical treatise of M. Loéve. A former student of Loéve, Bhat is in a good position to accomplish this objective.

Each chapter contains a good number of illustrative examples and complements and problems. The parenthetical questions and comments included in the discussion make the material quite challenging as well as insightful.

The book is suitable for use in a department of statistics or a department of MS/OR with a strong component of stochastic processes. Its emphasis is on a rigorous treatment of the theory of probability, not applications. I think the need for a book at this level has existed for some time and the author and publishers are to be congratulated for fulfilling this need.

As stated in his preface, in *Applied Probability* Professor Haight assumes only a minimal background in mathematics. In a university setting we may consider the book directed to a student at the junior or senior level with at least a year of calculus. Even though the book uses such advanced topics as Stieltjes integrals, Laplace transforms, generating functions, and matrix algebra, they have been introduced with great detail.

The book covers a wide range of topics in its six chapters: (1) Discrete Probability (including random variables, probability distributions and generating functions); (2) Conditional Probability (including Bayes' theorem, convolutions and sums of random variables); (3) Markov Chains; (4) Continuous Probability Distributions (including parameter mixing, Stieltjes inte-

gration and Laplace transforms); (5) Continous Time Processes (including renewal process, Markov process and counting distributions), and (6) The Theory of Queues. The basic concepts of probability and distributions and related techniques have been developed, not just as topics of interest, but with the objective of using them in the analysis of probability models. Thus it does not seem necessary for a student to have a probability background in order to take this course on applied probability as would be the case with many other textbooks.

Even though I have not had the good fortune of listening to Professor Haight's lectures, the book leaves the distinct impression that he is an excellent instructor. One of the book's strengths is the simple and elementary nature in which complicated concepts are developed. Derivation of expressions are given in quite some detail, which we rarely see in books of this nature. A complaint students often make is that the textbook used for such a course does not explain enough and skips too many steps. No such complaints will be heard about this book. Each chapter contains a large number of problems which is another strength.

The emphasis in the book is on classical models and examples. Consequently, some applied scientists may feel that it is a little bit old-fashioned. Nevertheless, the value of the book is in the classroom — and not in research laboratories. In a classroom fundamental concepts and techniques are to be emphasized regardless of applications. In this respect the book provides the necessary material.

Each writer has his or her own way of looking at things and favorite topics. In my view, under continuous time processes, the discussion of Markov process is too curtailed to be sufficient to cover the potential variety of models used by the applied scientist. A general discussion of Markov processes does not provide enough insight into the behavior of the various birth and death processes widely used in applications. The author's preferences are also noticeable in his discussion of some topics which do not find much coverage in other textbooks of this type, for example, Fisher and Catalan distributions, a heavy traffic result in the simple queue, and an extended discussion of the busy period using Borel's method.

Professor Haight's *Applied Probability* can be a valuable textbook for an introductory course on applied probability even for students with no background in probability and statistics. For others it might serve as an introductory text for self-study.

Reference

Loéve, M. 1977, *Probability Theory*, fourth edition, Springer-Verlag, New York.

U. Narayan Bhat

Southern Methodist University, Dallas, Texas 75275

Books Received for Review

Ansoff, H. I. 1982, *Understanding and Managing Strategic Change*, North-Holland, New York, pp. 254, $41.75.

Aram, John D. 1983, *Managing Business and Public Policy*, Pitman, Belmont, California, pp. 600, $24.95.

Balinski, Michel L. and Young, H. Peyton 1982, *Fair Representation*, Yale University Press, New Haven, Connecticut, pp. 191, $27.50

Behn, Robert D. and Vaupel, James W. 1982, *Quick Analysis for Busy Decision Makers*, Basic Books, New York, pp. 415, $18.95.

Bell, Chip R. 1982, *Influencing Marketing the Ideas That Matter*, Learning Concepts, Austin, Texas, pp. 185, $17.95.

Cummings, L. L. and Staw, Barry W. 1983, *Research in Organizational Behavior*, Jai Press, Greenwich, Connecticut, pp. 357, $45.00.

Dynkin, E. B. 1982, *Markov Processes and Related Problems of Analysis*, Cambridge Press, New York, pp. 312, $24.95.

Feichtinger, G. 1982, *Optimal Control Theory and Economic Analysis*, North-Holland, New York, pp. 414, $74.50.

Fishman, Katherine Davis 1982, *The Computer Establishment*, McGraw-Hill, Hightstown New Jersey, pp. 470, $7.95.

Frohlich, Norman J. and Oppenheimer, Joe A. 1978, *Modern Political Economy*, Prentice-Hall, Englewood Cliffs, New Jersey, pp. 143, $8.95.

Gheorghe, Adrian 1982, *Applied Systems Engineering*, John Wiley, New York, pp. 342, $41.95.

Goffin, J. L. and Rousseau, J. M. 1982, *Applications*, North-Holland, New York, pp. 212, $30.25.

Gordon, Gilbert and Pressman, Israel 1983, *Quantitative Decision Making for Business*, second edition, Prentice-Hall, Englewood Cliffs, New Jersey, pp. 596, $26.95.

Guignard, M. 1982, *Optimality and Stability in Mathematical Programming*, Elsevier North-Holland, New York, pp. 240, $30.25.

Jackson, Michael 1983, *System Development*, Prentice-Hall, Englewood Cliffs, New Jersey, pp. 418, $32.00.

Kasschau, Richard A., Lachman, Roy, and Laughery, Kenneth R. 1982, *Information Technology and Psychology*, Praeger, New York, pp. 260, $29.95.

Kroeber, Donald W. 1982, *Management Information Systems*, Free Press, New York, pp. 266, $17.95.

Lagadec, Patrick 1982, *Major Technological Risk*, Pergamon, Elmsford, New York, pp. 516, $60.00.

Ledin, George, Jr. 1980, *A Structured Approach to Essential BASIC*, Boyd & Fraser, San Francisco, pp. 162, $7.95.

Lewi, Paul J. 1982, *Multivariate Data Analysis in Industrial Practice*, John Wiley, New York, pp. 244, $31.95.

Matthies, Leslie H. 1982, *Documents to Manage By*, Office Publications, Stamford, Connecticut, pp. 193, $14.00.

McKelvey, Bill 1982, *Organizational Systematics*, University of California Press, Berkeley, pp. 511, $29.95.

Matszek, David L. 1982, *Quick Pascal*, John Wiley, New York, pp. 179, $11.95.

McGlynn, Daniel R. 1982, *Fundamentals of Microcomputer Programming*, John Wiley, New York, pp. 332, $14.95.

Mensch, Gerhard and Niehaus, Richard J. 1982, *Work, Organizations and Technological Change*, Plenum, New York, pp. 412, $49.50.

Mitchelhill, Alan 1982, *Bills of Lading: Law and Practice*, Chapman and Hall, Methuen, New York, pp. 127, $23.00.

Mood, Alexander M. 1983, *Introduction to Policy Analysis*, Lexington Books, Lexington, Massachusetts, pp. 175, $28.95.

Moriarty, Rowland T. 1983, *Industrial Buying Behavior*, Lexington Books, Lexington, Massachusetts, pp. 175, $28.95.

Newell, G. F. 1982, *Applications of Queuing Theory*, second edition, Chapman and Hall, Methuen, New York, pp. 303, $29.95.

Pasic, Najdan, Grozdanic, Stanislav and Radevic, Milorad 1982, *Worker's Management in Yugoslavia: Recent Developments and Trends*, International Labor Office, London, England, pp. 198, $19.95.

Phatak, Arvind V. 1982, *International Dimensions of Management*, Kent, Northridge, California, pp. 145, $8.95.

Quasney, James S. and Maniotes, John 1982, *Standard BASIC Programming: For Business and Management Applications*, Boyd & Fraser, San Francisco, pp. 407, $15.95.

Ransom, Harry Huntt 1982, *The Conscience of the University*, University of Texas Press, Austin, pp. 105, $12.50.

Rosa, Alexander, Sabidussi, Gert and Turgeon, Jean 1982, *Theory and Practice of Combinations*, North-Holland, New York, pp. 262, $59.00.

Ruskin, Arnold M. and Estes, W. Eugene 1982, *What Every Engineer Should Know About Project Management*, Marcel Dekker, New York, pp. 176, $19.75.

Scanlon, Leo J. 1982, *Apple II Assembly Language Exercises*, John Wiley, New York, pp. 205, $9.95.

Schoemaker, S. 1982, *Computer Networks and Simulation II*, North-Holland, New York, pp. 326, $55.75.

Singer, Larry M. 1982, *The Data Processing Manager's Survival Manual*, John Wiley, New York, pp. 226, $24.95.

Smith, W. Novis, Meyer, E. Gerald and Nirsig, Alan R. 1982, *Industrial R&D Management*, Marcel Dekker, New York, pp. 192, $32.50.

White, D. J. 1982, *Optimality and Efficiency*, John Wiley, New York, pp. 232, $46.50.

Zoltners, A. A. 1982, *Marketing Planning Models*, North-Holland, New York, pp. 270, $55.00.