

# Short Book Reviews

Vol. 13. No. 1— April 1993

Editor Dr. A.M. Herzberg

## THE DESIGN AND ANALYSIS OF RESEARCH STUDIES.

B.F.J. Manly. Cambridge University Press, 1992,  
pp. xvi + 353, £50.00/US\$89.95 Cloth; £19.95/US\$37.95  
Paper.

Contents:

1. Preview
2. The sample survey
3. Other sampling designs
4. The linear regression model
5. Experimental designs to assess the effect of a treatment
6. Interrupted time series
7. More advanced experimental designs
8. Some special types of data
9. Computer-intensive statistics
10. Ethical considerations
11. Synthesis: Carrying out a research study

Readership: Research workers in the biological health and social sciences

The design and the analysis are both essential aspects of research studies. This is by now essentially universally accepted both by statisticians and by re-search workers with a background in the substantive areas of application, and yet disagreements arise and defective studies are published. Why should this be? Perhaps because of difficulties in understanding variation, and a reluctance to admit how complicated cause-and-effect relationships can be. The present book deals, sensibly but inevitably rather briefly, with a wide variety of types of situation, for example random-ized experiment and observational study, and of methods of collecting data, for example surveys, capture-recap-ture methods, classical designs, illustrating many of these and the points they raise by examples and case studies.

University of Sheffield  
Sheffield, U.K.

R.M. Loynes

## QUESTIONS ABOUT QUESTIONS: INQUIRIES INTO COGNITIVE

BASES OF SURVEYS. J.M. Tanur (Ed.). New York: Russell  
Sage Foundation, 1992, pp. xxi + 306, US\$34.95.

Contents:

Preface: A brief history of the movement to study  
cognitive aspects of surveys and the Social  
Science Research Council (SSRC) Committee

PART I : Introduction

1. Cognitive aspects of surveys and this volume

PART II : Meaning

2. Asking questions and influencing answers
3. Direct questioning about comprehension in a survey setting

PART III: Memory

4. Personal recall and the limits of retrospective  
questions in surveys

5. Improving episodic memory performance of survey respondents

6. Memory and mismemory for health events

7. Attempts to improve the accuracy of self-reports of voting

8. Applying cognitive theory in public health investigations: Enhancing  
food recall with the cognitive interview

PART IV : Expression: The Case of Attitude Measurement  
in Surveys

9. Opportunities in survey measurement of attitudes

10. The case for measuring attitude strength in surveys

11. New technologies for the direct and indirect assessment of  
attitudes

PART V : Social Interaction

12. Validity and the collaborative construction of meaning in face-to-  
face surveys

PART VI : Government Applications

13. A review of research at the Bureau of Labor Statistics

Readership: Survey statisticians, sociologists, psychologists

This book is a collection of papers that focusses on the contributions of the cognitive sciences to understanding issues in survey research. It brings together some of the theory and empirical research that have developed out of the movement to study cognitive aspects of surveys. The book is the product of the Social Science Research Council Committee on Cognitive and Survey Research. The material for most of the chapters originated in the committee's meetings and workshops. Particularly interesting are Part II on "Meaning" that reflects the view that respondents must share the meaning of a question intended by the survey researcher if they are to respond usefully and Part III on "Memory" that deals with respondents' retrieval of information. The book will be of interest to survey researchers and questionnaire designers who want to learn more about the cognitive bases of survey responding.

Statistics Canada  
Ottawa, Canada

A.R. Gower

## STATISTICS IN THE ENVIRONMENTAL AND EARTH SCIENCES.

A.T. Walden and P. Guttorp (Eds.). London: Arnold/New  
York: Halsted, 1992, pp. xiv + 306, £49.50.

Contents:

Introduction to Statistics in the Environmental  
Sciences

1. Establishing a statistical context for the  
evaluation of air quality models, A.D. Thrall

2. Quality data networks that minimize entropy,  
W.F. Caselton, L. Kan and J.V. Zidek

3. Nonparametric estimation of spatial covariance with application to  
monitoring network evaluation,

P. Guttorp, P.D. Sampson and K. Newman

4. Spatial covariance estimation for monitoring data,  
C. Louder and P. Switzer
5. Modeling daily precipitation - progress and problems, D.A. Woolhiser
6. Aging functions and their nonparametric estimation in point process models of rainfall, M.J. Phelan  
Introduction to Statistics in the Earth Sciences
7. Deconvolution of chaotic and random time series,  
J.D. Sargle
8. Deconvolving nonGaussian time series: The seismic experience, A.T. Walden
9. Deconvolution of short period teleseismic and regional time series, Z.A. Der, A.C. Lees,  
K.L. McLaughlin and R.H. Shumway
10. Envelope estimation for quasi-periodic geophysical signals in noise: A multitaper approach, J. Park
11. Statistical methods for the description and display of earthquake catalogues, D. Vere-Jones
12. Stochastic models for the distribution of rock types in petroleum reservoirs, B.D. Ripley
13. Analysis of geochemical data sampled on a regional scale, K. Conradson, A.A. Nielsen and K. Windfield  
Readership: Applied statisticians, geophysical scientists

This is a compendium of papers which the editors solicited from the participants in a summer 1989 conference which was held in Belgium and entitled "Statistics: Space and Earth Sciences". Papers in this volume are organized in two groups corresponding to the physical domain of the problems discussed. The lead paper raises a challenge to include the effects of model uncertainty in inferences which are made with the output from geophysical models. The author points out that policy makers, and other model users, need to be able to quantify the uncertainties which arise from a less than complete understanding of the physical processes represented by the model and from the often numerous parameterizations of unresolved processes which are part and parcel of models of geophysical systems. This challenge will only be answered through unprecedented interaction between geophysical scientists and statisticians. The remainder of the volume is more technical in nature and is illustrative of some of the best current work in the statistical sciences to emerge from geophysicist/statistician interactions. Statisticians will find these papers to be both accessible as there is a minimum of subject matter jargon, and substantive. Unfortunately, for the same reasons, many geophysical scientists will find these papers to be less engaging.

Canadian Climate Centre

Downsview, Canada

F.W. Zwiers

#### THE ANALYTICS OF UNCERTAINTY AND INFORMATION.

J. Hirshleifer and J.G. Riley. Cambridge University Press, 1992, pp. xi + 465, £45.00/US\$59.95 Cloth; US\$19.95 Paper.

Contents:

1. Elements of decision under uncertainty
2. Risk-bearing: to the optimum of the individual
3. Comparative statics of the risk-bearing optimum
4. Market equilibrium under uncertainty
5. Information and informational decisions
6. The economics of emergent public information
7. Research and invention
8. Informational asymmetry and contract design
9. Strategic uncertainty and equilibrium concepts
10. The economics of contests
11. Competition and hidden knowledge
12. Long-run relationships and the credibility of

threats and promises

Readership: Economists, students in economics

This book consists of two untitled parts. Part I deals with the analysis of uncertainty faced by a decision maker, and with the implications of uncertainty on economics, risk-bearing and market equilibrium. In Part II, dynamic states of knowledge are discussed in what could be termed "the economics of information". The book is written in a refreshing style, it is easy to read and it contains many examples and discussions. It is difficult to judge whether the "global" theory forms a suitable model for the many practical applications presented by the authors. However, the resulting uncertainty and information models are remarkably coherent and versatile.

Mobil Research and Development Corporation

Dallas, U.S.A.

M.A. Maes

#### MATHEMATICS IN MEDICINE AND THE LIFE SCIENCES.

F.C. Hoppensteadt and C.S. Peskin. New York:

Springer-Verlag, 1992, pp. xii + 252, DM.78.00.

Contents:

1. The mathematics of populations: Demographics
  2. Inheritance
  3. A theory of epidemics
  4. Biogeography
  5. The heart and circulation
  6. Gas exchange in the lungs
  7. Control of cell volume and the electrical properties of cell membranes
  8. The renal countercurrent mechanism
  9. Muscle mechanics
  10. Biological clocks and mechanisms of neural control
- Readership: Advanced science undergraduates

This is a book in two distinct halves: Chapters 1-4 give a brief overview of a range of fields concerned with populations while Chapters 5-10 deal with some mathematical models in physiology. The former are at an elementary level while the latter are more mathematically sophisticated, requiring a 'feeling' for detailed models involving differential equations. The intended audience is pre-medical science undergraduates, but the book will also prove useful to undergraduates in applied mathematics.

There are obvious difficulties inherent in a short, introductory book with such an ambitious scope. Models are formulated and then discarded, without allowing a full appreciation of what a mathematical model can and cannot contribute to an understanding of the phenomenon concerned. Readers of Short Book Reviews will be disappointed at the lack of a fundamental role for stochastic ideas, i.e. uncertainty, error and sampling. Probabilistic models are introduced where unavoidable, in genetics and epidemics, but readers are given the misleading advice that stochastic effects usually do not matter when the population size exceeds thirty.

Queen Mary and Westfield College

London, U.K.

D.J. Balding

#### DESIGN AND ANALYSIS OF BIOAVAILABILITY AND BIOEQUIVALENCE STUDIES.

S.C. Chow and J.P. Liu. New York: Dekker, 1992, pp. x + 416, US\$125.00.

Contents:

1. Introduction
2. Design and bioavailability studies
3. Statistical inference for effects from a standard 2x2 crossover design
4. Statistical methods for average bioavailability

5. Power and sample size determination
6. Transformation and analysis of individual subject ratios
7. The assessment of inter- and intra-subject variabilities
8. Assumptions and outliers detection
9. Optional crossover designs for two formulations
10. Assessment of bioequivalence for more than two formulations
11. Assessment of bioequivalence for drugs with negligible plasma levels
12. Some related problems in bioavailability studies

Readership: Statisticians from the biopharmaceutical industry

Bioavailability and bioequivalence studies play an important role in the drug development process. This text gives a thorough review of the statistical aspects of their design and analysis. It is written for statisticians, primarily those in the pharmaceutical industry who are responsible for these types of studies. The text gives an up-to-date description of the relevant ideas and techniques used for bioavailability and bioequivalence studies, and should be a valuable resource for this audience.

Harvard University  
Boston, U.S.A.

S.W. Lagakos

A SHORT COURSE IN EPIDEMIOLOGY. S. Norell.  
New York: Raven Press, 1992, pp. ix + 192.

Contents:

1. Introduction
2. Cohort design
3. Systematic error
4. Random error
5. Exercises for Chapters 1-4
6. Principles of case-control design
7. Case-control Design A
8. Case-control Design B
9. Case-control Design C
10. Exercises for Chapters 6-9
11. Choice of study design
12. Interpretation of results

Readership: Medical students, health care professionals

The text is lean (88 pages), the exercises/ answers muscular (44 pages) and the references pleasantly plump (40 pages, 700 citations). The stated goal of this volume is to coach the reader in critical assessment of epidemiologic study, design and accuracy. A series of definitions and examples describes the methods of epidemiology. The text is in fact largely an amplification of the six-page glossary. Statistical formulae are completely absent which frustrated this reviewer. However, it is entirely possible that medical scientists will like the omission of statistical techniques.

University of Washington  
Seattle, U.S.A.

P. Feigl

STATISTICAL METHODS FOR SURVIVAL DATA ANALYSIS,  
2nd edition. E.T. Lee. New York: Wiley, 1992,  
pp xii + 482, £47.50.

Contents:

1. Introduction
2. Functions of survival time
3. Examples of survival data analysis
4. Nonparametric methods of estimating survival functions
5. Nonparametric methods for comparing survival distributions
6. Some well-known survival distributions and their applications
7. Graphical methods for survival distribution fitting and goodness of fit tests
8. Analytical estimation procedures for survival distributions
9. Parametric methods for comparing two survival distributions
10. Identification of prognostic factors related to survival time
11. Identification of risk factors related to dichotomous data
12. Planning and design of clinical trials I
13. Planning and design of clinical trials II

Readership: Statisticians, epidemiologists

This is a revised edition of a book first published in 1980. According to the author's preface "The book has been written for biomedical investigators, statisticians, epidemiologists and researchers in other disciplines who are involved or interested in analyzing survival data". In addition to standard topics in survival analysis such as life-table estimation, proportional hazards models and the fitting of parametric survival curves, the book includes discussion of logistic regression, discrimination, and topics in the planning of clinical trials. The book is intended to be less mathematically demanding than texts such as Kalbfleisch and Prentice (1980) [*Short Book Reviews*, Vol.0, p.2] or Cox and Oakes (1984) [*Short Book Reviews*, Vol.4, p.35], and the treatment is more discursive than in those books. However, some degree of mathematical sophistication is required.

University of Rochester  
Rochester, U.S.A.

D. Oakes

THE USE OF RESTRICTED SIGNIFICANCE TESTS IN CLINICAL TRIALS. D.S. Salsburg. New York: Springer-Verlag, 1992, pp. x + 173, DM.78.00.

Contents:

1. The randomized controlled clinical trial
2. Probability models and clinical medicine
3. Significance tests versus hypothesis tests
4. Neyman's insights
5. Reconciling Fisher and Neyman
6. Continuous measures taken over time
7. Combining data across measures
8. Counts of events
9. Permutation tests and resampling techniques
10. Neyman's restricted chi-square tests
11. Miscellaneous methods for increasing power
12. Bayesian estimation
13. An example of the type of analysis suggested in this book

Readership: Fairly sophisticated statisticians

For those who know or know of David Salsburg the most radical

attribute of this book is that it is not radical. Salsburg does an excellent job in his personalized and practical summary of some major statistical controversies of the 20<sup>th</sup> Century. Though this summary relates only indirectly to his principal thesis of "statistical science, please", my paraphrase, it is entertaining and informative. Salsburg's view from the trenches leads to an approach to hypothesis testing based on targeted, restricted, alternatives instead of omnibus tests. He proposes that these alternatives must be based on scientific understandings. If aimed in the appropriate direction restricted alternatives will increase power. He explains his philosophy through creative approaches to interesting examples and includes extensive data and analysis in Chapter 13.

I am not completely pleased with the book. Salsburg's historical review adds little to recent books. He tantalizes the reader until finally on page 29 he mentions "Bayes". His examples, while realistic, are from applications where sufficient information exists to formulate a restricted alternative. At times his tone is a bit too cute.

Though experienced statisticians may react to the book by thinking that they already know and practice a similar philosophy, all readers will benefit from the reminder that most hypothesis tests target a specific alternative and that, as Salsburg writes on page 160: "...statistics should be the handmaiden of medical research ... and not its jailer."

University of Minnesota  
Minneapolis, U.S.A.

T.A. Louis

ANALYSIS OF QUANTAL RESPONSE DATA. B.J.T. Morgan.  
London: Chapman and Hall, 1992, pp. xx + 511, £35.00.

Contents:

1. Data and models
2. Maximum-likelihood fitting of simple models
3. Extensions and alternatives
4. Extended models for quantal assay data
5. Describing time to response
6. Over-dispersion
7. Non-parametric and robust methods
8. Design and sequential methods

Readership: Senior undergraduate and graduate students in biostatistics, toxicology and pharmacology

This book is a welcome addition to the analysis of dose-response quantal bioassays which are so important in toxicology and pharmacology. It contains eight chapters with over fifty real sets of data as well as two hundred and sixty-seven exercises with solutions to many. Most major computing software, including SAS, GLIM and MINITAB, are described and illustrated. The proofs and derivations are minimal. The chapters on over-dispersion and time-dependent experiments are extraordinarily comprehensive. There are over seven hundred recent references. Although this book does not contain analysis of quantitative assays, it contains the best collection and description of all known methods in quantal bioassays.

University of Guelph  
Guelph, Canada

J.J. Hubert

PROBABILITY AND RANDOM PROCESSES, 2nd edition.  
G.R. Grimmett and D.R. Stirzaker. Oxford: Clarendon Press, 1992, pp. xii + 541, £22.50 Paper.

Contents:

1. Events and their probabilities
2. Random variables and their distributions
3. Discrete random variables

4. Continuous random variables
5. Generating functions and their applications
6. Markov chains
7. Convergence of random variables
8. Random processes
9. Stationary processes
10. Renewals
11. Queues
12. Martingales
13. Diffusion processes

PROBABILITY AND RANDOM PROCESSES. PROBLEMS AND SOLUTIONS. G.R. Grimmett and D.R. Stirzaker. Oxford: Clarendon Press, 1991, pp. x + 366, £49.50 Paper.

Contents: Idem as the previous contents

Readership: Students and professionals interested in probability

Already in my 1983 review of the first edition of the book [Short Book Reviews, Vol.3, p.5.], I praised this text as an interesting addition to the long list of textbooks on probability. The present text has an extra two hundred pages which is reflected in changes and updates in all chapters, together with the addition of a new chapter on martingales and the splitting of a previous chapter on stationarity and diffusion into two separate chapters. Many new examples and exercises have been added. As it stands, this is definitely one of my favourites as a textbook. In the self-contained companion volume, all problems and exercises, six hundred and seventy-five, of the main text are listed and solved. This results in a wealth of interesting teaching material at all levels. My main concern remains to what extent students will have the willpower to follow the authors' advice in the preface: 'Make two serious attempts at each question before reading its solution.' It will definitely force ex-aminers to be even more inventive in setting future examination papers.

ETH-Zentrum  
Zürich, Switzerland

P.A.L. Embrechts

PROBABILITY AND ITS APPLICATIONS FOR ENGINEERS.  
D.H. Evans. New York: Dekker, 1992, pp. x + 634,  
US\$89.75.

Contents:

PART I

1. Preliminaries of probability
2. Finite sample spaces
3. Two or more events
4. Random variable, distribution function, and expected value
5. Functions of a random variable
6. Two or more random variables

PART II

7. Statistics
8. Quality control: Control charts
9. Tolerancing, error analysis and parameter uncertainty
10. Reliability engineering, by K.C. Kapur
11. Random processes and congestion
12. Decision trees

Readership: Advanced undergraduate, beginning graduate engineering students; practising engineers

Part I of this book may be thought of as a standard introduction to probability theory for engineers. Most theorems in this part are proved,

with the usual exceptions and limitations. Some nice examples, for example in quality control, telephone networks, show the student how he can already use his knowledge at this early stage for solving practical problems. The presentation of the first part is such that it can be used for the practising engineer as a collection of useful distributions and standard formulas.

Part II of this book is based on the first part but every chapter is self-contained and gives an introduction to various fields of interest of the engineer. The author aims to introduce basic concepts without proofs in applied fields like statistics, quality control and reliability. The interested reader can also find some references to more advanced and specialized topics in these areas thus providing "guidance needed to get help". These and numerous interesting exercises form the core of this well-written book. I am convinced that many engineering students will find this a very readable introduction to probability theory and its applications.

University of Victoria

Wellington, New Zealand

T. Mikosch

ADVENTURES IN STOCHASTIC PROCESSES. S.I. Resnick.

Boston: Birkhäuser, 1992, pp. xii + 626,

Sw.fr.118.00.

Contents:

1. Preliminaries: Discrete index sets and/or discrete state spaces
2. Markov chains
3. Renewal theory
4. Point processes
5. Continuous time Markov chains
6. Brownian motion
7. The general random walk

Readership: Students of stochastic processes

This text is intended to be accessible to beginning students of stochastic processes as well as those with more background; the author indicates some variation in routes through topics according to students' expertise. Though some basic probability theory is required, no previous exposure to measure theory is assumed and, where certain measure-theoretic ideas are introduced, such as in a discussion of stopping times in Chapter 1, over-dependence on them may be avoided. As the contents list indicates, a good variety of topics is treated in some depth, though martingale theory is not included. Chapter 7 deals with Wiener-Hopf factorization, with some applications here, as often elsewhere in the book, to queueing processes. There is a large number of exercises and, frequently characteristic, examples. It appears that a companion disc is in preparation for solution of numerical examples.

Imperial College of Science,

Technology and Medicine

London, U.K.

C.J. Ridler-Rowe

APPLIED MULTIVARIATE DATA ANALYSIS. Volume II:

Categorical and Multivariate Methods. J.D. Jobson.

New York: Springer-Verlag, 1992, pp. xi + 731 + disk,

DM.118.00.

Contents:

1. Contingency tables
2. Multivariate distributions, inference, regression and canonical correlation
3. MANOVA, discriminant analysis and qualitative response models
4. Principal components, factors and correspondence analysis

5. Cluster analysis and multidimensional scaling

Readership: University students in a second course

This is the second of a two-volume survey totalling 1352 pages, under the general heading 'Applied Multivariate Data Analysis'. For a review of the first volume, see Short Book Reviews, Vol. 12, p.8. This volume constitutes a thorough treatment of multi-variate topics, with a heavy emphasis on working through all the practical details associated with each of the sociological or business types of example chosen to demonstrate the topics. The notation of these examples assumes the use of a computer package, with MINITAB, SPSSX and SAS having been used by the author,

although no specific programming assistance is given. The exercises are follow-ups to these examples, and the twenty-two sets of data are supplied on a disk supplied with the book. The questions are designed to extend the theory but are laid out in a helpful manner for the student reader. As with the first volume, the graphics and presentation are good.

University of Manchester

Institute of Science and Technology

Manchester, U.K.

P.J. Laycock

A FIRST COURSE IN ORDER STATISTICS. B.C. Arnold,

N. Balakrishnan and H.N. Nagaraja. New York: Wiley,

1992, pp. xvii + 279, £39.95.

Contents:

1. Introduction and preview
2. Basic distribution theory
3. Discrete order statistics
4. Order statistics from some specific distributions
5. Moment relations, bounds, and approximations
6. Characterizations using order statistics
7. Order statistics in statistical inference
8. Asymptotic theory
9. Record values

Readership: Students in mathematical sciences at the first-year graduate and advanced undergraduate levels

Order statistics is perhaps no longer such an important field, at any rate in statistical inference, as was once thought it would be. Only extreme values flourish. Still, any serious probabilist and statistician should know something about the underlying theory, and for such a purpose this book, or part of it, will serve excellently. It is a matter of taste whether the material on characterizations should have been included. 'Record values' is perhaps not always considered as a part of order statistics, but the inclusion herein is logical and welcome.

University of Lund

Lund, Sweden

G. Blom

PREDICTION THEORY FOR FINITE POPULATIONS. H. Bolfarine

and S. Zacks. New York: Springer-Verlag, 1992,

pp. xi + 207, DM.98.00.

Contents:

1. Basic ideas and principles
2. Optimal predictors of population quantities
3. Bayes and minimax predictors
4. Maximum likelihood predictors
5. Classical and Bayesian prediction intervals
6. The effects of model misspecification, conditions for robustness, and Bayesian modelling

7. Models with measurement errors
8. Asymptotic properties in finite populations
9. Design characteristics of predictors

Readership: Graduate students, mathematical statisticians

Statistical inference for finite populations and survey sampling is introduced from the perspective of superpopulation models. The general approach is to bring to bear classical results in statistical optimality and decision theory in a theory based on predictive inference. The approach adopted emphasizes the optimality properties of particular classes of estimators, for given data, with little discussion of sampling design. Substantial references are provided to the considerable literature in this area, and exercises are provided in

each chapter, making the text suitable for an advanced course in superpopulation models.  
Macquarie University  
Sydney, Australia

M. Hudson

AN INTRODUCTION TO STOCHASTIC PROCESSES AND THEIR APPLICATIONS. P. Todorovic. New York:

Springer-Verlag, 1992, pp. xiii + 289, DM.98.00.

Contents:

1. Basic concepts and definitions
2. The Poisson process and its ramifications
3. Elements of Brownian motion
4. Gaussian processes
5.  $L_2$  space
6. Second-order processes
7. Spectral analysis of stationary processes
8. Markov processes I
9. Markov processes II: Application of semigroup

theory

10. Discrete parameter martingales

Readership: Graduates with a sound grasp of probability and measure theory

Here we have a modern, reasonably rigorous theoretical treatment of some of the major features of the stochastic process landscape. Ideas such as coupling and stochastic integration, familiar in the advanced literature are now making an appearance at a popular graduate level. In particular the differential equation approach to the Poisson process is replaced by methods based around a coupling argument. A lot of effort is devoted to stationary and Markov processes; renewal, queueing and branching processes are discussed only briefly, if at all. The proofs are clear with sufficient detail although an appendix with important results from measure theory would have been useful. Plenty of exercises are given at the end of each chapter. There was very little evidence of the applications referred to in the title.

Macquarie University  
Sydney, Australia

J.R. Leslie

MULTIVARIATE DENSITY ESTIMATION: THEORY PRACTICE AND VISUALIZATION. D.W. Scott. New York: Wiley, 1992,

pp. xii + 317, £47.50.

Contents:

1. Representation and geometry of multivariate data
2. Nonparametric estimation criteria
3. Histograms: Theory and practice
4. Frequency polygons
5. Average shifted histograms
6. Kernel density estimators
7. The curse of dimensionality and dimensionality reduction
8. Nonparametric regression and additive models
9. Other applications

Readership: Graduate students of statistics, statisticians, biostatisticians,

electrical engineers, econometricians, and other scientists involved in data analysis

The author's aim is to demonstrate that density estimation can be a powerful tool in spaces with more than two dimensions, with special emphasis on the trivariate and quadrivariate. He attempts to cover both theoretical and practical aspects and hopes the book will serve both as an introductory text and also as a general reference. I think he succeeds.

The development is from the familiar background of the histogram and the relationships between estimators is emphasized. The key role of graphical displays is noted. There is a nice introductory discussion about the merits of different types of method, and how a technique which is theoretically best in some circumstances may in fact not be the one that is practically best. Overall the discussion is well set in historical context and the development from one topic to another is natural. The book is extremely well written. Overall I strongly recommend it to anyone who wants an overview of an area which is of growing importance.

The Open University  
Milton Keynes, U.K.

D.J. Hand

CURRENT ISSUES IN STATISTICAL INFERENCE: ESSAYS IN HONOR OF D. BASU. M. Ghosh and P.K. Pathak, (Eds.).

Hayward, California: Institute of Mathematical Statistics, 1992, pp. iv + 264, US\$25.00.

Contents:

PART I : Foundational Issues in Statistical Inference

1. Conditional inference from confidence sets, G. Casella
2. Intervention experiments, randomization and inference, O. Kempthorne
3. Ancillarity, E.L. Lehmann and F.-W. Scholz
4. The Pitman closeness of statistical estimators:

Latent years and the renaissance, P.K. Sen

5. Unbiased sequential binomial estimation, Bimal K. Sinha and Bikas K. Sinha
6. Sufficiency, S. Yamada and H. Morimoto

PART II: Bayesian Methods

7. Foundations of statistical quality control, R.E. Barlow and T.Z. Irony
8. Prequential data analysis, A.P. Dawid
9. Bayesian nonparametric inference, T.S. Ferguson, E.G. Phadia and R.C. Tiwari
10. Hierarchical and empirical Bayes multivariate estimation, M. Ghosh
11. Basu's contributions to the foundations of sample survey, G. Meeden

PART III: Sampling, Designs and Majorization

12. Survey sampling - As I understand it, V.P. Godambe
13. Two basic partial orderings for distributions derived from Schur functions and majorization, K. Joag-Dev and J. Sethuraman
14. Optimal integration of surveys, P.K. Pathak and M. Fahimi
15. The model based (prediction) approach to finite population sampling theory, R.M. Royall
16. Sampling theory using experimental design concepts, J. Srivastava and Z. Ouyang

Readership: Statisticians interested in statistical inference, especially its foundations

This volume is a Festschrift to Professor D. Basu on the occasion of this 65th birthday. The sixteen articles that constitute the volume are written by friends and colleagues of Professor Basu. The papers are mostly of the review type, and the majority of them relate closely to Dr. Basu's many, varied and important, contributions to statistical

inference.

Overall the volume contains little original material, and some of the papers are rather specialized [4,5,14]. Others [1,3,6] address subject areas of wide interest and basic importance and provide useful overviews of some parts of those areas. However, further parts, of much current interest, are not mentioned or only slightly indicated.

Of very considerable value are the contributions [9] and [16]. The first provides an overview of the extensive amount of material on random probability distributions and their relation to nonparametric Bayesian inference that has appeared within the fifteen years following the 1974 review article by T.S. Ferguson and which is scattered over the statistical and probabilistic literature. Much of the theory revolves around the class of Dirichlet processes. In [16] a highly illuminating and readable discussion is given of the progress made in the model-based approach to finite population sampling and of the light this throws on the randomization-based methodology. It is gratifying to see how basic ideas of main stream statistical inference are coming to play the same kind of role in finite population sampling that they have in other parts of statistics.

University of Aarhus

Aarhus, Denmark

O.E. Barndorff-Nielsen

#### ITEM RESPONSE THEORY: PARAMETER ESTIMATION

TECHNIQUES. F.B. Baker. New York: Dekker, 1992, pp. xiii + 440, US\$143.75.

Contents:

1. The item characteristic curve: Dichotomous response
2. Estimating the parameters of an item characteristic curve
3. Maximum likelihood estimation of examinee ability
4. Maximum likelihood procedures for estimating both ability and item parameters
5. The Rasch model
6. Parameter estimation via marginal maximum likelihood estimation and an EM algorithm
7. Bayesian parameter estimation procedures
8. The graded item response
9. Nominally scored items
10. Implementation of maximum likelihood estimation of item parameters
11. Implementation of maximum likelihood estimation of examinee's ability
12. Implementation of item parameter estimation via MMLE/EM
13. Implementing the Bayesian approach
14. Implementation of item and ability parameter estimation under a graded response model
15. Implementation of maximum likelihood estimation of item and ability parameters under normal response scoring

Readership: Specialists in psychometrics

The item response models dealt with in this book belong to the class of factor analysis models with categorical response variables. The author considers only one-dimensional models, and for the most part the special cases where the response is binary. The latter models are widely used in psychometric test construction and analysis, where a set of test item responses is viewed as a two-way table of subjects by items with a response in each cell of the table. This book gives details of the estimation procedures commonly applied to these models with appendices setting out source code programs written in BASIC. There are no data analyses presented, and there is no attempt to provide any substantive justification for the use of such models or the problems associated with the restriction to one-dimension. For readers who want a broader statistical perspective on these models the book by Bartholomew Latent Variables and Factor Analysis can be recommended.

Institute of Education

University of London

London, U.K.

H. Goldstein

#### NUMERICAL SOLUTION OF STOCHASTIC DIFFERENTIAL

EQUATIONS. P.E. Kloeden and E. Platen. Berlin:

Springer-Verlag, 1992, pp. xxxv + 632, DM.118.00.

Contents:

PART I : Preliminaries

1. Probability and statistics
2. Probability and stochastic processes

PART II : Stochastic Differential Equations

3. Itô stochastic calculus
4. Stochastic differential equations
5. Stochastic Taylor expansions

PART III: Applications of Stochastic Differential Equations

6. Modelling with stochastic differential equations
7. Applications of stochastic differential equations

PART IV : Time Discrete Approximations

8. Time discrete approximation of deterministic differential equations
9. Introduction to stochastic time discrete approximation

PART V : Strong Approximations

10. Strong Taylor approximations
11. Explicit strong approximations
12. Implicit strong approximations
13. Selected applications of strong approximations

PART VI : Weak Approximations

14. Weak Taylor approximations
15. Explicit and implicit weak approximations
16. Variance reduction methods
17. Selected applications of weak approximations

Readership: Everyone interested in the theory and applications of stochastic differential equations

By now, the theory of stochastic differential equations is well understood. Over the last years, we have seen many important applications in such diverse fields as for instance biology and finance. In this book, the authors give a comprehensive and self-contained overview of the basic stochastic differential equation theory, its many applications and above all, a detailed discussion of the numerical aspects of solving stochastic differential equations. The reader is amply warned that for the latter, one cannot 'just use a stochastic version of the deterministic analogue'. Many examples, exercises and so-called PC-exercises make this text an impressive and scholarly piece of work. The authors do not content themselves with only explaining the mathematical results, but they spend a lot of effort in convincing the reader to actually sit down and work out some examples. More of this hands-on approach is to be expected from the companion volume The Numerical Solution of Stochastic Differential Equations through Computer Experiments. It is really remarkable that the authors have succeeded in writing a text for a very wide audience including those who actually want to solve a given stochastic differential equation and those doing research in the field. It is clear that a short review cannot fully do justice to the enormous amount of work which has gone into the preparation of the manuscript. I can highly recommend this text to all students and researchers alike who want to start using stochastic differential equations in applications.

ETH-Zentrum

Zürich, Switzerland

P.A.L. Embrechts

QUEUEING AND RELATED MODELS. U.N. Bhat and I.V. Basawa

(Eds.). Foreword by N.U. Prabhu. Oxford: Clarendon Press, 1992, pp. xvii + 348, £50.00.

## Contents:

## PART I : Some General Techniques for Analysing Queueing and Related Models

1. Level-crossing analysis of queues, B. Doshi
2. Random allocation in a waiting room problem, J. Gani
3. Dynamic analysis of matrix Lindley process with replacement, Y. Masuda and U. Sumita

4. Reversibility and compound birth-death and migration processes, R.F. Serfozo

## PART II : Some Queueing Models

5. Feedback retrial queueing systems, B.D. Choi and V.G. Kulkarni
6. A limit theorem on the output of GI/M/? queues, H. Kaspi and M. Rubinovitch

7. A tandem fluid network with Lévy input, O. Kella and W. Whitt
8. Second-order properties of single-stage queueing systems, L. Liyanage and J.G. Shanthikumar

9. On the relationship between stationary and Palm moments of backlog in the G/G/1 priority queue, M.A. Wortman and R.L. Disney

## PART III: Approximations and Numerical Analysis

10. Inequalities concerning the waiting time in single-server queues: A survey, D.J. Daley, A. Ya. Kreinin and C.D. Trengove

11. An algorithm for finding characteristic roots of quasi-triangular Markov chains, C.M. Harris, W.G. Marchal and R.W. Tibbs

12. Approximating the distribution of the maximum queue length for M/M/s queues, W.P. McCormick and Y.S. Park

13. Numerical transient solution of finite Markovian queueing systems, J.K. Muppala and K.S. Trivedi

14. Approximations of performance characteristics in periodic Poisson queues, T. Rolski

## PART IV : Control and Inference

15. Admission to a general stochastic congestion system: Comparison of individually and socially optimal policies, M. Bartroli and S. Stidham, Jr.

16. Sequential inference for single-server queues, I.V. Basawa and B.R. Bhat

17. Some results on inference for stationary processes and queueing systems, C.C. Heyde

Readership: Research workers in queueing theory and applications

This book, dedicated to N.U. Prabhu, is a collection of invited and refereed papers covering a variety of recent research in queueing theory. Several of the chapters illustrate new computational techniques and applications, others are reviews of previously scattered results together with further developments, and others present theoretical advances. Taken as a whole, the book certainly succeeds in giving an accurate reflection of the nature of a wide cross-section of current research, and should be of interest to both beginning and established research workers in this area.

University College London

London, U.K.

S.M. Pitts

LECTURES ON THE COUPLING METHOD. T. Lindvall.

New York: Wiley, 1992, pp. xii + 257, £39.95.

## Contents:

Introduction

PART I : Preliminaries

PART II : Discrete Theory

PART III: Continuous Theory

PART IV : Inequalities

PART V : Intensity-Governed Processes

PART VI : Diffusions

Readership: Probabilists and applied probabilists

Over the last two decades coupling techniques have opened new vistas,

sharpened insights, and provided incisive proofs in many areas of probability. This book provides the first systematic treatment of the subject. It is aimed at readers with a sophisticated understanding of probability. In keeping with the title, the style of the book is compact, however technicalities are fully signposted and in some cases treated in detail. Perhaps in contrast to the implication of the title, the coverage is both broad and thorough. In some cases, for example, comparison techniques, it serves to show what is possible, easily, from the coupling method. In others, notably renewals and regeneration, it gives an essentially complete treatment, using coupling, of much of the classical theory. It is a reflection on both the beauty of the method and on the skills of the author that the book is so enjoyable to read.

Queen Mary and Westfield College

London, U.K.

P.J. Donnelly

ANALYSIS OF RANDOM WALKS. J.W. Cohen. Amsterdam: IOS Press, 1992, pp. vii + 382, Dfl.180.00/60.00/US\$98.00.

## Contents:

1. One-dimensional random walks
2. Two-dimensional random walks
3. The two-dimensional workload process
4. The N-dimensional random walk

Readership: Pure probabilists, queueing theorists

In the last few years, several books have appeared on random walks. Most of them are mostly devoted to weak and strong limit theorems. The present book deals with exact results like the characterization of the generating functions of different sequences of random variables and stochastic processes. The most important models are the reflecting and absorbing random walks and workload processes in the one- and two-dimensional cases. Some of the results are extended to the n-dimensional random walk.

Technical University

Vienna, Austria

P. Révész

PASSAGE TIMES FOR MARKOV CHAINS. R. Syski.

Amsterdam: IOS Press, 1992, pp. x + 550, Dfl.180.00/60.00/US\$98.00.

## Contents:

PART I : Preliminaries

1. Markovianity
2. Passage probabilities

PART II : Analytic Theory

3. First entrance times
4. Last exit times
5. Dirichlet problem and Poisson equation
6. Decomposition theorems
7. Examples

PART III: Measure Theory

8. Functionals and potentials
9. Transformations

10. Extensions

PART IV : Applications

11. Structures
12. Boundary theory
13. Examples

Readership: Applied probabilists

"The book is a survey of work on passage times in stable Markov chains with a discrete state space and a continuous time parameter".

The main language used is that from probabilistic potential theory. Besides giving a unifying approach to passage time problems, the author spends much time on discussing various applications to specific chains. As such, the reader gets a good overview of the potential applicability of certain techniques without getting lost in some of the more intricate measure theoretic problems encountered for general Markov processes. The latter theory is appropriately referenced throughout the book. The text can be used for a postgraduate course on the topic or isolated chapters may be brought in to complement a standard course on Markov chains. Students as well as researchers with an interest towards applications will find this a useful book.

ETH-Zentrum

Zürich, Switzerland

P.A.L. Embrechts

RANDOM WALKS, CRITICAL PHENOMENA, AND TRIVIALITY IN QUANTUM FIELD THEORY. R. Fernández, J. Fröhlich and

A.D. Sokal. Berlin: Springer-Verlag, 1992,

pp. xiii + 444, DM.120.00.

Contents:

PART I : Critical Phenomena, Quantum Field Theory,

Random Walks and Random Surfaces: Some

Perspectives

1. General introduction
2. Phase transitions and critical points in classical spin systems: A brief survey
3. Scale transformation and scaling (continuum limits in lattice spin systems)
4. Construction of scaling limits: The renormalization group
5. Random walks as Euclidean field theory (EFT)
6. EFT as a gas of random walks with hard-core interactions
7. Random surface models

PART II : Random-Walk Models and Random-Walk

Representations of Classical Lattice Spin Systems

8. Introduction
9. Random-walk models in the absence of magnetic field
10. Random-walk models in the presence of a magnetic field
11. Factorization and differentiation of the weights
12. Correlation inequalities: A survey of results

PART III: Consequences for Critical Phenomena and

Quantum Field Theory

13. Background material
14. Inequalities for critical exponents
15. Continuum limits

Readership: Researchers in mathematical physics and probability theory

This book provides a mathematical treatment of issues related to universality in statistical physics. Universality is the principle that "physical systems are divided, according to their critical behaviour, into a relatively small number of classes". These classes are determined by the values of and relations among their critical exponents, which are the powers describing the divergence of quantities of physical interest at critical points in the parameter space. Information about critical exponents for many models has been obtained numerically and by the use of renormalization group arguments. Rigorous results about them are usually derived using correlation inequalities. Many of these inequalities, on the other hand, are based on random walk-type representations for the models of interest. In this work, three of the more important contributors to our understanding of this circle of ideas have provided us with a wealth of information in a clear and attractive form.

University of California

Los Angeles, U.S.A.

T.M. Liggett

AN INTRODUCTION TO THE MODELLING OF NEURAL NETWORKS.

P. Peretto. Cambridge University Press, 1992,

pp. xviii + 473, £60.00 Cloth; £24.95 Paper.

Contents:

1. Introduction
2. The biology of neural networks: A few features for the sake of non-biologists
3. The dynamics of neural networks: A stochastic approach
4. Hebbian models of associative memory
5. Temporal sequences of patterns
6. The problem of learning in neural networks
7. Learning dynamics in 'visible' neural networks
8. Solving the problem of credit assignment
9. Self-organization
10. Neurocomputation
11. Neurocomputers
12. A critical view of the modelling of neural networks

Readership: Graduate students, physicists and applied mathematicians, neurobiologists

Given the extraordinarily large numbers of neurons comprising the central nervous systems of higher organisms, a statistical approach in the sense of statistical physics to the theory of neural networks is very attractive. This book addresses both physicists and applied mathematicians, for whom an introduction to the biological background is provided, and neuro-biologists who want to go beyond the traditional descriptive approach of neurobiology, though they must be able to handle the mathematics. The author states that 'the book presents the status (sic) of the art in the field of neural networks that has been reached by the end of 1988', which makes one feel a little uneasy given the acknowledged pace of development in the field. Indeed, in the preface the author stresses that a single volume can nowadays only hope to serve as an introduction to what has become a very large subject. Nevertheless, he has made a creditable attempt to be comprehensive. The English is a little stilted in places, but the forty-five pages of references will provide a useful source.

The Open University

Milton Keynes, U.K.

D.J. Hand

THE DESIGN OF RELATIONAL DATABASES. H. Mannila and

K.J. Räihä. Wokingham, U.K.: Addison-Wesley,

1992, pp. xii + 318, £24.95.

Contents:

1. Introduction
2. An overview of database design
3. The entity-relationship model
4. The relational model
5. Object-oriented data models
6. Design principles
7. Integrity constraints and dependencies
8. Properties of relational schemas
9. Axiomatizations for dependencies
10. Algorithms for design problems
11. Mappings between ER-diagrams and relational database schemas
12. Schema transformations
13. Efficient algorithms for design problems
14. Use of example database in design
15. Dependency inference

Readership: Final year undergraduate and postgraduate students of database design, database design practitioners

The first chapter of the book points out some drawbacks of traditional methods for designing relational databases and states that the main goal of the book is to develop a theory of database design, 'Design-by-example', which overcomes them. This might make it sound as if the book is rather specialized, but in fact it does give a good introduction to relational database technology. Algorithms and methods for the use of example databases in database design are presented and the software tool 'Design-by-example' is currently under development, with release intended in 1993. Exercises and bibliographic notes are included at the end of each chapter. No prior knowledge of database systems of design is assumed and overall I found this a clear and well-written book and would recommend it.

The Open University  
Milton Keynes, U.K.

D.J. Hand

ALGORITHMS, ROUTINES, AND S FUNCTIONS FOR ROBUST STATISTICS. THE FORTRAN LIBRARY ROBETH WITH AN

INTERFACE TO S-PLUS. A. Marazzi. With the collaboration of J. Joss and A. Randriamiharisoa. Pacific Grove, California: Wadsworth and Brooks/Cole, 1993, pp. xii + 436, US\$59.95.

Contents:

Introduction

1. Location problems
2. M-estimates of coefficients and scale in linear regression
3. Weights for bounded influence regression
4. Covariance matrix of the coefficient estimates
5. Asymptotic relative efficiency of regression M-estimates
6. Robust testing in linear models
7. High breakdown point regression
8. M-estimates of covariance matrices
9. Mixed procedures
10. M-estimates for discrete generalized linear models
11. Weight functions
12. Utility routines
13. FORTRAN sources
14. S-PLUS interface

Readership: Statisticians interested in statistical computing, experimental scientists and research workers interested in modern statistical methods

This book is a collection of algorithms that allows the computation of a broad class of robust statistical procedures. These procedures are based on M-estimation and high breakdown point estimation, including robust regression, robust testing of linear hypotheses and robust covariances. All of the algorithms are implemented into the FORTRAN subroutine library ROBETH. It is possible to use ROBETH routines with many common packages, such as SAS, SPSS, etc., provided tools for interfacing FORTRAN routines exist in these packages. The authors discuss this interface to the statistical environment S-PLUS. The book is well organized and readable. Most chapters are organized into three primary sections: the first describes the statistical methodology, the second contains the description of FORTRAN subroutines and the third presents examples for using subroutines by means of S-PLUS interface. Anyone with an interest in statistical software will find this book and the added software useful.

Sevastopol Instrument Making Institute  
Sevastopol, Ukraine

A.V. Tsukanov

INTRODUCTION TO SHAPE OPTIMIZATION. Shape Sensitivity Analysis. J. Sokolowski and J.-P. Zolesio. Berlin: Springer-Verlag, 1992, pp. 250, DM.128.00.

Contents:

1. Introduction to shape optimization
2. Preliminaries and the material derivative method
3. Shape derivatives for linear problems
4. Shape sensitive analysis of variational inequalities

Readership: Mathematicians especially those interested in optimization

Shape optimization refers to the problem of adjusting the shape of an object in order to achieve the best performance for a given purpose. For example, one might ask what is the best shape for the fins on a radiator in order to dissipate the most heat from a specified volume of material. Problems of this nature occur in many areas including thermodynamics, fluid mechanics, structures and electronics. The solution of these problems depends upon variational methods for systems governed by partial differential equations. This book outlines a range of approaches to these problems and shows how appropriate differentials can be obtained for different classes of problems. This research monograph is recommended to people who are interested in solving engineering problems involving the optimization of shape.

University of Newcastle  
Newcastle, Australia

G.C. Goodwin

NUMERICAL METHODS FOR STOCHASTIC CONTROL PROBLEMS IN

CONTINUOUS TIME. H.J. Kushner and P.G. Dupuis. New York: Springer-Verlag, 1992, pp. ix + 439, DM.98.00.

Contents:

1. Review of continuous time models
2. Controlled Markov chains
3. Dynamic programming equations
4. The Markov chain approximation method: Introduction
5. Construction of the approximating Markov chain
6. Computational methods for controlled Markov chains
7. The ergodic cost problem: Formulations and algorithms
8. Heavy traffic and singular control problems: Examples and Markov chain approximations
9. Weak convergence and the characterization of processes
10. Convergence proofs
11. Convergence for reflecting boundaries, singular control and ergodic cost problems
12. Finite time problems and nonlinear filtering
13. Problems from the calculus of variations
14. The viscosity solution approach to proving convergence of numerical solutions

Readership: Mathematicians with an interest in stochastic processes and stochastic control

This book is concerned with the numerical solution of various problems in the study of stochastic processes. The essential idea is to approximate the problem via a Markov chain on a finite state space. The discretized problem can then be readily solved. This procedure is described in a general format so it can be applied to a wide range of problems. The approximations are developed in such a way that properties of the Markov chain approach those of the original problem as a discretization parameter approaches zero. For those readers who are interested in the formal verification of these facts, the proofs are

given based on Weak Convergence Theory. This is an interesting book for anybody who really wants to solve a stochastic control problem. The key point made in the book is that naive discretization methods may simply not work and thus there is strong motivation to study discretization methods with guaranteed convergence properties.

University of Newcastle  
Newcastle, Australia

G.C. Goodwin

DYNAMIC PROGRAMMING. M. Sniedovich. New York: Dekker, 1992, pp. viii + 410.

Contents:

1. Introduction
- PART I : Science
2. Fundamentals
  3. Multistage decision model
  4. Dynamic programming: An outline
  5. Solving the functional equation
  6. Successive approximations method
  7. Optimal policies
  8. The curse of dimensionality
  9. A perspective on Part I
- PART II : Art

10. Refinements
  11. The state
  12. Parametric schemes
  13. The principle of optimality
- PART III: Epilogue
14. What then is dynamic programming?
- APPENDIX A: Contraction Mapping  
APPENDIX B: Fractional Programming  
APPENDIX C: C-Programming  
APPENDIX D: The Principles of Optimality in Stochastic Processes

Readership: Mathematicians, operational researchers

This text approaches dynamic programming as a methodology, as an approach to problem solving. The discussion is directed to discussing and characterizing the constituents of the dynamic programming model. It uses examples to demonstrate how to make concrete the model's components for specific problems. The use of examples to illustrate the theory avoids the tangle of theory and the idiosyncrasies of a problem that is all too common in dynamic programming texts. The author presents no computational schemes for solving problems; his aim is to elucidate the fundamental and universal character of the dynamic programming model and in this he succeeds completely.

London School of Economics  
London, U.K. S. Powell

## NOTES

THE RISE OF PUBLIC SCIENCE. Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750. L. Stewart. Cambridge University Press, 1992, pp. xxxiv + 453, £45.00/US\$69.95.

What became of the rhetorical promises of the early Royal Society? How was it that the experimental philosophy of the early Newtonians was regarded by some as destructive of British society and by others as its savior? Why did numerous entrepreneurs in the eighteenth century come to see Newton's disciples as the means to ensure success in the wild world of technical adventures? These are some of the questions, the author seeks to answer by exploring the social attitudes toward the claims and activities of the natural philosophers in Britain from the Restoration to the first stage of industrialization.

THE VOICE OF THE DOLPHINS AND OTHER STORIES. Expanded edition. L. Szilard. Introduction by B.J. Bernstein. Stanford, California: Stanford University Press, 1992, pp. vi + 182, US\$24.50 Cloth; US\$10.95 Paper.

This volume was first published in 1961. It comprises a collection of stories by the physicist Leo Szilard (1898-1964). This edition includes a further story which was the origin of the idea for the Moscow-Washington hot line.

D.J. Kevles wrote of the book, "The book is fiction, but it is fiction of a Swiftian nature, addressed to major issues, including those of geopolitics, the arms race, disarmament, population control, the morality of war, and the mismatch between modern man's enormous technical capabilities and his limited moral capacities. There is a continuing vitality in much of the material, which is instructive about apprehensions manifest not only in Szilard's day but in our own concerning the social role of science and technology. I know of no other modern book like it."

GLOBAL WARNING ... GLOBAL WARMING. M.A. Benarde. New York: Wiley, 1992, pp. xi + 317, £24.50.

The book begins with a discussion of seasonal and atmospheric factors

and the potential effects of a higher CO<sub>2</sub>. It describes the work of many researchers who are seeking ways to cope with the expected changes and others who are finding some solutions to the problems.

GLOBAL ENVIRONMENTAL CHANGE. Understanding the Human Dimensions. P.C. Stern, O.R. Young and D. Druckman (Eds.). Washington, D.C.: National Academy Press, 1992, pp. ix + 308. £21.95.

This volume gives a strategy for combining the efforts of national and social scientists to understand how the actions of humans influence the global environment and how change in the environment better influences humans.

ADVERSE EFFECTS OF PERTUSSIS AND RUBELLA VACCINES.

A Report of the Committee to Review the Adverse Consequences of Pertussis and Rubella Vaccines. C.P. Howson, C.J. Howe and H.V. Fineberg (Eds.). Washington, D.C.: National Academy Press, 1991, pp. xii + 367, US\$39.95.

There is some evidence that vaccination against pertussis, whooping cough, and rubella, German measles, is in a small number of cases associated with increased risk of serious illness. Here the controversy over the evidence is examined and a documented assessment of the risk of illness following immunization is presented.

THE HEAVENS ARE FALLING. The Scientific Prediction of Catastrophes in Our Time. W.J. Karplus. New York: Plenum, 1992, pp. xviii + 320, US\$24.95.

The most debated catastrophes, that many scientists have predicted will endanger the lives of many people all over the world, are discussed. These catastrophes include: the depletion of the ozone layer, the greenhouse effect, nuclear radiation, the population explosion, earthquakes. The strengths and weaknesses of arguments of the seriousness of these calamities are given. The shortcomings of scientific prediction are presented.

ELEPHANTS IN THE VOLKSWAGEN: Facing the Tough Questions About Our Overcrowded Country. L. Grant (Ed.). New York: Freeman, 1992, pp. xii + 272, £18.95 Cloth; £11.95 Paper.

In the last century, the United States of America has grown from seventy-five million people to two hundred and fifty million. How can an optimum population be identified and achieved? The answers to these questions are discussed. The editor is a former Deputy Assistant Secretary of State for Environmental and Population Affairs for the U.S. government.

BEYOND THE LIMITS. Global Collapse or a Sustainable Future. D.H. Meadows, D.L. Meadows and J. Randers. Foreword by J. Tinbergen. London: Earthscan, 1992, pp. xix + 300, £9.95.

This volume is the sequel to The Limits to Growth which was published twenty years ago by The Club of Rome. The first volume showed that, if growth trends continued unchanged, the limits to physical growth on the planet would be reached within one hundred years. The book made headlines around the world and sold nine million copies in twenty-nine languages. Many refused to accept the book's conclusions, but global scientific evidence has confirmed the conclusions. In the new volume, it is shown that the world has already overshoot some of its limits and if present trends continue, it is virtually certain there will be global collapse.

But there is a choice. It is shown that a sustainable society is technically and economically feasible if growth in material consumption and population are eased down along with more efficiency in the use of materials and energy, thus achieving a sustainable global future.

A SCIENTIST'S VOICE IN AMERICAN CULTURE. Simon Newcomb and the Rhetoric of Scientific Method. A.E. Moyer (Ed.). Berkeley, California: University of California Press, 1992, pp. xviii + 301, US\$40.00.

Simon Newcomb was born in 1835 and died in 1909, his life spanning the interval between two visits of Halley's Comet. Although a mathematical astronomer, Newcomb spent a large part of his life as a spokesman for the scientific community. The book is divided into three parts: (i) an introduction to the rhetoric of scientific methods, (ii) Newcomb's life and thought, and (iii) a commentary on pragmatism and scientific method.

EMINENT ECONOMISTS. Their Life Philosophies. M. Szenberg (Ed.). Cambridge University Press, 1992, pp. xvi + 304, £24.95/US\$34.95.

Twenty-two short autobiographies of economists are contained in this volume. Those included are: M. Allais, K.J. Arrow, W.J. Baumol, A. Bergson, K.E. Boulding, K. Brunner, J.M. Buchanan, G. Debreu, E.D. Domar, N. Georgescu-Roegen, F. Hahn, C.P. Kindleberger, L.R. Klein, R.A. Musgrave, A. Robinson, W.W. Rostow, P.A. Samuelson, T. Scitovsky, H.A. Simon, R.M. Solow, J. Tinbergen and S. Tsuru.

SCIENCE WITH A SMILE. An Anthology selected by R.L. Weber. Bristol: Institute of Physics, 1992, pp. 452, £19.50/US\$39.00.

In this volume, Professor Weber once again shows the humorous side of science and scientists. His previous anthologies include A Random Walk in Science (1973) and More Random Walks in Science (1982). An

article from the statistical literature is H. Wainer's article, "How to display data badly" American Statistician, 38 (1984) 137-147.

MATHEMATICAL CRANKS. U. Dudley. Washington, D.C.: The Mathematical Association of America, 1992, pp. x + 372, US\$25.00.

From the back cover: "Mathematical Cranks is about mathematical cranks: people who think that they have done something impossible, like trisecting the angle, squaring the circle, duplicating the cube, or proving Euclid's parallel postulate; people who think they have done something they have not, like proving Fermat's Last Theorem, verifying Goldbach's Conjecture, or finding a simple proof of the Four Colour Theorem; people who have eccentric views, from mild (thinking that we should count by 12s instead of 10s) to crazy (thinking that second-order differential equations will solve all problems in economics, politics, and philosophy); people who pray in matrices; people who find the American Revolution ruled by the number 57; people who have in common something to do with mathematics and something odd, peculiar, or bizarre."

SCIENCE AND TECHNICAL WRITING. A Manual of Style. P. Rubens (Ed.). New York: Holt, 1992, pp. xxiii + 513, US\$40.00.

This manual aims to teach writers how to plan consistent and useful scientific and technical documents.

THE ECONOMIST. DESK COMPANION. How to Measure, Convert, Calculate and Define Practically Anything. P. Butler (Ed.). New York: Holt, 1992, pp. 272, US\$40.00.

This volume is divided into four parts: Part I describes the metric, British and American measurement systems; Part II gives an A to Z subject listing of definitions, special measurements, formulae and calculations for specific industries; Part III gives conversion tables for length, area, volume, etc; Part IV includes common abbreviations and symbols.

COMPARABLE WORTH. Theories and Evidence. P. England (Ed.). New York: De Gruyter, 1992, pp. xii + 346, US\$46.95 Cloth; US\$22.95 Paper.

This book attempts to give an interdisciplinary examination of the issue of comparable worth, i.e. the comparisons between the pay in different jobs.

STATISTICAL PROBLEM SOLVING. W.E. Carr. Milwaukee: ASQC Quality Press/New York: Dekker, 1992, pp. xv + 204, US\$30.00.

Two hundred and fifty-one problems and their solutions are given here. These problems are divided into fifteen categories: probability, combinations and permutations, games, sampling, surveys, population per-cent defective, statistical process control, measurement accuracy, quality control audits, sampling plans, correlation, reliability, moving averages, significance tests, confidence intervals, nonstatistical problems.

LIKELIHOOD. Expanded edition. A.W.F. Edwards. Baltimore: The Johns Hopkins University Press, 1992, pp. xix + 275, US\$48.00 Cloth; US\$18.00 Paper.

The main text of this expanded edition is the same as that of the 1984 paperback edition except for a few corrections. An added appendix contains five re-printed papers of the author.

## PAPER EDITIONS OR REPRINTS

CATASTROPHE THEORY. Third, Revised and Expanded Edition. V.I. Arnol'd. Translated from the Russian by G.S. Wassermann. Based on a translation by R.K. Thomas. Berlin: Springer-Verlag, 1992, pp. xiii + 150, DM.38.00. [Original 1984. Reviewed in Short Book Reviews, Vol. 4, p.17.]

[Original 1991. Reviewed in Short Book Reviews, Vol. 12, p.13].

JEAN-JACQUES ROUSSEAU AND THE 'WELL-ORDERED SOCIETY'. M. Viroli. Translated by D. Hanson. Cambridge University Press, 1992, pp. viii + 247, £35.00/US\$49.95. [First published 1988].

FRACTALS, CHAOS, POWER LAWS. Minutes from an Infinite Paradise. M. Schroeder. New York: Freeman, 1992, pp. xviii + 429, £24.95 Cloth; £15.95 Paper.

## GOVERNMENT PUBLICATIONS

COMMERCE EXTERIEUR. Bulletin du STATEC, No. 4, 1992. Luxembourg: Service Central de la Statistique et des Etudes Economiques, 1992, pp. 36.

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