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# *The Analyst's Bookshelf*

Hugh J. Miser, Editor

## BOOKS

### *Reviews*

**EDWARD BENNETT, JAMES DEGAN, and JOSEPH SPIEGEL (editors),** *Human Factors in Technology*, McGraw-Hill Book Co., Inc., New York, N. Y., 1963, 699 pages, \$14.50.

**TIMOTHY W. COSTELLO and SHELDON S. ZALKIND (editors),** *Psychology in Administration: A Research Orientation*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1963, 512 pages, \$11.35.

CONTEMPORARY psychology and psychologists have not yet influenced operations research and operations analysts to any appreciable degree, in contrast with mathematics, economics, and computers. And yet the great problems, with which operations analysts should be concerned, surely depend for their solution more upon human factors and human psychology than they do upon the details of programming, scheduling, or inventory management—presently favorite topics in operations research. Is this lack of influence caused by inadequacies in the psychological sciences, or instead is it only the result of chance events that have biased operations research toward mathematical models and economic optimization?

The two excellent books of readings here under review deserve serious attention by all operations researchers who would examine the psychological sciences for possible help with problems in which humans and their psychological characteristics play an important role. Each book includes some forty papers that have been well-organized and integrated by the editors to give uncommon unity to the treatments.

The papers on human factors are concerned with the many problems encountered in matching individual man to his increasingly complex technological environment: on the highway, at the workplace, in space, at the computer, and with prosthetic aids. An appendix lists 200 selected handbooks, textbooks, and general references for the reader who wishes to explore human factors engineering more deeply; three-fourths of these references were published within the past decade.

The forty readings on psychology in administration relate to humans interacting in social groups, thus oriented toward problems of organization and management. The book is divided into six parts: perception, motivation, emotion, learning, attitudes, and thinking. Each part starts with a discussion of basic psychological knowledge and illustrates the application of these findings to common

organizational situations. The material is drawn almost entirely from research grounded on experiments; the readings themselves are usually brief, but they are also supported by concise research summaries that help the reader greatly to gain perspective as he reads along. There is a bibliography of some 400 items, divided under the same six part headings.

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Business Administration*)

FERDINAND LEIMKUHNER, *Trucking of Radioactive Materials: Safety vs. Economy in Highway Transport*, The Johns Hopkins Press, Baltimore, Maryland, 1963, 166 pages, \$7.50.

**T**HIS book is an offspring of a study made under a contract for the Atomic Energy Commission; it also fulfills a promise of revision accompanying the recent publication of a thesis abstract (see *Operations Research*, 11 (1963), page 301). The title adequately describes the area of interest.

The problem to be solved by operations-research techniques is defined as "one of *cost minimization*, where total cost includes both the cost of control and the liability for accident losses." In elaboration:

Protective measures can be very costly and the commercial considerations of a competitive nuclear industry will lead to a re-examination of existing controls in order to avoid unnecessarily high costs. Basically, the problem is how to determine in advance the *optimum balance between the risks involved and the cost* of the protective measures which are available for reducing this risk. [Emphasis supplied in both quotations.]

There are some who will object to such an ambitious role for operations research in the determination of policies so affected with the public interest. This reviewer, were he a decision-making customer of operations research, would be content with its merely furnishing a shopping list of practices that offer promise of reducing accident rates and severity of damage, along with estimates of their respective costs.

The first two chapters provide a "summary of the entire study with a minimum of mathematical intricacy," and they contain the author's conclusions and recommendations. The conclusions suggest some promising approaches to accident reduction; at least they appear to merit trial. The guidance for minimizing costs is rather tenuous.

The remaining three chapters contain "all of the analytic details which support the results and conclusions drawn." The reader may find some difficulty in bridging the gap between the technical analyses and the conclusions and recommendations. One analysis stops when the mathematics reveals that the accident rates for Motor Carriers of Explosives and Dangerous Articles do not differ significantly from those of some other carriers. The conclusions, however, disclose that Carriers of Explosives have established certain operating practices—diesel tractors and nylon tires to reduce fire hazard, special practices in driver selection and truck

maintenance—which conceivably can help to prevent accidents. Since these are *operating* practices one might expect them to be accommodated in an operations-research model, especially in this instance, where the finding of no significant difference is suspect because it is possible that accident-reporting regulations are administered more rigorously, and are obeyed more diligently, for this carrier group. Again, in the light of the precision in the technical chapters, it is somewhat anticlimactic to find that the conclusions and recommendations are heavily weighted with a discussion of the need for establishing uniform systems of motor carrier reporting. Such conclusions have been reached before, and by less rigorous paths. The meaning of one paragraph (the second on page 41) escapes the reviewer completely; nor can he find anything in the technical chapters either to support it or to clarify its meaning.

The mathematics of the analyses seem unnecessarily detailed; in contrast to this precision, the verbal exposition could have borne some editing. *Examples*: the use of the word *infers* instead of *implies*; dividing the United States into two regions, East and West, in these terms: "The dividing line is roughly the Mississippi River, exclusive of Wisconsin, Kentucky, Tennessee, and Mississippi. . ." One can wish that in operations research the virtue of rhetoric and syntax be defended as vigorously as is the purity of the equation.

REGINALD V. HOBBAH  
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**JOSEPH MATHIEU, HEINRICH JUNG, and KONSTANTIN BEHNERT, *Ein Verfahren zur Planung der Maschinenbelegung in einer Fertigungstufe*, Forschungsberichte des Landes Nordrhein-Westfalen Nr. 1216, Westdeutscher Verlag, Köln, Germany, 1963, 39 pages, DM 19.50 (paper)**

**T**HIS booklet, one of a series of reports of research in many fields sponsored by the government of North Rhine-Westphalia, deals with the following problem: For several products processed on one machine, with fixed lot sizes and known time-dependent demands, to determine a sequence of processes that minimizes the total cost from carrying stocks and from shortages.

The first part uses a numerical example to describe a heuristic method in detail: the jobs are scheduled step-wise in order of time. At each step the authors proceed by selecting from the eligible jobs the one that produces the smallest cost increment for that step.

The second part describes a method for the general problem. The procedure is basically as follows: At each step there is a set of 'best' sequences for all possible choices of the next job. One looks two steps ahead and determines which choices give the least increase in total cost for each of the possible following choices, thus obtaining a new set of 'best' sequences. Finally, the procedure ends with one sequence when only one job is left. It is assumed that no shortages are allowed, and therefore sufficient initial stocks have to be determined with the schedule.

The third part describes the modifications necessary if the initial stocks are given and therefore shortages have to be admitted.

The methods are straightforward calculations, appealing to common sense. No

attempt is made to justify them mathematically or even heuristically from an over-all point of view. However, the words 'optimal,' 'praktisch optimal,' 'theoretisch optimal,' etc., are generously and indiscriminately used without precise definition, and sometimes quite differently from common usage.

H. C. JOKSCH  
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### **Books Received**

- NORMAN ABRAMSON, *Information Theory and Coding*, McGraw-Hill Book Co., Inc., New York, N. Y., 1963, 217 pages, \$7.95.
- AIR MINISTRY, *The Origins and Development of Operational Research in the Royal Air Force*, Air Publication 3368, Her Majesty's Stationery Office, London, England, 238 pages, 35 shillings.
- PHILIP L. ALGER, *Mathematics for Science and Engineering*, McGraw-Hill Book Co., Inc., New York, N. Y., 1957 (1963 in paper), 378 pages, \$2.95.
- MARY JEAN BOWMAN AND W. WARREN HAYNES, *Resources and People in East Kentucky: Problems and Potentials of a Lagging Economy*, The Johns Hopkins Press, Baltimore, Md., 1963, 474 pages, \$10.00.
- DAVID BRAYBROOKE AND CHARLES E. LINDBLOM, *A Strategy of Decision: Policy Evaluation as a Social Process*, The Free Press of Glencoe (a Division of the Macmillan Co.), New York, N. Y., 1963, 280 pages, \$5.95.
- FREDERICK P. BROOKS, JR., AND KENNETH E. IVERSON, *Automatic Data Processing*, John Wiley and Sons, Inc., New York, N. Y., 520 pages, \$10.75.
- NED CHAPIN, *An Introduction to Automatic Computers, Second Edition*, D. Van Nostrand Co., Inc., Princeton, N. J., 1963, 515 pages, \$9.75.
- AN-MIN CHUNG, *Linear Programming*, Charles E. Merrill Brooks, Inc., Columbus 16, Ohio, 1963, 352 pages, \$9.00.
- TIMOTHY W. COSTELLO AND SHELDON S. ZALKIND, *Psychology in Administration: A Research Orientation*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1963, 512 pages, \$11.35. A text with integrated readings; the subjects include thinking, problem solving, decision making, creativity, and group problem solving.
- BOYD EARL, *Introduction to Probability: A Programmed Unit in Modern Mathematics*, McGraw-Hill Book Co., New York, N. Y., 1963, 278 pages, \$3.95 (plastic bound with soft cover).
- RICHARD L. EISENMAN, *Matrix Vector Analysis*, McGraw-Hill Book Co., Inc., New York, N. Y., 1963, 324 pages, \$3.95 (paper). An introductory textbook.
- GALILEO GALILEI, *Dialogues Concerning Two New Sciences*, translated by HENRY CREW AND ALFONSO DE SALVIO, McGraw-Hill Book Co., Inc., New York, N. Y., 1963, 314 pages, \$2.95 (paper). A paperback reprint of a book first published in 1914; Galileo's original book was first published in 1638.
- ROBERT H. GREGORY AND RICHARD L. VAN HORN, *Automatic Data-Processing Systems: Principles and Procedures (Second Edition)*, Wadsworth Publishing Co., Inc., Belmont, California, 1963, 828 pages, \$9.25.
- ULF GRENANDER, *Probabilities on Algebraic Structures*, John Wiley and Sons, Inc., New York, N. Y., 1963, 228 pages, \$12.00.