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The Analysts' Bookshelf

***Experimental Designs in Industry*, Edited by Victor Chew, John
Wiley & Sons, Inc., New York, 1958, 268 pages, \$6 00**

THIS BOOK contains eight papers presented at a symposium held at North Carolina State College in 1956, along with an introductory chapter aimed at presenting necessary material to the uninitiated to enable him to understand the papers. Of these papers, three present, in as concise a form as possible, the basic statistical methodology that the authors feel are applicable to industry, and the remainder gives examples of the application of these techniques in industry.

There are four topics which the reviewer feels should be incorporated into any discussion of designs for industry. These topics are (i) time—the time dimension occurs in problems of life testing, (ii) interactions—in certain experiments the main effects are small or unimportant while the interactions may be large or important, (iii) split-plot designs—industrial experiments are forced into split plot designs by the very nature of the situations, and (iv) multivariate analysis—many important variables can't always be controlled in industrial experiments but these variables can, in many cases, be measured. Among these four topics only that dealing with split-plot designs was emphasized adequately in the methodology and in the examples in this book. The major emphasis throughout these papers is on fractional-factorial and response-surface designs and regression analysis.

This book is well written and concise. However, it is not at the level to be understood by the layman and there is very little to be learned by the statistician that is not already available in standard texts. A statistician will find the papers on applications interesting and many of the nonstatistical problems familiar.

G. RONALD HERD
Booz, Allen Applied Research

**E. F. BEACH, *Economic Models*, John Wiley & Sons, Inc.,
New York, 1957, 227 pages, \$7 50**

**R. G. D. ALLEN, *Mathematical Economics*, The Macmillan Company,
New York, 1957, 563 pages, \$10 00**

TO OPERATIONS ANALYSTS, economists appear to look through telescopes when observing society, sometimes using one end, sometimes the other. Economic models either represent the behavior of the microcosmos of the economy, individual households and enterprises, or that of broad sectors, such as *all* consumers, *all* workers, *all* borrowers and lenders.

Models are static or dynamic, according to the dating of related variables. A model is dynamic when a variable's value in one period depends on a variable's value in another period, it is static otherwise. For instance, a model in which

national income this year depends on investment plans last year, which in turn depend on national income of the previous year, is dynamic. The purpose of static models is to study how the solution values of the variables change as functions of the policy parameters (the controlled variables, such as taxes and interest rates). Dynamic models are used to study the economic fluctuations caused by changes in the values of both controlled and uncontrolled variables.

Models are classed as mathematical or econometric. The former group states relationships between economic variables in general terms, the latter represents specific economic structures, such as, for instance, the market of margarine and butter in the U. S. A. Determining the parameters of an econometric model is all but simple, as the work of the Cowles Commission shows, determining these parameters *reliably* is next to impossible.

Publication of these two recent books permits the operations analyst to easily peer over the shoulder of his fellow model constructor, the economist (sometimes called 'mathematical economist,' or, *horribile dictu*, 'econometrician') and observe the above. PROFESSOR BEACH's book gives an introductory, PROFESSOR ALLEN's a highly advanced, treatment of economics *de more geometrico*. The first author developed his text as a vehicle by which quantitative concepts, mathematical procedures, and statistical inference can be smuggled into the curriculum of not-very-cooperative undergraduate economics majors. The second author, concentrating on economic theory, did not worry about the mathematical preparedness of his audience. In an earlier book,* published twenty years ago, he put down the foundations, and left it up to the student to use the intervening time constructively. For those who did, he now provides chapters on differential and difference equations, and on vector and matrix algebra, areas of mathematics he did not cover previously and which lately became important in economic model construction.

Both books, at different levels of comprehension and detail, give a good presentation of conceptual structures developed by economists. Allen's work is a systematic treatment of economic theory in an order that descends from aggregate dynamic models through the static theory of general equilibrium to economic competition among firms, presented with the use of game theory, and the theory of the firm, exposed with the use of linear programming. Beach lays emphasis on the two-fold problem of mathematical-model construction and estimation of parameters. The details of either book can be of great interest to the operations analyst. Allen's book, in chapters 15 to 19, presents a link between the economic theory of the firms and certain models of operations research.

One *caveat*. Since few economic models can face empirical test, the operations analyst should be careful, when reading the books, particularly the one by Beach, not to equate knowledge of economic models with knowledge of economics.

TIBOR FABIAN

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* R. G. D. ALLEN, *Mathematical Analysis for Economists*, The Macmillan Company, New York, 1938.

THREE VOLUMES ON MATHEMATICS

M. RICHARDSON, *Fundamentals of Mathematics*, Revised Edition, The Macmillan Company, New York, 1958, 507 pages, \$6.50

THIS is a revised edition of a well-known book which offers an informative and broad outlook on the subject of mathematics. The book treats its material in a balanced form, makes for interesting reading, and has an adequate amount of elementary theoretical calculations for the reader to follow. The discussion of combinational topology and particularly of networks would be of interest to the operations-research reader.

JOHN RIORDAN, *An Introduction to Combinatorial Analysis*, John Wiley & Sons, Inc., New York, 1958, 244 pages, \$8.50

THIS BOOK does not give the expected insight into combinatorial analysis. It is a collection of ideas without a guiding framework, and hence does not make for interesting reading. However, it does contain useful information.

SAMUEL GOLDBERG, *Introduction to Difference Equations*, John Wiley & Sons, Inc., New York, 1958, 260 pages, \$6.75

THIS is an excellent book and is recommended reading in the elementary use and solutions of difference equations. It has a number of interesting illustrations from economics and the social sciences and is primarily intended for workers in these fields.

THOMAS L. SAATY
Booz, Allen Applied Research

MISCELLANEOUS PAPERS

THE FOLLOWING articles that have appeared recently in other than the usual operations-research sources have come to the attention of the Editors:

G. R. ANDLINGER, "Business Games—Play One!" *Harvard Business Review* **36**, 115–125 (1958)

ROBERT G. BROWN, "A General-Purpose Inventory Control Simulation," *AIIE Proceedings* (1958)

ROBERT G. BROWN, "A System of Records for Reorder Control," *ASME Paper No. 58-PROD-2* (1958)

C. H. COATES, "Role of the Military Sociologist in Operations Research," *Sociology and Social Research* **42**, 327–331 (May 1958)

J. B. DENNIS, "High Speed Computer Technique for the Transportation Problem," *Journal of the Association for Computing Machinery* **J5**, 132–153 (April 1958)

ALISON DOIG, "A Bibliography on the Theory of Queues," *Biometrika* **44**, 490–514 (December 1957)

STEPHEN ENKE, "An Economist Looks at Air Force Logistics," *The Review of Economics and Statistics* **40**, 230–239 (August 1958)

FARIS AND MCPHERSON, "Application of Linear Programming in an Analysis of

- Economic Changes in Farming," *Review of Economics and Statistics* **39**, 421–434 (November 1957)
- P. D. FINCH, "The Effect of the Size of the Waiting Room on a Simple Queue," *Journal of the Royal Statistical Society B* **20**, No. 1 (1958).
- M. M. FLOOD, "Operations Research and Automation Science," *Journal of Industrial Engineering* **9**, 239–242 (July–August 1958)
- JAY W. FORRESTER, "Industrial Dynamics," *Harvard Business Review* **36**, 37–66 (1958)
- F. H. GEORGE, "Cybernetics, Operational Research, and Automation," *Process Control & Automation* **5**, 218–222 (June 1958)
- A. P. HAYWARD, "Minimization of Fuel Costs by the Technique of Linear Programming," *Power Apparatus & Systems*, 1288–1293 (February 1958)
- GEORGE E. KIMBALL, "A Critique of Operations Research," *Journal of the Washington Academy of Sciences* **48**, 33–37 (February 1958)
- RICHARD B. MAFFEI, "Simulation, Sensitivity, and Management Decision Rules," *Journal of Business* **31**, 177–186 (July 1958)
- RICHARD R. NELSON, "Degeneracy in Linear Programming," *Review of Economics and Statistics* **39**, 402–407 (November 1957)
- F. E. O'MEARA, "Military Operations Research," *Aeronautical Engineering Review* **16**, 56–58 (December 1957)
- HERBERT J. H. ROY, "Operations Research in Action," *Harvard Business Review* **36**, 120–128 (September–October 1958)
- ALBERT M. SCHRIEBER, "Gaming—A New Way to Teach Business Decision-Making," *University of Washington Business Review*, 18–29 (April 1958)
- H. A. SIMON AND C. P. BONINI, "The Size Distribution of Business Firms," *The American Economic Review* **48**, 607–617 (September 1958)
- J. SPILLIUS, "Natural Disaster and Political Crisis in a Polynesian Society—An Exploration of Operational Research," *Human Relations* **10**, 3–27, 113–125 (1957)
- JEREMY J. STONE, "An Experiment in Bargaining Games," *Econometrica* (April 1958)
- HARVEY M. WAGNER, "On the Distribution of Solutions in Linear-Programming Problems," *Journal American Statistical Association* **53**, 161–163 (March 1958):
- HARRY B. WOLFE, "Operations Research and What It Can Do for the Paper Industry," *Paper Trade Journal* (September 22, 1958)
- "Operational Research in Advertising," *Nature* **182**, 846 (September 1958)
- "Economics and Operations Research: A Symposium," *Review of Economics and Statistics* **40**, 195–229 (August 1958):
- W. W. COOPER—*Operations Research and Economics*, pp. 195–199
- CHARLES HITCH—*Economics and Military Operations Research*, pp. 199–209
- WILLIAM J. BAUMOL—*Marginalism and the Demand for Cash in Light of Operations Research Experience*, pp. 209–214
- MARTIN SHUBIK—*Economics, Management Science, and Operations Research*, pp. 214–220
- T. C. SCHELLING—*Comment*, pp. 221–224

STEFAN VALAVANIS—*Marginalism Versus Algorithmism*, pp. 224–227

DANIEL ELLSBERG—*A Final Comment*, pp. 227–229

BOOKS RECEIVED

PAUL WASSERMAN AND FRED S. SILANDER, *Decision-Making—An Annotated Bibliography*, Graduate School of Business Administration, Cornell University, Ithaca, New York, 1958, 111 pages, \$3.50

FRANKLIN A. LINDSAY, *New Techniques for Management Decision Making*, McGraw-Hill Book Company, New York, 1958, 173 pages, \$15.00

EUGENE M. GRABBE, SIMON RAMO, AND DEAN E. WOOLDRIDGE, Editors, *Handbook of Automation, Computation, and Control*, Volume I, *Control Fundamentals*, John Wiley & Sons, Inc., New York, 1958, 1020 pages, \$17.00

LEON K. KIRCHMAYER, *Economic Operation of Power Systems*, John Wiley & Sons, Inc., New York, 1958, 260 pages, \$12.00

SYLVAN FICH AND JAMES L. POTTER, *Theory of A. C. Circuits*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1958, 453 pages, \$11.35

SAUL I. GASS, *Linear Programming: Methods and Applications*, McGraw-Hill Book Company, New York, 1958, 223 pages, \$6.50.

EARL O. HEADY AND WILFRED CANDLER, *Linear Programming Methods*, Iowa State College Press, Ames, Iowa, 1958, 597 pages, \$5.95

TAPAS MAJUMDAR, *The Measurement of Utility*, St. Martin's Press, Inc., New York, 1958, 149 pages, \$3.00

S. VAJDA, *Readings in Linear Programming*, John Wiley & Sons, Inc., 1958, 99 pages, \$3.00

D. R. COX, *Planning of Experiments*, John Wiley & Sons, Inc., New York, 1958, 308 pages, \$7.50

ROBERT B. WHEELAN, *Corporate Records Retention*, Volume I, *A Guide to U.S. Federal Requirements*, Controllershship Foundation, Inc., New York, 1958, 223 pages, \$10.00

Recent Research in Maritime Transportation, Proceedings of the Second Symposium, The Maritime Cargo Transportation Conference, Publication 592, National Research Council, Washington, D.C., 1958, 134 pages, \$2.00