

GLIMPSES OF INDIA'S STATISTICAL HERITAGE. J.K. Ghosh, S.K. Mitra and K.R. Parthasarathay (Eds.). New Delhi: Wiley Eastern, 1992, pp. ix + 293.

Contents:

1. Remarks on transitive sufficiency, R.R. Bahahdur
2. Learning from counterexamples: At the Indian Statistical Institute in the 1950's, D. Basu
3. My quest for research ideas, V.S. Huzurbazar
4. Random reflections, G. Kallianpur
5. From number theory to national sample survey: An autobiographical letter, D.B. Lahiri
6. Random processes and probabilistic functional analysis: Some contributions, P.R. Masani
7. In statistics by design, K.R. Nair
8. Statistics as a last resort: An autobiographical account, C.R. Rao
9. Combinatorics and I, S.S. Shrikhande
10. Statistics, nutrition, education and social change, P.V. Sukhatme

Readership: General

A substantial number of the world's most influential statisticians in recent decades were born in India, received at least their initial education there and, in many cases, either worked in India or kept substantial contacts there, even if primarily working in other countries. This book celebrates that record by personal statements from ten individuals. The book combines scientific value with considerable human interest.

Your reviewer enjoyed all the essays. It is in some ways invidious to single out particular ones for mention, but the account by the late V.S. Huzurbazar, in particular of his time as H. Jeffreys's only research student in statistics, the comments of P.V. Sukhatme on social issues and the personal details and perspective of his research provided by C.R. Rao are especially striking.

Nuffield College  
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D.R. Cox

PROBABILITY AND THE ART OF JUDGEMENT. R. Jeffrey.

Cambridge University Press, 1992, pp. xi + 244, £32.50/US\$49.95 Cloth; £10.95/US\$16.95 Paper.

Contents:

1. Introduction: Radical probabilism (1991)
2. Valuation and acceptance of scientific hypotheses (1956)
3. Probable knowledge (1968)
4. Probability and the art of judgement (1985)
5. Bayesianism with a human face (1983)
6. Alias Smith and Jones: The testimony of the senses (1987)
7. Conditioning, kinematics, and exchangeability (1988)
8. Preference among preferences (1974)
9. On the interpersonal utility theory (1971)
10. Remarks on interpersonal utility theory (1974)
11. Mises redux (1977)

12. Statistical explanation vs statistical inference (1969)
13. New foundations for Bayesian decision theory (1965)
14. Frameworks for preference (1974)
15. Axiomatizing the logic of decision (1978)
16. A note on the kinematics of preference (1977)

Readership: Statisticians with strong interests in philosophy and decision theories; philosophers with strong interests in statistics and decision theories

"These essays explore a variety of topics, ranging from decision theory and the philosophy of mind to epistemology and scientific methodology, from a probabilistic viewpoint of a sort called subjective (Bruno de Finetti's term), personal (L.J. Savage's) and judgemental (mine) ... ."

"Essay 1 is new; the rest, going back over 35 years, appear here essentially unchanged, with after-thoughts clearly labelled ... ."

The term "radical" in Essay 1 relates to the fact that the familiar form of Bayes Theorem  $P(H|E)=P(E|H)P(H)/P(E)$  is commonly used when E is certainly known to be true. If, with Jeffrey, we doubt the attainability of certain knowledge, some reformulation of Bayesian "probability kinematics" may be needed. This is the principal preoccupation of Essays 5 and 7. Those who, like I, have difficulty with the argument here are recommended to read the paper by Diaconis and Zabell in J.Amer.Stat.Soc. 77, 882-829.

Those who accept frequency interpretations of probability will be depressed by the suggestion in Essay 11 that von Mises' interpretation is the only one available.

Philosophers working in this field pay much respect to the published and unpublished work of F.P. Ramsey. When they come across his references to Fisher's likelihood, one may expect considerable clarification to ensue.

University of Essex  
Colchester, U.K.

G.A. Barnard

A PRACTICAL GUIDE TO STATISTICAL QUALITY IMPROVEMENT: OPENING UP THE STATISTICAL TOOLBOX.

M.R. Beauregard, R.J. Mikulak and B. Olson. New York: Van Nostrand Reinhold, 1992, pp. x + 469.

Contents:

1. Fundamental concepts of total quality management
2. The basic tools
3. The measurement system
4. Statistical process control
5. Using the tools
6. Applications

Readership: Engineers in manufacturing industries interested in quality improvement. No prior knowledge of statistics is assumed, but some facility with basic mathematics would be helpful

This book was "written by working engineers for working engineers" to

provide an accessible introduction to statistically simple but fundamentally important methods that can be useful in industrial quality improvement. The book is ambitious, giving very broad but at times abbreviated coverage. The authors acknowledge that some statisticians may find fault with the short-cuts taken in some of the methods. The book's extended Table of Contents, not shown in the condensed version given here, would make a useful checklist of things for statistical practitioners in industry to know. Most of the material in the book is drawn from other sources. I enjoyed Chapter 6, which is a compilation of ways in which the statistical tools presented in earlier chapters can be applied, for example, in customer service, materials control, maintenance, marketing and sales, human resources, purchasing, safety, etc. However, I was disappointed by what appears to have been hasty proofreading, which resulted in errors ranging from the incorrect spelling of the name of R.A. Fisher on page 462 to incorrect statements of the area under the normal curve on page 408. These kinds of errors, which likely occur elsewhere in the book as well, could result in invalid analyses performed by non-statisticians who must depend on the absolute correctness of their statistical reference books.

University of Wisconsin  
Madison, U.S.A.

C.A. Fung

STATISTICAL QUALITY DESIGN AND CONTROL: CONTEMPORARY CONCEPTS AND METHODS. R.E. DeVor, T.-H. Chang and J.W. Sutherland. New York: Macmillan, 1992, pp. xvi + 472.

Contents:

PART I : Fundamental Concepts and Methods  
PART II : Process Control and Improvement  
PART III: Product/Process Design and Improvement

Readership: Engineers in manufacturing industries, and students just beginning their studies in these fields

This book is an elementary treatment of quality control and experimental design, aimed at non-statistical industrial practitioners and beginning students. Although "Design" comes first in its title, a far greater portion of the book is devoted to control charting. Deming's quality management philosophy and some of Taguchi's principles of product design are used to define a conceptual framework for, and to motivate, the methods presented in the book. The selection of topics is sensible. The approach to experimental design taken in the book is largely that of Box and Hunter. Discussion of the mathematical underpinnings of most of the methods is largely omitted, however, which limits the book's usefulness as a stand-alone text in academic departments. Nevertheless the book provides a useful starting point.

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C.A. Fung

BIVARIATE DISCRETE DISTRIBUTIONS. S. Kocherlakota and K. Kocherlakota. New York: Dekker, 1992, pp. xvi + 361.

Contents:

1. Preliminaries
2. Statistical inference
3. Sampling with replacement
4. Bivariate Poisson distribution

5. Bivariate negative binomial distribution
6. Sampling from finite populations
7. Bivariate logarithmic series distribution
8. Compound bivariate Poisson distributions
9. Some miscellaneous results

Readership: Graduate students, pure and applied statisticians, researchers in discrete distribution theory

This welcome addition to Dekker's series of monographs on particular distributions begins with a systematic presentation of analytical tools for handling multivariate discrete distributions. These include the use of generating functions, convolutions, various ways of combining distributions, polynomial expansions, and computer simulation procedures.

Most discrete multidimensional distributions are homogeneous in the sense that their probability generating functions have the form  $G(z_1, \dots, z_k) = H(a_1 z_1 + \dots + a_k z_k)$ . A number of bivariate discrete distributions lack this property, however. The tools that are provided in the first two chapters are used in later chapters to examine the structural properties of both homogeneous and inhomogeneous bivariate discrete distributions. Each of Chapters 3 through 8 examines bivariate generalizations of a different univariate distribution (binomial, Poisson, negative binomial, hypergeometric, logarithmic, and compound Poisson). Chapter 9 deals rapidly with the following distributions: bivariate Waring; bivariate "short"; bivariate generalized power series; and mixtures of bivariate generalized power series. The arrangement of material within each of these chapters brings out the interrelationships between distributions in different chapters whilst keeping each chapter independent of the others.

The presentation of the material is clear and well-organized, with good lay-outs of formulae. There are over forty pages of references to the somewhat scattered literature, a key word index to the references, and a subject index.

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A.W. Kemp

DISCRETE STOCHASTICS. K. Jacobs. Basel: Birkhäuser, 1992, pp. x + 283, Sw.Fr.78.00/DM.88.00.

Contents:

1. Introduction
2. Markovian dynamics
3. Discrete probability spaces
4. Independent identically distributed random variables
5. Statistics
6. Markov processes
7. Elements of information theory
8. Fluctuation theory
9. Optimal strategies in casinos: Red and black
10. Foundational problems

Readership: Undergraduates majoring in mathematics

'Discrete stochastics' may be translated as: probability and stochastic process theory for discrete distributions and random variables. The author introduces those ideas from measure theory relevant to discrete distributions and builds a simplified probability theory for that case. In this probability framework he discusses some basic stochastic processes, essentially Markov chains and independent, identically distributed random variables, as well as gambling strategies and

information theory. As the author points out, there are penalties for excluding more general probability spaces one of which is that countable sequences of random variables cannot be dealt with. This, in turn, circumscribes the extent to which limit theorems can be covered. The few exercises that are given are woven into the text with the objective, it would appear, more of abbreviating the presentation than as training examples to help reinforce earlier material. There is a tendency to focus on a particular aspect of a topic without giving a sufficiently broad overview that enables the reader to see where the subject is going and where the material fits in. The treatment requires a fair level of mathematical sophistication; explanations are sometimes difficult to follow. In spite of these reservations much of the material covered in the final four chapters is not widely available at an introductory level; thus to this extent the book plays a useful role.

Macquarie University  
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J.R. Leslie

FUNDAMENTALS OF BIOSTATISTICAL INFERENCE. C.T. Le.  
New York: Dekker, 1992, pp. v + 254, US\$45.00.

Contents:

1. Probability and probability models
2. Estimation of parameters
3. Hypothesis testing
4. Other selected topics

Readership: Biostatisticians

This book is intended as a second course in statistical methods for biostatisticians. Much of the material is similar to that presented in standard statistical texts, except that examples and many of the problems are based on examples from the biomedical literature. This book is limited in scope, with Chapter 1 covering basic distributions and models, Chapters 2 and 3 focusing on maximum likelihood methods, and Chapter 4 covering several unrelated topics. However, the material that is covered appears to be presented clearly. This text could serve as a useful text for quantitative epidemiologists or for biostatisticians who do not plan to take an advanced course in statistical inference.

Harvard University  
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S.W. Lagakos

THE ANALYSIS OF CONTINGENCY TABLES, 2nd edition.

B.S. Everitt. London: Chapman and Hall, 1992,  
pp. ix + 164, £22.50.

Contents:

1. Contingency tables and the chi-square test
2. 2 x 2 contingency tables
3. r x c contingency tables
4. Multidimensional tables
5. Log-linear models for contingency tables
6. Linear-logistic models
7. Contingency tables with ordered categories
8. Some special types of contingency table

Readership: Research workers, statisticians, students

Methods for the analysis of count data have been one of the major developments in statistics over the last fifteen years or so. This is reflected in the second edition of Everitt's book, almost two-thirds of which is devoted to a lucid discussion of the many new techniques available for the analysis of contingency tables of all shapes, sizes and

dimensions. Here the reader will find, inter alia, non-technical descriptions of: the graphical display of the information in a contingency table using correspondence analysis; the fitting and selection of log-linear models; logistic models for dichotomous or polychotomous responses; conditional logistic regression for case control studies; modelling tables with ordered categories and special techniques for incomplete and square tables. For the most part the methods are illustrated with numerical examples and concluded with helpful discussions of issues that arise in their implementation and interpretation.

The first edition of this book was a useful reference for anyone, statistician or otherwise, contemplating the analysis of count data; the second edition is even more so. Now that many of these techniques can be easily implemented with the aid of a package, even by the statistically naive, this book will do much to deepen understanding. The professional statistician will find this book useful too, since it contains good discussions of issues that have been controversial, such as whether or not to apply Yates's correction and what to do when the expected frequencies are small.

All in all, this book is a welcome addition to the fast-growing literature on the analysis of count data.

University of Cape Town  
Rondebosch, South Africa

J.M Juritz

COMPUTER-INTERACTIVE DATA ANALYSIS. A.D. Lunn and  
D.R. McNeil. Chichester, U.K.: Wiley, 1991,  
pp. xiv + 374 + two disks, £39.95.

Contents:

1. First steps
2. One or two samples
3. Multiple comparisons
4. Straight-line data
5. Multiple regression
6. Two-way ANOVA
7. Categorical data
8. Epidemiologic data
9. Multivariate data I
10. Multivariate data II

Two DOS disks with SPIDA program and data sets

Readership: Students, teachers and users of statistics

This book and the accompanying software and data sets provide the materials for a comprehensive introduction to interactive data analysis, suitable for undergraduates in statistics, graduate students in applied statistics, and users of statistics in other disciplines. The emphasis is on using the tools to discover structure and meaning in data rather than on mathematical formulas and statistical properties.

Installation of the DOS computer package SPIDA (Statistical Package for Interactive Data Analysis) and data sets took me fifteen minutes from first opening of the book; exploring the package's data handling facilities to the end of Chapter 1, another fifteen. From there, I proceeded chapter by chapter, trying the computer examples and following a fascinating exposition of classical statistical procedures as data analysis tools enhanced by techniques of exploratory data analysis. Some not-so-elementary methods are covered, including log-linear models, proportional-hazards regression, and multidimensional scaling. I found the exposition clear and helpful, and used SPIDA with ease.

The eighty-six sets of data, almost all from Data by D.F. Andrews and A.M. Herzberg [Short Book Reviews, Vol. 5, p.38], are sufficiently rich and varied to supply motivation and adequate scope for the "detective

work" of interactive data analysis.

Queen's University  
Kingston, Canada J.T. Smith

THE ANALYSIS OF STOCHASTIC PROCESSES USING GLIM.

J.K. Lindsey. Berlin: Springer-Verlag, 1992,  
pp. vi + 294.

Contents:

1. Normal theory models and some extensions
2. Markov chains
3. Point and renewal processes
4. Survival curves
5. Growth curves
6. Time series: The time domain
7. Time series: The frequency domain
8. Repeated measurements
9. Stochastic processes and generalized linear models

Readership: Applied statisticians, GLIM users, social scientists

The GLIM package is not the obvious choice of a software package to use for the analysis of stochastic processes. However, this book presents clearly how the theory of generalized linear models from which GLIM was originally developed can be adapted to problems of probabilistic modelling. In some cases, the theory must be inferred from a knowledge and understanding of the GLIM codes presented in the text.

The book contains numerous macros written for GLIM 3.77 and is lavishly illustrated with applications. Many of the macros included in the text were originally written by various authors. They have been modified to make them more accessible to the reader not familiar with the details of GLIM programming.

To my mind, the strength of the book and that of the GLIM package lies in the area of preliminary data analysis. Recently, I found Lindsey's treatment of Markov chains and time series to be of considerable utility prior to the development of Fortran codes and the programming of confirmatory analyses using the statistical package BMDP.

Museu Paraense Emilo Goeldi  
Belem, Para, Brazil

C.M. O'Brien

REGRESSION ANALYSIS BY EXAMPLE, 2nd edition.

S. Chatterjee and B. Price. New York: Wiley, 1991,  
pp. xvii + 278, £32.00.

Contents:

1. Simple linear regression
2. Detection and correction of model violations:  
Simple linear regression
3. Multiple regression model
4. Qualitative variables as regressors
5. Weighted least squares
6. The problem of correlated errors
7. Analysis of collinear data
8. Biased estimation of regression coefficients
9. Selection of variables in a regression equation
10. Selected problems

Readership: Users of regression methods

The first edition (1977) had 228 pages; thus this revision has been increased by fifty pages, or approximately twenty-two per cent. The chapter headings are the same as before. The main changes are: (a) an infiltration of newer material on regression diagnostics throughout; (b) an elaboration of work on logistic regression in Chapter 5, of time series in Chapter 6, and of multicollinearity in Chapters 7 and 8; (c) two pages on model fitting strategy in Chapter 9; and (d) a new section of eleven pages called "Selected Problems" containing "seven real data sets with directed questions."

Overall, the book retains its character as a useful series of examples illustrating regression techniques.

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N.R. Draper

REGRESSION WITH GRAPHICS. A Second Course in Applied

Statistics. L.C. Hamilton. Pacific Grove, California:  
Brooks/Cole, 1991, pp. vx + 363.

Contents:

1. Variable distributions
2. Bivariate regression analysis
3. Basics of multiple regression
4. Regression criticism
5. Fitting curves
6. Robust regression
7. Logit regression
8. Principal components and factor analysis

Readership: Regression students with basic statistics

The subtitle "A Second Course in Applied Statistics" has the implication that the book is designed for a wide audience with limited prerequisites. A great variety of material has been packed into relatively few pages in a flowing and discursive way. The exercises contain a variety of examples of real data. There are plenty of diagrams. The mathematical level is comparatively low. The book places "more emphasis on practical issues and troubleshooting than on statistical theory". Students will likely emerge with a wide, but relatively shallow, knowledge of regression. For such an objective, the book is excellent.

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N.R. Draper

HIERARCHICAL LINEAR MODELS: APPLICATIONS AND DATA

ANALYSIS METHODS. A.S. Bryk and S.W. Raudenbush.

Newbury Park, California: Sage, 1992, pp. xvi + 265, £30.00.

Contents:

1. Introduction
2. The logic of hierarchical linear models
3. Principles of estimation and hypothesis testing for hierarchical linear models
4. An illustration
5. Applications in organizational research
6. Applications to the study of individual change
7. Applications in meta-analysis and other cases where level-1 variances are known
8. Three-level models
9. Assessing the adequacy of hierarchical models
10. Technical appendix

Readership: Applied statisticians in all fields, social science research workers

This is a first-class book dealing with one of the most important areas of current research in applied statistics. The authors work in education and the many illustrative examples are drawn from this field, but the methods they describe are as widely applicable as ordinary linear modelling. The standard of exposition is extremely high, though the notation is inevitably complex and non-mathematical research workers may find it tough going. The underlying theory is passed over fairly lightly, with a largely Bayesian approach being adopted. The would-be user of the techniques will need to come to terms with one of the available computer packages, but with this proviso the book shows that many of the most awkward problems of data analysis when there is more than one error stratum are now capable of solution.

Institute of Education,  
University of London  
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M.J.R. Healy

CORRESPONDENCE ANALYSIS HANDBOOK. J.-P. Benzecri.

New York: Dekker, 1992, pp. xii + 665, US\$155.25.

Contents:

PART I : The Theory of Correspondence Analysis

PART II : Numerical Example of Correspondence Analysis Exercise Illustrating the Theory

PART III: Reading and Illustration of the Listings

PART IV : Analysis and Interpretation

PART V : Cluster Analysis: Agglomerative Hierarchical Clustering

Readership: Users of data analysis, implicitly ranging from casual users of statistics to research statisticians

At last a text in English on correspondence analysis by perhaps its leading exponent, with three chapters on cluster analysis thrown in for good measure. Parts I, II, III consisting of 244, 63 and 67 pages, respectively cover all the underlying theory, a detailed analysis by hand of a small example (12 observations), and information on how to use a computer to undertake, and interpret output from, correspondence analysis, in the context of two computer programs, a FORTRAN listing being given for one. It is suggested that these three parts are read in parallel, rather than in sequence, with a selection of chapters depending on the reader's background. Part IV (183 pages) consists mainly of the detailed analysis of sixteen examples, illustrating the wide-ranging applications of correspondence analysis. Various general practical points are made in an introductory section to this part. Part V (83 pages) concentrates on one particular variety of agglomerative hierarchical clustering, with a distance measure based on inertia. Each part starts with a useful summary. The index also acts as a glossary.

University of Aberdeen

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I.T. Jolliffe

DISCRIMINANT ANALYSIS AND STATISTICAL PATTERN

RECOGNITION. G.J. McLachlan. New York: Wiley,

1992, pp. xv + 526, £52.00.

Contents:

1. General introduction
2. Likelihood-based approaches to discrimination
3. Discrimination via normal models
4. Distributional results for discrimination via normal models
5. Some practical aspects and variants of normal theory-based discriminant rules
6. Data analytic considerations with normal theory based discriminant analysis
7. Parametric discrimination via non-normal models
8. Logistic discrimination
9. Nonparametric discrimination

10. Estimation of error rates

11. Assessing the reliability of the estimated posterior probabilities of group membership

12. Selection of feature variables in discriminant analysis

13. Statistical image analysis

Readership: Applied and theoretical statisticians and researchers making use of discriminant analysis

This is an impressive volume. It provides a comprehensive and deep account of the state of the art of discriminant analysis. The extent of coverage is indicated by the fact that it contains over 1200 references. The depth is indicated by the chapter headings. It is sufficiently up to date to include detailed discussion in Chapter 9 of kernel methods, nearest neighbour methods, tree based methods and other non-parametric methods. Mention of appropriate software packages appears at the relevant places in the text.

The author describes the book as 'a monograph, not a textbook' and it does not contain exercises. It does not shy from the necessary mathematics but is nevertheless written in an accessible style.

It seems almost churlish to cavil at things inadequately dealt with in the face of such a tour de force, but I would have liked to see some discussion of choice of technique and also more than the brief mention on page 21 of alternatives to error rate as comparison criteria. Brier score, for example, does not even appear in the index. In general, however, I find it difficult to think what more one could ask of a book devoted to discriminant analysis. This will be the standard work in the area for some years to come. Any statistician who has occasion to use discriminant analysis, which surely must include most statisticians, should buy a copy.

The Open University

Milton Keynes, U.K.

D.J. Hand

STATISTICS FOR SPATIAL DATA. N.A.C. Cressie. New York:

Wiley, 1991, pp. xx + 900, £71.00.

Contents:

1. Statistics for spatial data
- PART I : Geostatistical Data
2. Geostatistics
  3. Spatial prediction and kriging
  4. Applications of geostatistics
  5. Special topics in statistics for spatial data
- PART II : Lattice Data
6. Spatial models on lattices
  7. Inference for lattice models
- PART III: Spatial Patterns
8. Spatial point patterns
  9. Modeling objects

Readership: Reference for specialists in spatial statistics

This is an enormous volume, which is really too large to read comfortably yet not well structured for reference use. Much of it reads as a catalogue of work in spatial statistics without the comments and comparisons which would give the work structure and added value. Where there are comparisons and summaries, I frequently found myself in disagreement, especially as implied criticisms often contradict the chronological order!

A number of examples are interspersed throughout the text, but with very few exceptions these are taken from earlier publications of the author and illustrate his own methodological contributions. Thus there are rather few examples of the standard methods in the field. Because of this, newcomers to the field may gain a misleading impression and would be better advised to read one of the now standard texts of Ripley [[Short Book Reviews](#), Vol. 2 p.5 and Vol. 9. p.7], Diggle [[Short Book Reviews](#), Vol. 4. p.38], Upton and Fingleton [[Short Book Reviews](#), Vol. 5. p.41 and Vol. 9. p.45]. Cressie's book is a useful additional refer-

ence, especially to his own work which is widely scattered through the scientific literature.

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B.D. Ripley

CONFIDENCE INTERVALS ON VARIANCE COMPONENTS.

R.D. Burdick and G.A. Graybill. New York: Dekker,  
pp. ix + 211, US\$114.50.

Contents:

1. Introduction
2. General concepts
3. General results for balanced designs
4. The one-fold nested design
5. The two-fold and (Q-1)-fold nested design
6. Crossed random designs
7. Mixed models

Readership: Users of and students of advanced statistical methods

The book gives a careful account of methods for calculating confidence limits for variance components, linear combinations of variance components and ratios of variance components. The general organization of the book will be clear from the list of chapter titles. For those cases in which no "standard" exact treatment is available, the various suggestions in the literature, for example those based on Fairfield Smith, Welch, Satterthwaite-type chi-squared approximations, are described. Numerical examples and brief SAS programs are included.

The book is restricted to linear models based on normal theory. A general criticism is that, while the exposition is admirably clear, the methods tend to appear as a series of ad hoc tricks. Even in the one-way unbalanced case, while a number of methods are well described and the literature on their comparison summarized, one is left without a clear view of why one method works better than another. There is no systematic use of likelihood-based arguments, for example.

Nuffield College

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D.R. Cox

VARIANCE COMPONENTS. S.R. Searle, G. Casella and

C.E. McCulloch. New York: Wiley, 1992,

pp. xxiii + 501, £56.00.

Contents:

1. Introduction
2. History and comment
3. The 1-way classification
4. Balanced data
5. Analysis of variance estimation for unbalanced data
6. Maximum likelihood and restricted maximum likelihood
7. Prediction of random variables
8. Computing maximum likelihood and restricted maximum likelihood estimates
9. Hierarchical models and Bayesian estimation
10. Binary and discrete data
11. Other procedures
12. The dispersion-mean model

Readership: Theoretical statisticians, users of components of variance  
This substantial work of scholarship is likely to be a major source of information on variance components for a good many years to come. The book proceeds at a fairly leisurely pace from a careful discussion of the balanced one-way classification, through to a discussion of maximum likelihood and restricted maximum likelihood estimation in generality. The final chapters deal with more advanced issues, including a relatively short chapter on binary and discrete data.

Inevitably and properly the emphasis and contents reflect both the authors' special interests and more broadly the substantial body of work to emerge from Cornell over the years. Thus Henderson's various

methods are described in some detail, even though they have to an appreciable extent been replaced by the general availability of programs for restricted maximum likelihood estimation. Matrix formulations, often superficially rather formidable, are adopted at relatively early stages of the treatment. While some simple numerical examples are given they are quite formal and are not intended to give insight into how variance components are used in applications.

Criticisms that might be made of the book include the relatively light emphasis on generalized linear models, the absence of information on the back-ground to examples and the somewhat associated failure to study slightly nonstandard questions attached to the classical well-loved models or how to look for departures from these models.

Nuffield College

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D.R. Cox

DESIGNS AND THEIR CODES. E.F. Assmus Jr. and J.D. Key.

Cambridge University Press, 1992, pp. x + 352,

£40.00.

Contents:

1. Designs
2. Codes
3. The geometry of vector spaces
4. Symmetric designs
5. The standard geometric codes
6. Codes from planes
7. Hadamard designs
8. Steiner systems

Readership: Combinatorial design theorists, algebraic coding theorists

The connection between design theory and coding theory has long been one of the most interesting and exciting areas of combinatorics, and a book that gives an account of the linkage has long been needed. The authors present general material in the first five chapters, including a new approach to Reed-Muller codes, and then discuss applications of coding theory to some of the more important classes of designs, namely, finite planes, Hadamard designs, and Steiner systems. The bibliography is long, very complete, and very up-to-date, including references to preprints. The book provides a very valuable research reference for workers in both design theory and coding theory.

University of Manitoba

Winnipeg, Canada

R.G. Stanton

QUADRATIC FORMS IN RANDOM VARIABLES. Theory and

Applications. A.M. Mathai and S.B. Provost.

New York: Dekker, 1992, pp. xix + 367, US\$126.50.

Contents:

1. Preliminaries
2. Quadratic forms in real variables
3. Quadratic forms in random variables
4. The distribution of quadratic forms
5. Chi-squaredness and independence
6. Generalized quadratic forms
7. Applications

Readership: Undergraduate and postgraduate students in mathematical statistics, theoretical and applied statisticians

Quadratic forms in random variables arise in many branches of statistics and the authors have provided a valuable comprehensive source of their distributional properties in normal and non-normal

cases. Illustrations of their applicability in goodness-of-fit tests, linear models and variance components, multi-variate analysis, stochastic processes and time series analysis, coverage and optimal control problems, incomplete block designs, multivariate functional relationship models and optimization form the final chapter of the book. The early chapters of the book are devoted to a useful review of necessary matrix algebra and results for quadratic forms in real variables, making the contents, at least in part, readily available to undergraduate students in mathematical statistics.

Imperial College of Science,  
Technology and Medicine  
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A.F.S. Mitchell

EXPLORING THE LIMITS OF BOOTSTRAP. R. LePage and L. Billard (Eds.). New York: Wiley, 1992, pp. 426, £47.50.

Contents:

PART 1: Introduction  
PART 2: General Principles of the Bootstrap  
PART 3: Applications of the Bootstrap

Readership: Research statisticians

This book, based on papers presented at a special topics meeting of the Institute of Mathematical Statistics held in May 1990, describes recent developments of Efron's bootstrap. A readable introduction and overview by Efron and LePage is followed by a series of fifteen fairly technical papers on theoretical and methodological issues, including consistency of the bootstrap in general settings, efficient computation, higher-order refinement and applicability of the bootstrap to dependent data, including Markov processes and time series. The book concludes with a series of eight papers dealing with applications of the bootstrap to areas such as exploratory regression, model selection, survival analysis and genetics. The volume represents much of current thinking on the bootstrap; because it is a conference proceedings, there are a number of notable absentees from the list of authors. It is a valuable collection of research papers.

University of Cambridge  
Cambridge, U.K.

G.A. Young

ARMA MODEL IDENTIFICATION. B.S. Choi. New York: Springer-Verlag, pp. xi + 200, DM.78.00.

Contents:

1. Introduction
2. The autocorrelation methods
3. Penalty function methods
4. Innovation regression methods
5. Pattern identification methods
6. Testing hypothesis methods

Readership: Researchers in statistics, econometrics, and the physical sciences

The aim of this book is to unify most of the significant work on identifying autoregressive moving average models. The methods discussed include final prediction error, Akaike information criterion, Bayesian information criterion, inverse autocorrelation functions, and pattern identification methods such as the Corner method. The book is written in a very readable style, concentrating its effort on the most important characteristics of the techniques covered, and giving extensive references for those interested in more details. One of its strengths is that the book nicely bridges the gap between the statistical and

electrical engineering/signal processing literatures; results from the latter are well represented. It would have been interesting to have seen more discussion of order determination of autoregression processes (by, say final prediction error) when parameter estimation is by techniques other than Yule-Walker (for example, by Burg's method). Also, the book would have benefited from some illustrations. These are, however, minor criticisms. I liked the book very much, and think it will prove to be very useful.

Imperial College of Science,  
Technology and Medicine  
London, U.K.

A.T. Walden

FOUNDATIONS OF THE PREDICTION PROCESS. F.B. Knight. Oxford University Press, 1992, pp. xii + 248, £40.00.

Contents:

Introduction  
1. The measure-theoretic prediction process  
2. Topological considerations and prediction space: Application to Markov processes  
3. Gaussian processes and the prediction process in the wide sense  
4. A classification of measurable processes  
5. Prediction of measurable processes  
6. Application to concrete examples, and ramifications of the theory

Readership: Pure probabilists

This book is an account of how the mathematical theory of continuous time stochastic processes might have developed. Two processes are considered which co-exist on the same probability space, one representing stationary physical time, the other moving observer's time, and together they make the observer's process strongly Markovian. This leads to a representation of any measurable stochastic process in terms of martingales, and the mechanisms for their prediction.

This is given a careful mathematical treatment involving some hard mathematics. Whilst it may be too late for seasoned probabilists to embrace these ideas wholeheartedly, those embarking on their careers as probabilists will find this strongly argued thesis, stimulating and worth working at.

The writing and the production are both at a very high standard. Readers need a basic knowledge and interest in measure theory, functional analysis, stochastic integration, and martingale theory.

Imperial College of Science,  
Technology and Medicine  
London, U.K.

R. Coleman

THE ECONOMETRIC ANALYSIS OF TRANSITION DATA.

T. Lancaster. Cambridge University Press, 1992, pp. xii + 352, £13.95/US\$17.95.

Contents:

PART I : Model Building  
PART II: Inference

Readership: Econometricians, demographers, biostatisticians

This is the first paperback edition of a book published in 1990. Its aim is to give a systematic exposition of the analysis of transition data from an econometric point of view but it enriches it with many insights taken from the statistical survival literature.

The author stresses that the subject of the book is the analysis of transition data and not only of duration data. The destination at the end

of a spell

is indeed of interest in many, not only econometric, applications. After pointing at the different jargon used in econometric and biostatistic literature, the author discusses in Part I models for single spell (alias survival) data with emphasis given to the case of neglected heterogeneity (frailty) and of time-varying endogenous (internal) covariates. Further multiple destinations and multiple cycles (competing risks and multi-state) models are discussed in detail.

Part II deals with the inferential problems encountered when fitting parametric or semi-parametric models. It suggests graphical and numerical methods to detect misspecification of the assumed model. The methods proposed for multi-state models are not familiar to biometricians and are therefore particularly interesting.

This is a very good book in its own right but also since it succeeds in linking the econometric and biometric literature on the subject.

Imperial Cancer Research Fund  
London, U.K.

B.L. De Stavola

RANDOM NUMBER GENERATION AND QUASI-MONTE CARLO METHODS.

H. Niederreiter. Philadelphia: Society for Industrial and Applied Mathematics, 1992, pp. v + 241, US\$34.50.

Contents:

1. Monte Carlo methods and quasi-Monte Carlo methods
2. Quasi-Monte Carlo methods for numerical integration
3. Low-discrepancy point sets and sequences
4. Nets and (t,s)-sequences
5. Lattice rules for numerical integration
6. Quasi-Monte Carlo methods for optimization
7. Random numbers and pseudorandom numbers
8. Nonlinear congruential pseudorandom numbers
9. Shift-register pseudorandom numbers
10. Pseudorandom vector generation

Readership: Statisticians interested in theoretical properties of simulation methods, computer scientists

A quasi-Monte Carlo method can be described as the deterministic version of a Monte Carlo method, where the random samples of the Monte Carlo method are replaced by deterministic points, selected to produce a deterministic error bound smaller than the probabilistic Monte Carlo error bound. This monograph is an expanded account of a series of talks given by the author at a conference held at the University of Alaska in August 1990. Useful background material is included, though the bulk of the monograph is taken up with a very technical and dense account of the theoretical properties of quasi-Monte Carlo methods. The treatment is very full but clear. The statistical practitioner is likely to find more interest in the later chapters which describe recent advances in pseudorandom number generation. Quasi-Monte Carlo methods underlie the theoretical analysis of the various methods for the generation of uniform pseudorandom numbers discussed. An interesting monograph rather than a reference work.

University of Cambridge  
Cambridge, U.K.

G.A. Young

UNIVERSAL ALGEBRA FOR COMPUTER SCIENTISTS. W. Wechler.  
Berlin: Springer-Verlag, 1992, pp. 339.

Contents:

1. Preliminaries
2. Reductions
3. Universal algebra

#### 4. Applications

Readership: Graduate students in computer science, algebra, logic and related areas

Modern universal algebra arose in the 1930's from studying general algebraic constructions in equationally-defined systems like semigroups, lattices, Boolean algebras, groups, rings, etc.

The book under review is a very well-written graduate course in universal algebra inspired by applications in theoretical computer science. Chapters 1 and 2 give a thorough treatment of term rewriting theory (some topics: structural induction, fixed-point theory, rewriting systems, termination orderings, word problems for congruences). Chapter 3 presents varieties and quasi-varieties of algebras and their model theory (some topics: free algebras, representation theorems, Horn and conditionally equational theories). Chapter 4 gives applications to semantics of programming languages and algebraic data types. In an unusual step, the author treats the important topics of multi-sorted and order-sorted, as well as  $w$ -complete algebras.

The book is very clear and makes a good and interesting introduction to many aspects of universal algebra, while stressing applications to computer science and formal languages. Unfortunately, there are no exercises, which somewhat impedes its pedagogical aims.

University of Ottawa  
Ottawa, Canada

P.J. Scott

RANDOM SERIES AND STOCHASTIC INTEGRALS: SINGLE AND MULTIPLE. S. Kwapien and W. Wołczyński. Boston:

Birkhäuser, 1992, pp. xvi + 360, Sw.fr.148.00.

Contents:

PART I : Random Series  
PART II: Stochastic Integrals

Readership: Researchers in stochastic analysis, probabilists and mathematical statisticians

In 1938, N. Wiener introduced the fact that any square-integrable function of Brownian motion is representable as a series (over  $n$ ) of  $n$ -th order multiple integrals with respect to product Brownian motion. To statisticians, this result could be re-phrased in terms of every finite-variance statistic that is a function of Brownian motion being expressible as a series of  $U$ -statistics of increasing degree. From the 1951 formulation of this result by K.Ito to the present, there has been extensive work done on these "polynomial chaoses", the expression by Wiener for the terms of the series.

In this text an excellent presentation is made of the by now extensive literature on random series and stochastic integrals, both single and multiple. Particularly fine expositions of hypercontractivity, polynomial chaos and independently scattered random measures are included, all being key topics in the background for the book's main emphasis. The book also pulls together a lot of material including probability inequalities that will be of interest to a wider group of probabilists and statisticians than suggested by the book's main coverage.

University of Washington  
Seattle, U.S.A.

R. Pyke

IDENTIFIABILITY IN STOCHASTIC MODELS. CHARACTERIZATION OF PROBABILITY MODELS. B.L.S. Prakasa Rao. Boston:

Academic Press, 1992, pp. xii + 253, US\$49.95.

Contents:

1. Introduction
2. Identifiability of distributions of random variables based on some functions of them

3. Identifiability of probability measures on abstract spaces
4. Identifiability for some types of stochastic processes
5. Generalized convolutions
6. Identifiability in some econometric models
7. Identifiability in reliability and survival analysis
8. Identifiability for mixtures of distributions

Readership: Probabilists and statisticians

This book carries as a subtitle 'Characterization of Probability Distributions'. In Chapter 2, the following problem is discussed: let  $X_1, X_2, X_3$  be three independent real-valued random variables. Define  $Z_1 = X_1 - X_3, Z_2 = X_2 - X_3$ . Under which condition on  $(Z_1, Z_2)$ , does the joint distribution of  $(Z_1, Z_2)$  determine the distribution of  $X_1, X_2, X_3$  up to a change of location. Chapters 2, 3 and 4 all deal with variants of this problem. After a brief excursion on generalized convolutions, Chapters 6, 7 and 8 all deal with the problem of statistical identifiability, both in the parametric as well as in the non-parametric case. Though some of the problems treated have important practical applications, the style in which the book is written emphasizes much more the mathematical methodology underlying the analytic solutions. The various theorems given are often complemented by specific, though in many cases artificial, examples. Ploughing through the text the reader has to be prepared to jump from the real line, over Polish spaces to topological groups and semigroups having visited also Stiefel manifolds on the way. The specialist in the field might perhaps welcome this text, I very much doubt, however, that the more applied probabilist or statistician will get much out of it.

ETH-Zürich

Zürich, Switzerland

P.A.L. Embrechts

STOCHASTIC APPROXIMATION AND OPTIMIZATION OF RANDOM

SYSTEMS. L. Ljung, G. Pflug and H. Walk. Basel:

Birkhäuser, 1992, pp. 113, SwFr.38.00.

Contents:

1. Foundations of stochastic approximation, H. Walk
2. Applicational aspects of stochastic approximation, G. Pflug
3. Applications to adaptation algorithms, L. Ljung

Readership: Research statisticians and control theorists, graduate students

It is pleasant to find hard results collected together in such an elegant fashion. For those interested in the frontier between statistics and control theory this monograph is a must. The increasing use of stochastic approximation in non-linear control is a pleasant surprise to those who bemoan the separation between the two fields. It should also be useful to research workers in stochastic learning and related fields.

City University

London, U.K.

H.P. Wynn

STOCHASTIC CONTROL OF PARTIALLY OBSERVABLE SYSTEMS.

A Bensoussan. Cambridge University Press, 1992,

pp. xii + 352, £50.00.

Contents:

1. Linear filtering theory
2. Optimal stochastic control for linear dynamic systems with quadratic payoff
3. Optimal stochastic control of linear stochastic systems with an exponential-of-integral performance index

4. Nonlinear filtering theory
5. Perturbation methods in nonlinear filtering
6. Some explicit solutions of the Zakai equation
7. Some explicit controls for systems with partial observation
8. Stochastic maximum principle and dynamic programming for systems with partial observation
9. Existence results for stochastic control problems with partial information

Readership: Control theorists, econometricians

This research monograph gives a comprehensive survey of optimal filtering theory and optimal control for partially observed stochastic systems. The early part of the book deals with cases where finite dimensional statistics exist, for example, linear problems with quadratic type loss functions. Later in the book more general problems are studied where the solution is infinite dimensional. Bensoussan is well known for his contributions to these areas and this book provides a lucid account of his results plus the key background results of other key figures in the development of stochastic control theory (Kalman, Bucy, Fleming, Wonham, Whittle, Kushner, Zakai etc.). The book is recommended to those who would like a succinct introduction to this important topic.

University of Newcastle

Newcastle, Australia

G.C. Goodwin

TEN LECTURES ON WAVELETS. I. Daubechies. Philadelphia:

Society for Industrial and Applied Mathematics, 1992,

pp. xix + 357, US\$37.50.

Contents:

1. The what, why, and how of wavelets
2. The continuous wavelet transform
3. Discrete wavelet transforms: Frames
4. Time-frequency density and orthonormal bases
5. Orthonormal bases of wavelets and multiresolution analysis
6. Orthonormal bases of compactly supported wavelets
7. More about the regularity of compactly supported wavelets
8. Symmetry for compactly supported wavelets
9. Characterization of functional spaces by means of wavelets
10. Generalizations and tricks for orthonormal wavelet bases

Readership: Functional analysts, mathematicians, pure and applied scientists, anyone with an interest in wavelets

This compendium is as much a thorough introduction to wavelets as it is a history of the subject and the author's work in the field. This fully referenced and annotated series of lectures was presented at the CBMS-NSF conference on wavelets in June, 1990. The volume reads much more like a book than a lecture series and anyone with an interest in wavelets that is looking for a starter, or a good reference of Daubechies' work all-under-one-roof, will not be disappointed.

Wavelets are families of functions constructed by the dilation and translation of a function with sufficient decay in time and frequency. This work is directed predominantly at the graduate level mathematician; hence a reasonable knowledge of mathematics is essential for thorough understanding. It is still possible, however, to follow much of the development with less rigour by simply accepting some of the relationships as said. The beauty of this work is the time and patience with which all of the material is laid out. From the "what, why, and how"

of Chapter 1, through the definitions of the continuous and discrete wavelets

including new results on the windowed Fourier transform, on the details of construction and regularity, the style remains remarkably readable despite thorough groundwork and careful attention to detail. An interchange of carefully derived theorems with healthy doses of hand-waving and personalized analysis are complemented by many computed values and figures, many examples, and the inclusion of a number of useful tricks.

This work should serve well both as an introduction to the uninitiated and as a valuable reference book in any library. The statistician might justify the purchase after a perusal of a curious result in the last paragraph of page ninety-eight.

Andersen Consulting  
Toronto, Canada J.R. Whittle

## NOTES

BREAKTHROUGHS IN STATISTICS. Volume I. Foundations and Basic Theory. Volume II. Methodology and Distribution. S. Kotz and N.L. Johnson (Eds.).

New York: Springer-Verlag, 1992, pp. xli + 631, pp. xxi + 600, DM.178.00 each volume.

Professors Kotz and Johnson have once again come up with a useful idea. These volumes contain well-known papers. The thirty-nine papers include ones by Pearson (1900), "Student" (1908), Fisher (1926) and Neyman and Pearson (1933). Each paper is reproduced in full along with an introduction by various statisticians. The introductions tell of the impact of each paper on the literature and give further more recent references.

POISSON APPROXIMATION. A.D. Barbour, L. Holst and S. Janson. Oxford: Clarendon Press, 1992,

pp. x + 277, £30.00.

The Poisson distribution is often used as an approximation to a more complicated distribution, the Poisson approximation to the binomial being merely one very special case. This monograph gives a thorough account of methods for obtaining bounds on the error arising in such approximations. The main emphasis is on applying a general method, the Stein-Chen approach, to a wide variety of interesting problems, including results concerning the compound Poisson distribution and Poisson process approximation.

PROCEEDINGS OF THE THIRD INTERNATIONAL CONFERENCE ON TEACHING STATISTICS, Volume 1. School and General

Issues. Volume 2. Teaching Statistics Beyond the School Level. D. Vere-Jones. Voorburg, The Netherlands: ISI Publications in Statistical Education, 1991, pp. ix + 556, US\$38.00.

These two volumes are the Proceedings of the Third International Conference on Teaching Statistics which was held in Dunedin, New Zealand from August 19-24, 1990; there were 560 participants, five plenary sessions, 85 invited papers, 68 contributed papers and 66 abstracts. Forty-seven countries were represented. The first of these International Conferences was in 1982 in Sheffield, U.K. which attracted 420 participants and the second was in Victoria, Canada in 1986 and had 500 participants.

THE OXFORD DICTIONARY FOR SCIENTIFIC WRITERS AND EDITORS. A. Isaacs, J. Daintith and E. Martin (Eds.).

Oxford: Clarendon Press, 1991, pp. 389, £14.95.

From the preface: "The purpose of this dictionary is to provide scientists, science writers, and editors of scientific texts with a guide to the style for presenting scientific information most widely used within the scientific community. As far as possible this complies with the house style of the Oxford University Press; it also follows the recommendations of the International Union of Pure and Applied Physics and the International Union of Pure and Applied Chemistry.

The dictionary is not intended to be a dictionary of science; many of the entries have only a brief definition, no definition at all, or sometimes an identifying subject label. Full definitions for most of the terms found in this dictionary will be found in the Concise Science Dictionary (OUP, 2nd edn, 1991) or the Concise Medical Dictionary (OUP, 3rd edn, 1990).

The fields covered are primarily physics, chemistry, botany, zoology, biochemistry, genetics, immunology, microbiology, and astronomy, with some coverage of medicine, mathematics, and computer science." [The editor of Short Book Reviews found some statistical terms, including "statistics 1. (takes a sing. form of verb) The science itself. 2. (takes a pl. form of verb) The numerical data involved or the quantities derived from the data. Adjectival form: statistical".]

DICTIONARY OF SCIENTIFIC LITERACY. R.P. Brennan.

New York: Wiley, 1992, pp. xiv + 334, US\$22.95/£14.95.

This dictionary of scientific literacy includes over 650 scientific and technical terms, concepts and principles with which every informed citizen should be familiar.

SCIENCE AND TECHNOLOGY IN HISTORY. An Approach to

Industrial Development. I. Inkster. New Brunswick, New Jersey: Rutgers University Press, 1991, pp. xvi + 391, US\$50.00.

This book gives an analysis of the dynamic connections among science, technology, and economic development from the eighteenth century to the present. Science and technology are recognized as the crucial components of economic development in poor nations, the motors of growth in developing economies, and among the central issues of contemporary advanced societies. The relationships between science and technology and between science and technology and economic modernization are little understood and constantly changing. The author includes extended treatments of Japan, China and India, as well as the process of industrialization in the West. Important historical themes, such as the industrial revolution, the transfer of technology and the role of institutions in knowledge and technique diffusion, are approached through the use of detailed historical case studies.

NATIONALISM AND INTERNATIONALISM IN SCIENCE, 1880-1939.

Four Studies of the Nobel Population. E. Crawford. Cambridge University Press, 1992, pp. xii + 157, £27.95/US\$44.95.

This study shows how the rise of scientific organizations around the turn of the century centred on national scientific enterprises. It is argued that scientific activities of the late nineteenth century were an integral part of the emergence of the nation-state in Europe. Internationalism in science, both theoretical and practical, began to hold sway over scientists only when economic relations, transportation and communication began to cross national borders.

WHEN SCIENCE MEETS THE PUBLIC. Proceedings of a Workshop Organized by the American Association for the Advancement of Science Committee on Public Understanding of Science and Technology, February 17, 1991, Washington D.C. B.V. Lewenstein (Ed.). Foreword by S. Grinell. Washington, D.C.: American Association for the Advancement of Science, 1992, pp. xvi + 164, US\$14.00.

From the foreword: "Science information reaches the public through media and institutions that are isolated from one another, that often have commercial motives, that reach different audience segments, and that use different communications strategies. The people who work in these institutions become experts in their own fields, but often have little contact with other media. There are few opportunities to share significant research results or critical experiences across the science communication media; there are few opportunities to explore effects and alternatives from the point of view of society as a whole. Our workshop was organized specifically to fill this gap."

GOOD SCIENCE AND RESPONSIBLE SCIENTISTS. Meeting the Challenge of Fraud and Misconduct in Science. A.H. Teich and M.S. Frankel. Washington, D.C.: American Association for the Advancement of Science, 1992, pp. iv + 35, US\$3.00.

From the Introduction: "What are the dimensions of fraud and misconduct in science? How important an issue is it to science, to the government, to the public? What mechanisms exist for dealing with it? What has been learned from the experience of the past several years? What remains to be done? ... Drawing on the work of the National Conference of Lawyers and Scientists, this paper attempts to answer the questions posed above and to provide some perspective on incidents of this nature and the policy debates that surround them."

CARDINAL CHOICES. Presidential Science Advising from the Atomic Bomb to SDI. G. Herken. New York: Oxford University Press, 1992, pp. xiv + 317, £22.50. This volume gives the history of the relations between the scientific community and the President of the United States of America in the nuclear age.

THE ADVISERS. Scientists in the Policy Process. B.L.R. Smith. Washington, D.C.: The Brookings Institution, 1992, pp. xi + 238, US\$36.95 Cloth; US\$16.95 Paper. America's governing system is unique in the extent to which scientists and other outside experts participate in the policy process. This study traces the rise of scientists in the policy process and shows how outside experts inter-relate with politicians and administrators to produce a policy process. It also shows how the very openness of American government creates the potential for unusual conflicts of interest. Smith focuses on the experiences of agency and presidential-level advisory systems over the past several decades.

REPRESENTATIONS OF SCIENCE AND TECHNOLOGY. Proceedings of the International Conference on Science and Technology Indicators, Bielefeld, Federal Republic of Germany, 10-12 Juni 1990. P. Weingart, R. Sehringer and M. Winterhager (Eds.). Leiden, The Netherlands:

DSWO Press, Leiden University, 1992, pp. xx + 326, Dfl.62.50.

The articles in this volume address issues of the meaning of bibliographic indicators as well as technical and methodological problems of their construction.

THE SEEDS OF TIME. The Life of Sir Macfarlane Burnet. C. Sexton. With a foreword by HRH The Prince Philip, Duke of Edinburgh. Oxford University Press, 1991, pp. x + 301, £19.95.

Sir Macfarlane Burnet (1899-1985) was one of this century's outstanding biologists. Burnet was an Australian; he won the Nobel Prize for Medicine in 1960. For twenty-one years he headed the Walter and Eliza Hall Institute. In his retirement, he was President of the Australian Academy of Science and wrote many books on the relationship between science and society. This book is Burnet's official biography. The author quotes Boswell on Samuel Johnson in his dedication to the memory of Burnet: "And he will be seen as he really was; for I profess to write, not his panegyric, which must be all praise, but his life; which, great and good though he was, must not be supposed to be entirely perfect."

THE SCIENCE MATRIX. The Journey, Travails, Triumphs. F. Seitz. New York: Springer-Verlag, 1992, pp. xiii + 146, DM.78.00.

In the essays presented in this volume, Professor Seitz, President Emeritus of Rockefeller University, investigates the role of science and technology in modern science, its origins in ancient Greece and Rome, and the expansion of the centre of scientific activity from Western Europe to North America and recently to Japan. He also discusses the role science and technology play in shaping each other.

THE MATHEMATICAL HERITAGE OF C.F. GAUSS. A Collection of Papers in Memory of C.F. Gauss. G.M. Rassias (Ed.). Singapore: World Scientific, 1991, pp. xv + 902. This volume is dedicated to Carl Friedrich Gauss, 1777-1855, one of the greatest mathematicians. It contains papers on various problems and theories in the fields of mathematics and its applications in which Gauss made many fundamental discoveries.

CURIOSITY PERFECTLY SATISFIED. Faraday's travels in Europe 1813-1815. B. Bowers and L. Symons (Eds.). London: Peregrinus in association with The Science Museum, London, 1991, pp. xvi + 168, £19.00. As a young man, Michael Faraday travelled through Europe with Sir Humphrey Davy. Faraday kept a diary; this diary is published in full with the letters he wrote while he was in Europe. Although Faraday described some of the scientific work of Davy, most of his description is about the customs of the countries and details of the scenery and the buildings.

THE PILL, PYGMY CHIMPS, AND DEGAS' HORSE. The Autobiography of Carl Djerassi. C. Djerassi. Scranton, Pennsylvania.: Basic Books, 1992, pp. viii + 319, US\$25.00. This is the autobiography of the chemist who fathered the birth control pill, founded biomedical companies, thought and became later a best-selling novelist.

THE CORRESPONDENCE OF CHARLES DARWIN. Volume 7, 1858-1859. Supplement to the Correspondence 1821-1857. F. Burkhardt and S. Smith (Eds.). Cambridge University Press, 1991, pp. xxxv + 671, £35.00/US\$59.95.

This is the seventh volume of the complete edition of Charles Darwin's letters. The letters in this volume were written in the years 1858-1859. The volume also contains a Supplement (1821-1957) of all the letters that have been located or redated since the publication of Volumes 1-6. Many of these letters appear in print for the first time.

These volumes give for the first time full authoritative texts of Darwin's letters, edited according to modern textual editorial principles and practice. The letters in this volume cover two of the most momentous years in Darwin's life. Begun in 1856 and the fruit of twenty years of study and reflection, Darwin's manuscript on the species question was a little more than half finished, and at least two years from publication, when in June 1858 Darwin unexpectedly received a letter and a manuscript from Alfred Russel Wallace indicating that he too had independently formulated a theory of natural selection. 'So all my originality, whatever it may amount to, will be smashed', Darwin wrote to his friend and mentor Charles Lyell. 'Though my Book, if it will ever have any value, will not be deteriorated; as all the labour consists in the application of the theory.' All of the extant correspondence surrounding Darwin's receipt of Wallace's letter and the eventual publication of the 'abstract' of Darwin's theory a year later are gathered together in this volume.

The letters detail the various stages in the preparation of what was to become one of the world's most famous works: Darwin's On The Origin of Species by means of Natural Selection, published by John Murray in November 1859. They reveal the first impressions of Darwin's book given by his most trusted confidants, including, along with Lyell, Joseph Dalton Hooker, Thomas Henry Huxley, and Asa Grey. Finally, they relate Darwin's own anxious response to the early reception of his theory by friends, family members, and prominent naturalists in both their personal letters to him and in various publications. In short, this volume provides the capstone to Darwin's remarkable efforts for more than two decades to solve one of nature's greatest riddles: the origin of species.

A PHYSICIST ON MADISON AVENUE. T. Rothman. Princeton University Press, 1991, pp. xiv + 147, US\$19.95.

These essays bring the world of the non-scientist and scientist closer together with amusing and enlightening results.

SCIENCE A LA MODE. Physical Fashions and Fictions.

T. Rothman. Princeton University Press, 1989, pp. xii + 207, US\$12.95.

The essays presented in this book show in detail how scientists may in certain situations abandon objectivity and run after the latest fashion.

IN PURSUIT OF THE PH.D. W.G. Bowen and N.L. Rudenstine

in collaboration with J.A. Sosa, G. Lord, M.L. Witte and S.E. Turner. Princeton University Press, 1992, pp. xx + 442, US\$35.00.

This study seeks to answer questions of the kind: What percentage of graduate students entering Ph.D. programs in the arts and sciences at leading universities actually complete their studies? Do completion rates differ by fields?

The set of data consists of the experiences in graduate school of more than 35,000 students who entered programs in English, history, political science, economics, mathematics and physics at ten leading universities between 1962 and 1986.

A PATHOLOGY OF COMPUTER VIRUSES. D. Ferbrache. London:

Springer-Verlag, 1992, pp. xiii + 299.

This volume gives a detailed history of computer viruses.

GET FUNDED! A Practical Guide for Scholars Seeking

Research Support from Business. D. Schumacher.

Newbury Park, California: Sage, 1992, pp. xvi + 288, £12.95.

This volume discusses how the university-industry linkage can be accomplished. It shows how universities can persuade private businesses to sponsor research projects and programs.

MANAGING FOR WORLD-CLASS QUALITY. A Primer for

Executives and Managers. E. S. Shecter. New York:

Dekker, 1992, pp. ix + 275 US\$49.75.

This is a primer for executives and managers, addressing a wide selection of topics ranging from control charts and statistical process control, to communication and auditing. Treatments of statistical topics are intended to be accessible to non-statisticians. A significant part of the book is devoted to philosophical issues in quality management, using examples from the author's experience to crystallize ideas.

#### PAPER EDITIONS OR REPRINTS

APPLIED STATISTICS FOR ENGINEERS AND PHYSICAL

SCIENTISTS, 2nd edition. R.V. Hogg and J. Ledolter.

New York: Macmillan, 1992, pp. xxiii + 472.

[Original 1987].

BAYESIAN INFERENCE IN STATISTICAL ANALYSIS.

G.E.P. Box and G.C. Tiao. New York: Wiley, 1992,

pp. xviii + 588, £30.95. Reprint. [Original 1973].

HOW TO THINK ABOUT STATISTICS. Revised edition.

J.L. Phillips Jr. New York: Freeman, 1992,

pp. xiv + 201, £15.95 Cloth; £11.95 Paper.

[Original 1988].

INTRODUCTION TO LINEAR REGRESSION ANALYSIS,

2nd edition. D.C. Montgomery and E.A. Peck.

New York: Wiley, 1992, pp. xiv + 527, £39.95.

[Original reviewed in Short Book Reviews, Vol.2, p.16.].

LA REGRESSION. Nouveaux regards sur une ancienne méthode statistique, 2<sup>e</sup> édition révisée.

R. Tomassone, S. Audrain, E. Lesquoy-de Turckheim

and C. Millier. Paris: Masson, 1992, pp. 188. [Original reviewed in Short Book reviews,

Vol.3, p.30].

NONPARAMETRIC STATISTICAL INFERENCE, 3rd edition.

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