

Short Book Reviews

Vol. 15. No. 2— August 1995

Editor Dr. A.M. Herzberg

REVIEWS

LE JEU DE LA SCIENCE ET DU HASARD. D. Schwartz.
Paris: Flammarion, 1994, pp. viii + 111, F.Fr.85.00.

Table des matières:

1. La variabilité
2. La probabilité
3. Intermède
4. La description
5. La recherche
6. L'imputation causale
7. Un nouveau regard sur la démarche statistique et sur ... "la science du particulier"
8. Statistique et médecine
9. Un combat d'issue ... incertaine

Lecteurs: Le large public

Les concepts de base de la pensée statistique sont exposés en mots, sans faire appel aux formules mathématiques (sauf quelques pages dans l'annexe). Comme l'auteur est spécialisé dans le domaine de la médecine, la plupart des illustrations viennent de la recherche médicale. Ce petit livre n'est pas très original pour les statisticiens mais pourrait servir comme culture générale pour le grand public.

Limburgs Universitaire Centrum
Diepenbeek, Belgium

N. Veraberbeke

PHILOSOPHICAL ESSAY ON PROBABILITY. P.S. Laplace.

Translated from the fifth French edition of 1825 by
A.I. Dale. New York: Springer-Verlag, 1995,
pp. xvii + 270.

Contents:

Philosophical Essay on Probability
Notes
Appendix: Editions of Essai
Bibliography
Glossary

Readership: Statisticians, probabilists, historians of science

Laplace's Essai philosophique sur les probabilités is one of the classics of our field. Published in its first version two centuries ago, it is an elegant treatment of mathematical statistics that is at once a non-technical popularization and an influential philosophical treatise. The only previous English translation, widely available in a Dover edition, was prepared in 1902 by a professor of German and a professor of mechanics, an unfortunate pairing, since they evidently had limited facility with either French or probability. Dale's new translation is clearly superior both linguistically and scientifically to its predecessor, and it contains many bonuses.

This is a semi-variantum edition, translating the fifth edition of 1825 but indicating in copious footnotes the variations in that text from one of the editions of 1814. The editor's hundred pages of scholarly notes are particularly valuable, not least for their presentation of long extracts of sources to which Laplace only alludes. The Appendix gives an incomplete list of editions of the Essai, missing the earliest French version. Readers of French will prefer the scholarly edition in Laplace's own more elegant prose, published with notes and additional material by Bernard Bru in 1986 (Paris: Christian Bourgois), but others will welcome this overdue retranslation, despite its being marred by the inexplicable absence of an index.

University of Chicago,
Chicago, U.S.A.

S.M. Stigler

LOOKING FOR THE LAST PERCENT - The Controversy over
Census Undercounts. H. Choldin. New Brunswick, New
Jersey: University Press, 1994, pp. x + 264.

Contents:

1. Introduction
2. Science and politics in the US
3. Prelude to the 1980 census: Issues in the 1960s and 1970s
4. Measuring and overcoming the undercount
5. How they did the census: District managers' stories
6. The 1980 Detroit case
7. The New York case, 1980-1987
8. Research towards adjustment, 1980-1987
9. 1987-1988, Three attacks on the census
10. Census year 1990
11. The decision not to adjust
12. Conclusions

Readership: Statisticians, demographers, sociologists

This is the story of the conflict in the United States of America over the undercount in the 1980 and 1990 censuses. The focus is on the interplay between statistical science and politics, rather than on the more technical aspects of coverage measurement and adjustment. The book provides a glimpse into the workings of the Bureau of the Census and the political context in which it operates. As the author points out, the form and conduct of the census fit the kind of so-ciety we have, and the undercount is as much a feature of society as it is of the census. It is not sur-prising, therefore, that census adjustment cannot be dealt with as a purely technical issue. While the de-tails are specific to the United States, the book will be of interest to statisticians throughout the world.

Ottawa, Canada

R.G. Carter

FUNDAMENTALS OF EARTHQUAKE PREDICTION. C. Lomnitz.
New York: Wiley, 1994, pp. xi + 326, £66.00.

Contents:

PART I : The Spiral of Practice

1. Introduction
2. The earthquake hut
3. A blundering oracle
4. Trial by water
5. Scars and healing: The power of seismic gaps
6. The best-laid plans
7. Earthquake hazards

PART II: The Spiral of Theory

8. Disaster theory
9. Theory of strong motion on soft ground
10. Science in ashes: A theory of coincidence
11. Conclusion

APPENDIX 1: Earthquake Disasters by Country

APPENDIX 2: Seismic Moments of Great Shallow Earthquakes 1900-1990

Readership: Those interested in earthquakes

This is a wide-ranging, witty, iconoclastic review of earthquake prediction in the 1990's, not a success story despite some progress. The author speaks from a life-time involvement in seismology and first-hand knowledge of the subject and its practitioners in many different countries. His account is idiosyncratic, not always reliable, unlikely to win him friends in the establishment, but stimulating and entertaining. Statistical issues figure prominently throughout the book and form a focus for his criticisms of much recent work. Here also the treatment is controversial, but even where I am sceptical of the details of his discussion I am usually sympathetic to its general drift.

Victoria University

Wellington, New Zealand

D. Vere-Jones

QUANTITATIVE METHODS IN BIOLOGICAL AND MEDICAL SCIENCES. A HISTORICAL ESSAY. H.O. Lancaster.

New York: Springer-Verlag, 1994, pp. xvii + 297,
DM.118.00/ÖS.920.40/Sw.fr.118.00.

Contents:

1. Greek science
2. Later influences of the Greek authors
3. Microscopic world and the structure of living organisms
4. Genetics
5. Human genetics
6. Death rates and life tables
7. Evolution
8. Infectious diseases and microbiology
9. Puerperal sepsis
10. Wounds and hospital infections
11. Epidemiologic observations
12. Mathematics and epidemiology
13. Epidemiology and noninfectious diseases
14. Metrical characterizations of individuals and populations
15. Quantitative diagnostic and physiological methods
16. Classification of diseases
17. Numerical analysis of clinical experience
18. Modern clinical trials
19. Applications of mathematics to biology and medicine

Readership: Statisticians, medical and biological researchers

Professor Lancaster feels that biology has been neglected in studies of the history of science, that it is an exciting current area of investigation and that quantitative methods have had, and will have, a great impact on the study of biological and medical problems. This book provides considerable evidence in favour of this viewpoint and is full of interesting historical information. For example, there is speculation about an unknown mathematical adviser to Oliver Wendell Holmes in a study of puerperal fever and I was unaware of the work of Gavarret (1809-1890) who, it is claimed, may have given the first formal statement of the principles of medical statistics.

Although described as a historical essay, what has been provided is much more of a series of personal essays on selected topics of interest to the author. Thus I felt the book tended to lack cohesiveness and focus. There was also a selectivity to the aspects of each topic which were discussed. While some information, such as biographical details available elsewhere, was omitted intentionally, some discussions seemed to lack balance or completeness. Sometimes this derived from the unquestioned adoption of a particular perspective, sometimes from simplistic generalizations. An example of the latter was the grouping of clinical trials and statistical surveys as providing comparable information regarding questions of causation.

Whatever the possible weaknesses of the presentation, it is good that Professor Lancaster has provided his perspective on an important topic. This book will be valuable in motivating historical study and providing background information for teaching and research purposes.

University of Waterloo

Waterloo, Canada

V.T. Farewell

STATISTICS IN MEDICAL RESEARCH. DEVELOPMENTS IN CLINICAL TRIALS. E.A. Gehan and N.A. Lemak.

New York: Plenum, 1994, pp. x + 214, US\$47.40.

Contents:

1. The dawning of statistics
2. Statistics becomes a distinct discipline
3. Researchers and statisticians come together
4. The awakening of statistics in the United States
5. Clinical trials in the United States
6. Designs and analyses of studies of historical importance

Readership: Biostatisticians, epidemiologists, medical researchers

This is a very enjoyable book, both for its balanced contents and rich collections of portraits and photographs. The authors succeed in making light reading of a report of how new statistical ideas and methodologies were introduced and spread through the centuries and through the countries. They start from the early days of the registration of birth and death data, with the first studies in epidemics. They detail the period when mathematical statistics started in England with anecdotes like "Do you wonder where the k in Biometrika comes from?" and they link it to the awakening of statistics in the United States and the theoretical developments of statistics. They finally come to today's concerns on the design and analysis of clinical trials and epidemiological studies.

London School of Hygiene

and Tropical Medicine

London, U.K.

B.L. De Stavola

ANALYSING SURVIVAL DATA FROM CLINICAL TRIALS

AND OBSERVATIONAL STUDIES. E. Marubini and

M.G. Valsecchi. Chichester, U.K.: Wiley,

1994, pp. xvi + 414, £39.95.

Contents:

1. The scope of survival analysis
2. Randomized clinical trials: General principles and some controversial issues
3. Estimation of survival probabilities
4. Non-parametric methods for the comparison of survival curves
5. Distribution times for failure time T
6. The Cox regression model
7. Validation of the proportional hazards model
8. Parametric regression models
9. The study of prognostic factors and the assessment of treatment effect
10. Competing risks
11. Meta-analysis

Readership: Biostatisticians, medical researchers, senior undergraduate students

This excellent book is a complete guide to the design, analysis and interpretation of survival data. Drawing examples from clinical trials performed to estimate and compare the survival of subjects receiving different treatment regimes, the authors begin by discussing the issues that need to be considered in the design and recruitment of subjects to such studies, stressing the central role randomization plays in ensuring the statistical validity of the conclusions. In the subsequent chapters, the non-parametric, parametric and regression methods of survival analysis are discussed in sufficient mathematical detail to satisfy most statisticians. These chapters would also be accessible to clinicians since all the methods discussed are illustrated with graphs or by numerical calculations. At every stage the authors point out both the strengths and weaknesses of the methods they discuss. A particularly attractive feature of the book is the very positive advice they offer. When warning about the pit-falls of a technique such as, for example, the over enthusiastic examination of selected subsets of the data, they offer a better way to proceed.

An entire chapter is devoted to the selection of prognostic and confounding variables in a survival regression model, which may be viewed as a special form of model selection and interpretation in the context of clinical trials. A chapter on competing risks extends the survival analysis to multiple failures and the final chapter on a meta-analysis shows how to assess the evidence from a number of independent survival studies.

This book complements that of D. Collett Modelling Survival Data in Medical Research [Reviewed in Short Book Reviews, Vol. 14, p.25] in that it offers a deeper discussion of the design issues, competing risks and meta-analysis. On the other hand Collett gives more detail on the use of statistical packages for survival analysis.

The authors have done an admirable job in bridging the gap between the mathematical theory of survival analysis and its application in practice. This is an important book for statisticians since much of the discussion of practical issues has appeared in the medical literature not often read by statisticians. This is an important book for clinicians since they have a lucid exposition of a valuable tool in clinical research. It is highly recommended.

University of Cape Town
Rondebosch, South Africa

J.M. Juritz

EDA. EXPLORATIVE DATENANALYSE. Einführung in dieDeskriptive Statistik. Zweite, Neubearbeitete undErweiterte Auflage, 2nd edition. W. Polasek. Berlin:

Springer-Verlag, 1994, pp. 345, DM.45.00/ÖS.351.00/

Sw.fr.45.00.

Contents:

0. Introduction
 1. Exploratory and descriptive statistics
- PART I : Exploratory Data Analysis
 2. Stem and leaf
 3. Rank measures
 4. Box plots
 5. Data transformations
 6. Scattergrams
 7. Regressograms
 8. Time series
 9. Two-way tables
- PART II : Descriptive Statistics
 10. Location parameters
 11. Scatter measures
 12. Correlation
 13. Inequality and concentration
 14. Index numbers
- PART III: Graphical Techniques
 15. 2-dimensional graphics
 16. 3-dimensional graphics
 17. Projection techniques
 18. Postscriptum

Readership: Students and researchers in the social sciences using statistics

The second edition of the present textbook in the German "Springer-Lehrbuch" series has grown by fifty percent from the first edition (1988), mainly by improving on many details and adding more graphical examples. The goal of the book is to teach and demonstrate methods for exploratory, descriptive and graphical data analysis from a similar perspective to enable students to engage in model building without having to study probability theory.

The first part introduces Tukey's (1997) EDA to a German speaking audience in an informal way. Throughout the book, Austrian and Swiss sets of data from social sciences and economics are used. This makes the book particularly appealing to readers from this European Region.

The second part introduces more traditional non-inferential statistics in a similar way. In part three, the author discusses a set of selected topics from the vast field of statistical graphics. The author gives some guidance on practice ("not to lie with statistics"), but this is not done systematically. The chapter on projection techniques, Chapter 17, has nothing to do with modern methods for multivariate analysis. It deals with basic geometrical aspects of perspective representation, projecting from three to two dimensions.

The book has been produced from a camera ready copy and this shows. The typesetting of mathematical expressions, for example, is quite poor. There are exercises at the end of each chapter, but no solutions are provided.

ETH-Zentrum
Zürich, Switzerland

M. Maechler

AN INTRODUCTION TO REGRESSION GRAPHICS. R.D. Cook

and S. Weisberg. New York: Wiley, 1994,

pp. xx + 253 + two disks, £45.50/US\$63.50.

Contents:

1. Getting started
 2. Simple regression plots
 3. Two-dimensional plots
 4. Scatter plot matrices
 5. Three-dimensional plots
 6. Visualizing linear regression with two predictors
 7. Visualizing regression without linearity
 8. Finding dimension
 9. Predictor transformations
 10. Response transformations
 11. Checking models
 12. Assessing predictors
 13. Influence and outliers
 14. Confidence region
- APPENDIX: The R-code

Readership: Undergraduate statistics majors, postgraduates, researchers and lecturers

Ever since computer generated three-dimensional rotating plots became available it has been clear that they would be a powerful tool in data analysis. However, training in the use and interpretation of these plots for final year statistics majors has been out of the question because the software for DOS or Macintosh machines had not been readily available except in very expensive packages, but more importantly there was a lack of an accessible and up-to-date account of the subject. The appearance of this excellent introduction to regression graphics redresses these deficiencies and should have a significant impact on the teaching of multiple regression at both undergraduate and postgraduate levels. It comes with its own DOS/Macintosh software, UNIX being also available, software which in addition to the three-dimensional capability includes many other graphical features useful in regression analysis for example fitting of parametric and nonparametric smooths, transformations of the predictors or the response, linking, brushing and scatterplot matrices. The explanations in the book are clear, the use of the package is straight-forward and should pose few difficulties for any reasonable statistics majors. Well-chosen exercises at the end of each chapter help consolidate the ideas. The rotating plots are fascinating and play tricks with one's perception; it is possible to see certain points rotating in one direction whilst the rest rotate in the opposite direction! The wealth of information such plots convey can be bewildering. This package provides the reader with the tools necessary for a careful dissection of this information leading to a better understanding of the data. There is now no reason for not including these graphical techniques in undergraduate courses in multiple regression.

Macquarie University
Sydney, Australia J.R. Leslie

MODERN APPLIED STATISTICS WITH S-PLUS.

W.N. Venables and B.D. Ripley. New York: Springer-Verlag, 1994, pp. xiii + 462, 32 in. computer disk, DM.58.00/£24.50.

Contents:

1. Introduction
2. The S language
3. Graphical output
4. Programming in S
5. Distributions and data summaries
6. Linear statistical models
7. Generalized linear models
8. Robust statistics
9. Non-linear regression models

10. Modern regression
 11. Survival analysis
 12. Multivariate analysis
 13. Tree-based models
 14. Time series
 15. Spatial statistics
- APPENDIX A: Datasets and Software
APPENDIX B: Common S-PLUS Functions
APPENDIX C: S versus S-PLUS
APPENDIX D: Using S-PLUS Libraries
APPENDIX E: Command Line Editing
APPENDIX F: Answers to Selected Exercises

Readership: Aspiring, casual, and serious users of S-PLUS. Students and teachers of data analysis and statistics. Statisticians

Venables and Ripley have individually provided advice to the first generation of S-PLUS users via the Internet distribution list s-news and through their respective introductory guides. It is fitting that their collective wisdom, blended and extended, should appear in book form. This volume is an eminently usable introduction to the language and structure of S as well as a user's guide to the many statistical functions included in the S-PLUS package. Computer implementation of each statistical method is presented clearly and logically and is often accompanied by an outline of the underlying statistical idea. Graphs enhance the exposition; helpful insights abound. Many of the techniques are illustrated by examples of S code (valuable "get started" modules for new users), often in terms of sets of data available to the reader on the accompanying disk, which also contains supplementary S functions for neural nets, spatial statistics and miscellaneous statistical tasks.

This book is good value. It deserves to become the reference of choice for users of S-PLUS.

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

PRACTICAL METHODS FOR DESIGN AND ANALYSIS OF COMPLEX SURVEYS. R. Lehtonen and E.J. Pahkinen. Chichester, U.K.: 1995, pp. ix + 337, £34.95.

Contents:

1. Introduction
 2. Basic sampling techniques
 3. Further use of auxiliary information
 4. Handling missing data
 5. Linearization and sample re-use in variance estimation
 6. Covariance-matrix estimation of ratio estimators
 7. Analysis of one-way and two-way tables
 8. Multivariate survey analysis
 9. More detailed case studies
- APPENDIX 1: Software Review for Survey Analysis
APPENDIX 2: SAS Macro

Readership: Statisticians involved in survey sampling and survey analysis

After a short introduction, Chapter 2 covers the basic sampling methods of simple random sampling, stratified sampling and selection with probability proportional to size. Chapter 3 introduces the use of auxiliary information to form model assisted estimators and compares ratio, regression, post-stratified and design-based estimators. This chapter is completed with a discussion of design effects which are used exten-

sively in the rest of the book. In Chapter 4 methods of dealing with missing data through re-weighting and imputation are described and illustrated with a simple example. Methods of variance and covariance matrix estimation of a ratio estimator appear in the next two chapters including linearization, jackknifing and boot-strapping. The analysis, allowing for cluster effects, of one-way and two-way tables obtained from complex survey designs are illustrated using Rao-Scott adjustment to the Pearson and Neyman test statistics. Logit and linear models for proportions are considered in the penultimate chapter and the text concludes with three further practical examples.

The first half of the book would form a comprehensive introduction to survey sampling methodology at the undergraduate level, while selected topics from the later chapters would be suitable for a more advanced course. The presentation of the book and the use of several small sets of data throughout make this a most readable and instructive text.

Southampton University
Southampton, U.K.P. Prescott

EXACT STATISTICAL METHODS FOR DATA ANALYSIS.

S. Weerahandi. New York: Springer-Verlag, 1994,
pp. xiv + 328, DM.72.00/ÖS.561.60/Sw.fr.72.00.

Contents:

1. Preliminary notions
 2. Notions in significance testing of hypotheses
 3. Review of special distributions
 4. Exact nonparametric method
 5. Generalised p-values
 6. Generalised confidence intervals
 7. Comparing two normal populations
 8. Analysis of variance
 9. Mixed models
 10. Regression
- APPENDIX A: Elements of Bayesian Inference
APPENDIX B: Technical Arguments

Readership: Anyone with elementary knowledge of probability and statistics who is interested in analyzing some data

If, with given n , a binomial $B(n, p)$ X has been observed to equal x_0 , discreteness makes exact pre-fixed level α testing of $H_0: p < p_0$ against $H_1: p > p_0$ impossible without resorting to an absurd random-ization. Most data analysts wishing to make an objectively based response will in this situation quote the p-value $\Pr(X > x_0 | p_0)$, unless additional information justifying a prior density (p) is available. This p-value is exact in the sense of this book's title. In the Behrens-Fisher problem we could find a similarly exact p-value for $i_1 < i_2$ against $i_1 > i_2$ if only we knew λ the ratio of the unknown variances. The ratio of observed sample variances can be used in an exact pivotal for λ . A plot of p against λ together with a confidence distribution for λ would constitute an "exact" "generalized" p-value response to the problem, as also would the integral of p over a posterior distribution of λ were the necessary prior for available.

Weerahandi correctly points out that our founding fathers, the Pearsons, Gosset, Fisher, Yates et al., appeared to sanction pre-fixed level tests only because modern computers were not available to them. A book addressed to people who hope to extract useful messages from given data without being unduly bothered with considerations of an excessively formal kind makes refreshing reading. Another welcome

feature is, that Bayesian methods are not segregated from non-Bayesian methods, while Appendix A sets out the Bayesian versus non-Bayesian issues very clearly. Up-to-date references are made to packages such as StatXact and TESTIMATE, but the "exact" in the book's title does not exclusively refer to these.

University of Essex
Colchester, U.K. G. Barnard

CONTINUOUS UNIVARIATE DISTRIBUTIONS. Volume 1,
2nd edition. N.L. Johnson, S. Kotz and
N. Balakrishnan. New York: Wiley, 1994,
pp. xix + 756, £66.00.

Contents:

1. Continuous distributions (general)
2. Normal distributions
3. Lognormal distributions
4. Inverse Gaussian (Wald) distributions
5. Cauchy distribution
6. Gamma distributions
7. Chi-square distributions including chi and Rayleigh
8. Exponential distributions
9. Pareto distributions
10. Weibull distributions

Readership: Pure and applied statisticians, researchers in continuous distribution theory, scientists who use continuous distributions

This is the second book of Johnson and Kotz's classic 1969-72 reference series Distributions in Statistics to appear in a greatly enlarged second edition. For this volume, the co-author is Dr. N. Balakrishnan. The book is about two and one-half times the length of the first edition: the average textual content of each chapter is about doubled, whilst the number of references in the bibliographies is more than trebled. The general style and structure is the same as that of the first edition. As before, the chapter numbering follows on from the 'discrete' book, [Short Book Reviews, Vol. 13, p.17.]. However, the old Chapter 17 topics now fill two chapters (17 and 18); as a result, the old Chapter 21 on extreme value distributions has been transferred to the second 'continuous' volume which is to appear shortly. The order in which different aspects of distributions are dealt with varies from chapter to chapter. Much of the material in the first edition has been reproduced almost verbatim, though with some rearrangement; the very extensive new material appears both as complete additional sections and also as insertions or, more often, lengthy appendages to the existing material. In several chapters there is now a section devoted to the computer generation of the particular distribution(s). The subject index is a great improvement on its predecessor and the new author index is particularly useful since, as before, there is a separate bibliography for each chapter. The authors are to be congratulated on a very thorough and very substantial update which, with its companion volume, will remain the reference work on univariate continuous distributions for many years.

University of St. Andrews
St. Andrews, U.K. C.D. Kemp

ASYMPTOTIC APPROXIMATIONS FOR PROBABILITY INTEGRALS.

K.W. Breitung. Heidelberg: Springer-Verlag, 1994,
pp. ix + 146, DM.42.00/ÖS.327.60/Sw.fr.42.00.

Contents:

1. Introduction
2. Mathematical preliminaries
3. Asymptotic analysis
4. Univariate integrals
5. Multivariate Laplace type integrals
6. Approximations for normal integrals
7. Arbitrary probability integrals
8. Crossing rates of stochastic processes

Readership: Engineers

This book deals with asymptotic approximation methods for multivariate integrals, with special attention to examples from reliability theory, stochastic optimization and mathematical statistics. Most of these approximation formulas can be found in various existing textbooks on the subject, for example, Watson's lemma on Laplace transforms, Laplace's methods, The analytic approximation formulae brought together in this book could be useful in those problems where more is needed than just a numerical evaluation of an integral.

Limburgs Universitair Centrum
Diepenbeek, Belgium

N. Veraverbeke

PROBABILISTIC CAUSALITY IN LONGITUDINAL STUDIES.

M. Eerola. New York: Springer-Verlag, 1994,
pp. viii + 131, DM.49.00/ÖS.382.20/Sw.fr.49.00.

Contents:

1. Foundations of probabilistic causality
2. Predictive causal inference in a series of events
3. Confidence statements about the prediction process
4. Applications
5. Concluding remarks

APPENDIX 1: Derivatives of the Prediction Probabilities

APPENDIX 2: Results of Estimated Hazard Models

Readership: Philosophers and statisticians interested
in causality

The author extends the classical theory of probabilistic causality to longitudinal settings, suggesting that causal analysis is essentially dynamic analysis, and formulates the sequence of causal events as a marked point process. He adopts the definition that the influence of a cause is the difference between the prediction probability of the effect given that the cause has occurred and the probability given that it has not occurred. He presents a short but interesting discussion of philosophical and probabilistic ideas in causality and distinguishes

between explanation ('What were the causes of E?') and prediction (a generic description that 'usually' Type C events precede Type E events) and focuses on the latter, extending it to a causal chain of events.

As has been emphasized in work on expert systems, probability serves to model both the uncertainty about causal relationships as well as the inherent indeterminism of nature; in any particular application, we need to know the general relevant causal laws and the particular situation. Statistical modelling is used to model these to determine which conditions produce which events preceding the outcome. This allows us to calculate the probabilities of different routes to the outcomes and probabilities of the different outcomes.

This book is not merely a theoretical exposition, the author also applies the ideas to real data.

The subject is a deep one, but the author has given a very clear presentation. Even more impressive is that he has done this in a mere one hundred and thirty pages. I certainly recommend the book to anyone interested in the area.

The Open University
Milton Keynes, U.K.

D.J. Hand

PRACTICAL METHODS FOR RELIABILITY DATA ANALYSIS.

J.I. Ansell and M.J. Phillips. Oxford: Clarendon,
1994, pp. xvi + 240, £30.00.

Contents:

1. Introduction to reliability
2. Lifetime distributions
3. Analysis of lifetimes with covariates
4. System reliability
5. Models for repairable systems
6. Analysis of repairable systems
7. Growth and adaptive models
8. Dependency analysis
9. Practical aspects of reliability data analysis
10. Case studies in reliability

Readership: Statisticians, reliability engineers

This book provides a reasonably comprehensive but brief overview of statistical methods for reliability. It covers much of the same ground as the recent monograph Statistical Analysis of Reliability Data, by M.J. Crowder, A.C. Kimber, R.L. Smith and T.J. Sweeting [Short Book Reviews, Vol. 12, p.6]. The Crowder et al. book has a superior presentation of statistical techniques in my opinion, but the current book has some useful discussion on practical aspects of reliability studies. In terms of its stated aim of providing practitioners with guidance on the use of statistical techniques, it is fairly successful.

University of Waterloo
Waterloo, Canada

J.F. Lawless

THE BAYESIAN CHOICE: A Decision-Theoretic Motivation.

C.P. Robert. New York: Springer-Verlag, 1994,
pp. xiv + 436, DM.88.00/ÖS.686.40/Sw.fr.88.00.

Contents:

1. Introduction
 2. Decision-theoretic foundations of statistical inferences
 3. From prior information to prior distributions
 4. Bayesian point estimation
 5. Tests and confidence regions
 6. Admissibility and complete classes
 7. Invariance, Haar measures, and equivariant estimators
 8. Hierarchical and empirical Bayes extensions
 9. Bayesian calculations
 10. A defense of the Bayesian choice
- APPENDIX A: Usual Probability Distributions
APPENDIX B: Usual Pseudorandom Generators

Readership: Advanced undergraduate and postgraduate students and teachers of theoretical statistics

This book provides a traditional approach to the subject of Bayesian statistics. It contains many references to results and papers from the period 1985-1994 and, in this way, up-dates the book Statistical Decision Theory and Bayesian Analysis by J.O. Berger [Reviewed in Short Book Reviews, Vol. 6, p.6]. The use of numerical approximations and sampling techniques in Bayesian computation is one important new area covered. Others are of a more theoretical nature. The tone of the book is academic and, as a result, requires the reader to have a stronger general background and sophistication in statistical theory than does the book by Berger. However, its role in the teaching of Bayesian statistics is assured, not simply because of its up-to-date nature, but also for the large number of exercises, mainly theoretical, at the end of each chapter. These will be appreciated by students and teachers alike.

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

APPLIED BAYESIAN FORECASTING AND TIME SERIES ANALYSIS.

A. Pole, M. West and J. Harrison. New York: Chapman and Hall, 1994, pp. xviii + 409, £35.00.

Contents:

- PART A: Dynamic Bayesian Modelling
1. Practical modelling and forecasting
 2. Methodological framework
 3. Analysis of DLM
- APPENDIX 3.1 Review of Distribution Theory
APPENDIX 3.2 Classical Time Series Models
4. Application: Turkey chick sales
 5. Application: Market share
 6. Application: Marriages in Greece
 7. Further examples and exercises
- PART B: Interactive Time Series Analysis and Forecasting
8. Installing BATS
 9. Tutorial: Introduction to BATS
- APPENDIX 9.1: Files and Directories
10. Tutorial: Introduction to modelling
 11. Tutorial: Advanced modelling
 12. Tutorial: Modelling with incomplete data
 13. Tutorial: Data management

PART C: BATS Reference

14. Communications
15. Menu descriptions

Readership: Practitioners on time series analysis

The book provides a "hands-on" introduction to time series analysis suitable for non-statistics majors. The emphasis is on real sets of data. A key aspect of the book is the provision of the BATS (Bayesian Analysis of Time Series) program for both DOS and Windows environments. A significant proportion of the book is devoted to documenting this program and illustrating its use on time series drawn from different application domains.

The book would be a useful introduction to time series analysis with emphasis on manipulation of real sets of data. Relatively little mathematical sophistication is called for in reading the book and thus it is suitable for majors, for example, in business studies or operations research.

University of Newcastle
Newcastle, Australia

G.C. Goodwin

KERNEL SMOOTHING. M.P. Wand and M.C. Jones. London: Chapman and Hall, 1995, pp. xii + 212, £25.00.

Contents:

1. Introduction
 2. Univariate kernel density estimation
 3. Bandwidth selection
 4. Multivariate kernel density estimation
 5. Kernel regression
 6. Selected extra topics
- APPENDIX A: Notation
APPENDIX B: Tables
APPENDIX C: Facts About Normal Densities
APPENDIX D: Computation of Kernel Estimations

Readership: Graduate students in statistics

Much of the book is taken up with nonparametric density estimation using the kernel density approach. A substantial amount of detail concerning asymptotic behaviour of these estimates is provided because the authors feel that this also sheds considerable light on the behaviour of kernel smoothing estimates of nonparametric regression functions. One chapter is reserved for local polynomial smoothing of bivariate data. Since, as the authors point out, kernel smoothing in the sense of local averaging has fallen somewhat out of favour, many readers may find that the title of the book is somewhat misleading, but this chapter is nevertheless a welcome contribution.

McGill University
Montreal, Canada J.O. Ramsay

APPLIED DISCRIMINANT ANALYSIS. C.J. Huberty. New York: Wiley, 1994, pp. xxiii + 466 + disk, £62.00.

Contents:

- PART I : Introduction
1. Preliminaries
 2. Discriminant analysis in research
- PART II : Prediction
3. Basic ideas of classification
 4. Multivariate normal rules
 5. Classification results

6. Hit rate estimation
7. Effectiveness of classification rules
8. Selecting and ordering predictors
9. Two-group classification
10. Nonnormal rules
11. Reporting results of a PDA
12. Applications of PDA

PART III: Description

13. Group separation
14. Assessing effects
15. Describing effects
16. Selecting and ordering variables
17. Reporting results of a DDA
18. Applications of DDA

PART IV : Issues and Problems

19. Issues
20. Special problems

APPENDIX A: Data Set Description

APPENDIX B: Computer Printouts

APPENDIX C: Content of Accompanying Diskette

Readership: Users of multivariate techniques, mainly those in the field of education

The author's interpretation of discriminant analysis allows both for the construction of classification rules, so-called Predictive Discriminant Analysis, as well as multivariate analysis of variance related techniques (Descriptive Discriminant Analysis). Mainly based on data from education, a rather superficial introduction to the various techniques is given. Computer output (more than 100 pages of SAS, SPSS, BMDP output) on the analyses of four sets of data should help the reader in making the transition from theory to practice. Logistic discriminant analysis is only briefly mentioned and topics like neural nets or CART do not appear. The four sets of data presented all come from educational studies. The avoidance of basic mathematical statistics leads to definitions like that on page 81 " $E(R)$ denotes the 'expected value of R '. Suppose that all possible samples are selected and that for each sample, an R value is calculated; the mean of the collection of R values is the expected value of R ." I personally like the idea of reviewing a field of statistics using detailed analyses of substantial sets of data based on existing statistical software. I would, however, have preferred a more in depth, as well as more complete, discussion of the techniques used together with greater diversity in the choice of data. The space needed for the former could have been found by restricting the computer output to what is strictly necessary.

ETH-Zentrum

Zürich, Switzerland

P.A.L. Embrechts

DIFFUSIONS, MARKOV PROCESSES, AND MARTINGALES.

Volume 1: FOUNDATIONS, 2nd edition. L.C.G. Rogers

and D. Williams. New York: Wiley, 1994, pp. xx + 386, £49.95.

Contents:

Chapter I : Brownian Motion

1. Introduction
2. Basics about Brownian motion
3. Brownian motion in higher dimensions
4. Gaussian processes and Lévy processes

Chapter II : Some Classical Theory

1. Basic measure theory
2. Basic probability theory
3. Stochastic processes
4. Discrete-parameter martingale theory

5. Continuous-parameter supermartingales

6. Probability measure on Lusin spaces

Chapter III: Markov Processes

1. Transition functions and resolvents
2. Feller-Dynkin processes
3. Additive functionals
4. Approach to Ray processes: The Martin boundary
5. Ray processes
6. Applications

Readership: All those interested in a more in-depth treatment of stochastic processes

This second edition to the wonderful 1979 first edition by D. Williams alone has changed in many ways. Having taken C. Rogers as co-author on board, a completely new book emerged resulting in an extra one hundred and fifty pages. Especially the Chapters I and II have been extensively rewritten, offering many more detailed results and proofs. I fully agree with the authors when they say in the preface that "Chapter II is now a highly systematic account of what every young probabilist must know." The main feature of the book lies in the fact that the authors nearly always convey to the reader first why new (often difficult) results are needed, then go on by showing how these results are to be used before embarking on a proof. Together with D. Williams' Probability with Martingales [Reviewed in Short Book Reviews, Vol. 11, p.29] and Volume 2 of Itô Calculus [Reviewed in Short Book Reviews, Vol. 8, p.8] by the same authors, these books offer a very concise account of modern probability theory. Every student and indeed researcher in probability should have these volumes within easy reach.

ETH-Zentrum

Zürich, Switzerland

P.A.L. Embrechts

STOCHASTIC ORDERS AND THEIR APPLICATION. M. Shaked and J.G. Shanthikumar. Boston: Academic Press, 1994, pp. xvi + 545, US\$79.95.

Contents:

1. Univariate stochastic orders
2. Univariate variability orders
3. Univariate monotone convex and related orders
4. Multivariate stochastic orders
5. Multivariate variability and related orders
6. Stochastic convexity and concavity
7. Some applications of multivariate variability orders
8. Statistical inference for stochastic ordering
9. Association and unbiased tests in statistics
10. Information orderings and stochastic orderings
11. Stochastic orderings of epidemics
12. Comparing risk and risk aversion
13. Scheduling
14. Stochastic comparisons in closed Jackson networks
15. Comparison of maintenance policies
16. Stochastic order in system reliability theory

Readership: Applied probabilists

This is a welcome book, for many reasons. Stochastic orders have become important tools in diverse areas of applied probability. These orders, their properties and their interrelationships, are systematically described in the first part of the book. Although the style is somewhat terse, the treatment is comprehensive, and the book will provide an invaluable reference. Fourteen different authors contributed the final ten chapters of the book. Each chapter provides a relatively self-contained

treatment of its subject. They are valuable not only in their own right, but in illustrating the stochastic orders and in indicating the breadth of their application.

University of Chicago
Chicago, U.S.A.

P.J. Donnelly

HIERARCHICAL DECISION MAKING IN STOCHASTIC MANUFACTURING SYSTEMS. S.P. Sethi and Q. Zhang.

Boston: Birkhäuser, 1994, pp. xvi + 419,
DM.118.00/ÖS.920.40/Sw.fr.98.00/£44.00.

Contents:

PART I : Introduction of Models of Manufacturing Systems

1. Concepts of hierarchical decision making
2. Models of manufacturing systems

PART II : Optimal Control of Manufacturing Systems: Existence and Characterisation

3. Optimal control of parallel machine systems
4. Optimal control of dynamic flowshops

PART III: Asymptotic Optimal Controls

5. Hierarchical controls in systems with parallel machines
6. Hierarchical control in dynamic flowshops
7. Hierarchical control in dynamic jobshops
8. Hierarchical production and set up scheduling in a single machine system

9. Hierarchical feedback controls in two-machine flowshops

PART IV : Multilevel Hierarchical Decisions

10. A production of capacity expansion model
11. Production-marketing systems

PART V : Computations and Conclusions

12. Computations and evaluation of hierarchical controls
13. Further extensions and open research problems

Readership: Operations researchers, system and control theorists, applied mathematicians

The book is concerned with manufacturing problems described in a probabilistic or stochastic setting. It is further assumed that some variables, for example demand, change rapidly in comparison with other events, breakdowns, etc. In this case, it is shown that a two-time scale approach to optimization can lead to near optimal results. In this approach the fast changing processes are replaced by their long-run

averages to simplify the problem. The book is recommended to anybody who has an interest in applied stochastic processes or manufacturing problems.

University of Newcastle
Newcastle, Australia

G.C. Goodwin

HIDDEN MARKOV MODELS. ESTIMATION AND CONTROL.

R.J. Elliott, L. Aggoun and J.B. Moore.

New York: Springer-Verlag, 1995, pp. xii + 361,
DM.88.00/ÖS.656.40/Sw.fr.88.00.

Contents:

PART I : Introduction

1. Hidden Markov model processing

PART II : Discrete-Time HMM Estimation

2. Discrete states and discrete observations
3. Continuous-range observations
4. Continuous-range states and observations
5. A general recursive filter
6. Practical recursive filters

PART III: Continuous-Time HMM Estimation

7. Discrete-range states and observations
8. Markov chains in Brownian motion

PART IV : Two Dimensional HMM Estimation

9. Hidden Markov random fields

PART V : HMM Optimal Control

10. Discrete-time HMM control
11. Risk-sensitive control of HMM
12. Continuous-time HMM control

APPENDIX A: Basic Probability Concepts

APPENDIX B: Continuous-time Martingale Representation

Readership: Mathematicians with interests in stochastic dynamic systems or signal processing

The book uses change-of-probability measure techniques to study estimation and control problems associated with Hidden Markov Models (HMM's). The change-of-probability measure technique is used to convert potentially difficult problems into a simple form such that well-known results for identically and independently distributed random variables can be used. The book begins with a treatment of discrete-time, discrete-state HMM's and then proceeds to more difficult problems including continuous-time HMM's and two-dimensional image processing.

The book is a tribute to the power of the change-of-probability measure techniques and is recommended to anybody with an interest in stochastic dynamic systems of HMM's. A reasonable degree of mathematical sophistication is required to read the book.

University of Newcastle
Newcastle, Australia

C.G. Goodwin

NOTES

IRVING FISHER. A Biography. R.L. Allen. Cambridge, Massachusetts: Blackwell, 1994, pp. xv + 324, £45.00/US\$39.95.

Irving Fisher (1867-1947) was one of the greatest American economists.

From the book jacket: "Fisher was one of the greatest and certainly one of the most colorful American economists. Widely acknowledged as the chief architect of modern neoclassical economics, he was a writer and teacher of prodigious scope and output whose business career included the earning of a fortune from the invention of a card index system, and its sub-sequent loss in the Great Crash. He was also an active campaigner for numerous causes, including world peace, prohibition, preventative medicine, eugenics, and 100 percent deposit reserve money.

"This biography, focusing both on Fisher's personal life, as well as his intellectual contributions, will be of wide interest to economists and of particular interest to American economics scholars who regard him as their pre-1950 giant of the discipline."

NATURALIST. E.O. Wilson. Washington, D.C.: Island/Shearwater, 1994, pp. xii + 380, US\$24.95.

E.O. Wilson is not only the winner of two Pulitzer prizes but is also a champion of biodiversity. In this, his autobiography, Wilson, [from the book jacket] "describes for the first time his growth as a scientist and the evolution of the science he has helped define. He traces the trajectory of his life from a childhood spent exploring the Gulf Coast of Alabama and Florida to life as a tenured professor at Harvard detailing how his youthful fascination with nature blossomed

into a lifelong calling. He recounts with drama and wit the adventures of his days as a student at the University of Alabama and his four decades at Harvard University, where he has achieved renown as both teacher and researcher.

"As the narrative of Wilson's life unfolds, the reader is treated to an inside look at the origin and development of ideas that guide today's biological re-search. Theories that are now widely accepted in the scientific world were once untested hypotheses emerging from one man's broad-gauged studies. Throughout Natura-list, we see Wilson's mind and energies constantly striving to help establish many of the central principles of the field of evolutionary biology.

"The story of Edward O. Wilson's life provides fascinating insights into the making of a scientist and a valuable look at some of the most thought-provoking ideas of our time."

HUXLEY: THE DEVIL'S DISCIPLE. A. Desmond. London: Michael Joseph, 1994, pp. xvii + 475.

Thomas Henry Huxley was born May 4, 1825 and died June 29, 1895. This biography of Huxley tells of his life, his battles with Darwin, his talk of ape ancestors and agnosticism, a word he coined. The biography ends with Huxley's presidency of the British Association for the Advancement of Science.

JOSEPH BANKS AND THE ENGLISH ENLIGHTENMENT. Useful Knowledge and Polite Culture. J. Gascoigne. Cambridge University Press, 1994, pp. xi + 324, £35.00/US\$59.95.

Joseph Banks (1743-1820) was a long-time president of the Royal Society of London, Privy Counsellor and adviser to the British Government.

From the book: "Banks's importance lies not in his own scientific contributions which were few and slight but rather in his ability to publicise the possibilities of science when linked with sympathetic patrons, particularly government. For, to Banks, science above all meant useful learning which could, as Bacon had put it, contribute to 'the relief of man's estate.' The origins of Banks's belief in the possibilities of science as an agent for improving the wealth of nations and the welfare of humankind more generally lie in the cultural ambience of his age and class rather than in the influence of any specific institution or individual though the long-term influence of the Baconian tradition was doubtless an important, if imponderable, factor."

THE VALUES OF PRECISION. M.N. Wise (Ed.). Princeton, New Jersey: Princeton University Press, 1995, pp. viii + 372, US\$49.50.

This volume consists of thirteen essays on values of precision from a workshop sponsored by the Program in the History of Science at Princeton University. From the book jacket:

"Beginning with the late eighteenth century and continuing into the twentieth, the essays in this volume support the view that centralizing states with their increasingly widespread bureaucracies for managing trade, taxation, and armies and large-scale commercial enterprises with their requirements for standardization and mass production have been the major promoters of numerical precision. Scientists and engineers, pursuing their own interests in the virtues of precision for knowledge of nature and for technological control, have taken advantage of the resources available, thus entering a symbiotic relationship with state and industry that promotes ever more refined measures in ever-widening domains of the natural and social world. At the heart of this book, therefore, is an inquiry into the capacity of numbers and instruments to travel across boundaries of culture and materials."

IN AN AGE OF EXPERTS. The Changing Role of Professionals in Politics and Public Life. S. Brint. Princeton University Press, 1994, pp. x + 278, US\$29.95.

This volume shows that claims about the politics and values of the professional stratum have been overstated and that the political preferences of these professionals are linked to those of business owners and executives.

THE HUBBLE WARS. Astrophysics Meets Astropolitics in the Two-Billion-Dollar Struggle over the Hubble Space Telescope. E.J. Chaisson. New York: HarperCollins, 1994, pp. xi + 386, US\$27.50.

The Hubble telescope, named after the distinguished astronomer Edwin Powell Hubble (1889-1953), is the largest, most complex and most powerful observatory ever deployed in space.

From the day in 1990, when it was launched, the Hubble telescope has been involved in the controversy as to who was responsible for its failure and what could be done about it. This book tells the story of the controversy of the two-billion-dollar telescope.

Already in 1936, Hubble wrote in Realm of the Nebulae:

"From our home on the Earth, we look out into the distances and strive to imagine the sort of world into which we were born. Today we have reached far out into space. Our immediate neighbourhood we know rather intimately. But with increasing distance our knowledge fades, and fades rapidly, until at the last dim horizon we search among ghostly errors of observations for landmarks that are scarcely more substantial." "The search will continue. The urge is older than history. It is not satisfied and will not be suppressed."

TWENTY YEARS OF SCIENCE IN THE PUBLIC INTEREST.

A History of the Congressional Science and Engineering Fellowship Program. J.K. Stine. Foreword by W.T. Golden. Washington, D.C.: American Association for the Advancement of Science, 1994, pp. xiii + 192.

This volume describes the history and the benefits of the Congressional Science and Engineering Fellowship Program.

ETHICAL ISSUES IN SCIENTIFIC RESEARCH. An Anthology. E. Erwin, S. Gendin and L. Kleiman (Eds.). New York: Garland, 1994, pp. xii + 416, US\$ 6.00 Cloth; US\$18.95 Paper.

This edited volume is divided into six sections with several essays in each part. The titles of the sections are Science and Values, Fraud and Deception in Scientific Research, Experimentation on Humans, Animal Research, Genetic Research and Controversial Research Topics.

EVOLUTION OF INFECTIOUS DISEASE. P.W. Ewald. Oxford University Press, 1994, pp. vii + 298, £27.50.

From the preface: "More generally, I am trying to use this book to reach people in the health sciences who are interested in looking beyond the currently prescribed boundaries of their fields. But I am also writing to reach biologists with an interest in the health sciences, and anyone else who shares an enthusiasm for learning why we are the way we are. I want people to see that evolution is not just something we should learn

about to make us more broadly educated. It is that, but it is also going on around us all the time and is having deeply relevant effects that could determine whether we and our loved ones will live or die. And no organisms are evolving faster with pressing consequences than are the parasites among us: from the parasites of our agricultural resources, to the vectors of our lethal diseases, to the protozoa, bacteria and viruses that will kill millions of us this year. If we want to understand and manage our world better, we had better try to understand the evolution of infectious disease."

And a quotation from page 181:

"He who has only once through his own efforts tried to trace back the long path trod by his predecessors, who has felt how clear and luminous his own knowledge becomes as he grows aware of the historical circumstances out of which it has arisen, and who discovers the basis of the error by which even genuine investigators have been misled, he who has learned that a kernel of truth sticks in every error, will not place himself with those who despise historical studies."

(Virchow 1877/1962)

CANCER FROM BEEF. DES, Federal Food Regulation, and Consumer Confidence. A.I. Marcus. Baltimore, Maryland: Johns Hopkins University Press, 1994, pp. x + 235, US\$38.50.

Diethylstilbestrol, stilbestrol or DES, is a growth-promoting hormone for cattle. Mass production began in 1954. Gradually it was suspected that cattle given DES might cause cancer in humans. Because of this the United States Government imposed regulatory legislation and new risk assessment models were developed. This volume shows the interaction between science and government policy and public attitudes to these.

AAAS. SCIENCE AND TECHNOLOGY POLICY YEARBOOK, 1994.

A.H. Teich, S.D. Nelson and C. McEnaney (Eds.). Washington, D.C.: American Association for the Advancement of Science, 1994, pp. xii + 447, US\$24.95.

This volume is composed of both original and previously published articles. It includes selected papers from the 1994 American Association for the Advancement of Science and Technology Policy Colloquium held in April 1994. A selection of papers contained herein are: Can scientists provide credible advice in Washington? F. Press; Science: The endless frontier: A report to the president on a program from postwar scientific research. V. Bush; New relationships between industry, academia, and government in science and technology. E. Bloch; Congressional management of national research policies. J. Brademus and D.Z. Robinson.

GREATNESS. WHO MAKES HISTORY AND WHY. D.K. Simonton.

New York: The Guilford Press, 1994, pp. x + 502, US\$29.95.

This volume describes the psychology of greatness, that is how psychology helps one to understand the personalities and events that have shaped the past and present.

THE SCIENTIFIC REVOLUTION. A Historiographical Inquiry.

H.F. Cohen. Chicago, Illinois: The University of Chicago Press, 1994, pp. xviii + 662, US\$26.95.

In this volume, the intellectual, social and cultural origins of early modern science are discussed. The book begins with two quotations:

"It is not by renouncing the apparently impossible and unattainable goal of knowing the real, but on the contrary, by boldly pursuing it that science progresses on its endless path towards truth."

A. Koyré.

"It is better for a historian to be wrong than to be timid."

L. White, Jr.

THE DISCOURSES OF SCIENCE. M. Pera. Translated by

C. Boltsford. Chicago, Illinois, University of Chicago Press, 1994, pp. xi + 250, US\$29.95.

The author's aim in this volume is to understand the place of science between culture and nature and to appreciate science "For what it can give, without blaming it for what it cannot offer."

Chapter 1, The Paradox of Scientific Method, begins with two quotations.

"Descartes wrote and rewrote his book, On Method, many times; and yet, as it is now, it is useless.

Whoever perseveres over a period of time in scrupulous inquiry, will have to change method sooner or later." J.W. Goethe, Maximen und Reflexionen.

"All good scientists, doctors, observers, and thinkers do what Copernicus used to do: they turn data and methods upside down to see if they are any better." Novalis, Fragmente.

WHO WILL DO SCIENCE? Educating the Next Generation.

W. Pearson, Jr. and A. Fechter (Eds.). Foreword by L.S. Wilson. Baltimore, Maryland: Johns Hopkins University Press, 1994, pp. xxii + 169, US\$31.95.

From the book jacket: "The question "Who will do science?" is one of growing urgency in the United States. Fewer U.S. college students are choosing to study math, science, and engineering and half of those who do eventually switch to non-science majors. Moreover, U.S. Students do not perform well on science and math achievement tests or in international competitions. If current trends continue, there will be a shortage of qualified candidates to fill the vacancies when scientists trained in the 1950s and 1960s retire.

"In Who Will Do science? scholars and policy analysts from a variety of disciplines describe the present demographic situation, analyze the effectiveness of current programs for recruitment and retention, and examine policies that will improve the education of tomorrow's scientists and engineers. Topics discussed include the motives of students as they consider careers; the attitudes and influence of parents, teachers, and peers; the challenges faced by women and minorities; and the need for financial support during the lengthy training required to pursue careers in science."

THE RESEARCH UNIVERSITY IN A TIME OF DISCONTENT.

J.R. Cole, E.G. Barber and S.R. Graubard (Eds.).
Baltimore, Maryland: Johns Hopkins University Press,
1994, pp. ix + 404, US\$15.95.

The papers given in this volume are:

1. Balancing Acts: Dilemmas of Choice Facing Research Universities*, by J.R. Cole
2. The Politics of Ambivalence: Diversity in the Research Universities*, by N.J. Smelser
3. Rationality and Realism, What Is at Stake?* by J.R. Searle
4. Making Choices in the Research University*, by D. Kennedy
5. Presidential Leadership, by S. Muller
6. Competition and the Research Universities*, by S.M. Stigler
7. The Mission of the Research University*, by N.O. Keohane
8. The Place of Teaching in the Research University, by F.H.T. Rhodes
9. Can the Research University Adapt to a Changing Future? by W.E. Massey
10. America's Research Universities under Public Scrutiny*, by K. Prewitt
11. In Defense of the Research University, by S.M. Lipset
12. The Research University as a Setting for Undergraduate Teaching, by A. Jamison and N.W. Polsby
13. Current Criticisms of Research Universities, by H. Brooks
14. The Appropriate Scale of the Health Sciences Enterprise*, by W.C. Richarson
15. Federal Science Policy and Universities: Consequences of Success*, by R.W. Nichols
16. Governing the Modern University, by R.M. Rosenzweig
17. The Distinction and Durability of American Research Universities, by F.X. Sutton
18. Knowledge without Borders? Internationalization of the Research Universities*, by E.B. Skolnikoff
19. The Research University: Notes towards a new History, by S.R. Graubard

The papers marked with an asterisk appeared in the Fall 1993 issue of Daedalus, Journal of the American Academy of Arts and Science.

MINDS FOR THE MAKING. The Role of Science in American Education, 1750-1900. S.L. Montgomery. New York: The Guilford Press, 1994, pp. x + 316, US\$18.95.

This volume on the history of science education in the United States of America consists of ten essays:

1. Science and democracy: Emerging trends of faith
2. Science in the New Republic: Faculty, family, and the failure of idealism
3. The Age of Jackson and After, Part I: Popular imagery and public reformers
4. The Age of Jackson and After, Part II: Professionalization of science and the role of higher education
5. Science as "Culture": Education and modernism in the late 19th century
6. Science and the progressiveness: Standards, and standard bearers in the age of reformism
7. What bearing it may have: Legacies of progressivism in the early 20th century
8. The postwar era: The return of academism and the sputnik revolution
9. New voices and old limits: Reformism in the late 1960s
10. Troubled Symbolisms: Science and the curriculum at the Century's end.

EXPLAINING SCIENTIFIC CONSENSUS. THE CASE OF MENDELIAN

GENETICS. K.-M. Kim. New York: The Guilford Press,
1994, pp. xxiv + 239, US\$37.95.

From the last paragraph of the preface: "Through a detailed sociologicalCChistorical study of the community of evolutionary biologists and geneti-cists at the turn of this century, I will show in this book how scientists with radically different scien-tific, social, and even metaphysical backgrounds come to agree on the Mendelian principle of segregation, which is central to the whole notion of Mendelian genetics. After briefly reviewing the main arguments and empirical findings of the Mertonian research pro-gram, I shall explore the historical and philosophical contexts that gave rise to the so-called relativist/constructivist sociology of scientific knowledge. I will show that the identification of the area that has been neglected by both of these research programs offers a solution of the problem of consensus formation in science. In particular, I will argue that the failure of these two research programs to explain the dynamics of the consensus formation in the genetics community in the early twentieth century is due to their exclusive emphasis on the role played by the elite protagonists of scientific controversies. In con-tract to these two research programs, this book de-velops an approach to the formation of scientific consensus in a research network of English and American geneticists of the early twentieth century bringing to the fore the critical role played by the two groups of biologists whom I will call the paradigm articulators and the critical mass, respectively. Their presence as critics, experimenters, reviewers and validators curbs the excesses and biases of scientific elites and makes validity-enhancing scientific change possible. In the second part of this book, I will provide a detailed sociologicalCChistorical analysis of the reception of Mendelian genetics in the early twentieth centuryCCand, thereby, will attempt to test my hypothesis about the role played by the two groups of biologists in a scientific consensus change."

STATISTICAL METHODS FOR PHYSICAL SCIENCE. J.L. Stanford and S.B. Vardeman (Eds.). San Diego: Academic Press,
1994, pp. xix + 542, US\$99.00.

This volume is a self-contained introduction to methods on probability and statistics that are applicable and important in the physical sciences. The seventeen chapters are written by different authors and are:

1. Introduction to probability modelling, by W.R. Leo
2. Common univariate distributions, by L. Hodges
3. Random process models, by C. Chatfield
4. Models for spatial processes, by N. Cressie
5. Monte Carlo methods, by P. Clifford
6. Basic statistical inference, by J. Kitchin
7. Methods for assessing distributional assumptions in one- and two-sample problems, by V.N. Nair and A.E. Freeny
8. Maximum likelihood methods for fitting parametric statistical models, by W.Q. Meeker and L.A. Escobar
9. Least squares, by G.A.F. Sever and C.J. Wild
10. Filtering and data preprocessing for time series analysis, by W.T. Randel
11. Spectral analysis of univariate and bivariate time series, by D.B. Percival
12. Weak periodic signals in point processes data, by D.A. Lewis
13. Statistical analysis of spatial data, by D. Zimmerman
14. Bayesian methods, by H.F. Martz and R.A. Waller
15. Simulation of physical systems, by J.M. Hauptman

16. Field (Map) statistics, by J.L. Stanford and J.R. Ziemke
17. Modern statistical computing and graphics, by F.L. Hultin and A.P. Jaworski

CASE STUDIES IN DATA ANALYSIS. J.G. Gentleman and G.A. Whitmore. New York: Springer-Verlag, 1994, pp. 262, DM.69.00/ÖS.530.40/Sw.fr.65.50.

This volume is a collection of eight case studies in data analysis that appeared in issues of the Canadian Journal of Statistics between 1982 and 1993. One follow-up article is also included. Each case study gives the analysis of real sets of data by two or more analysts or teams of analysts working independently. The subjects include iceberg paths and collision risks, wind speeds and environmental chemicals.

THE ART OF CASE STUDY RESEARCH. R.E. Stake. Thousand Oaks, California: Sage, 1995, pp. xv + 175, US\$17.95.

From the introduction: "A case study is expected to catch the complexity of a single case. A single leaf, even a single toothpick, has unique complexities but rarely will we care enough to submit it to case study. We study a case when it itself is of very special interest. We look for the detail of interaction with its contexts. Case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances." Various research methods are discussed.

WHATEVER HAPPENED TO "EUREKA"?. Cartoons on Science.

N. Downes. New Brunswick, New Jersey: Rutgers University Press, 1994, pp. 157, US\$10.95.

This volume consists of over one hundred and fifty cartoons about science, medicine, technology, the environment, human nature and dogs. All the cartoons have previously appeared in many journals including, Science, Punch, Sky and Telescope.

EQUATIONS OF ETERNITY. Speculations on Consciousness, Meaning, and the Mathematical Rules that Orchestrate the Cosmos. D. Darling. New York: Hyperion, 1993, pp. xvi + 190, US\$10.95.

The title of this book "Equations of Eternity" comes from one of Einstein's sayings "Equations are more important to me, because politics is for the present, but an equation is something for eternity". The author's introduction begins: "You are roughly eighteen billion years old and made of matter that has been cycled through the multimillion-degree heat of innumerable giant stars. You are composed of particles that once were scattered across thousands of light-years of interstellar space, particles that were blasted out of exploding suns that for eons drifted through the cold, starlit vacuum of the Galaxy. You are very much a child of the cosmos.

"In giving birth to us, the universe has performed its most astonishing creative act. Out of a hot, dense melee of subatomic particles which is all that once existed it has fashioned intelligence and consciousness. Some of those tiny, primordial pinpoints of matter from the infant cosmos have become temporarily arranged to make your brain and mine. Your thoughts at this very moment derive from energy transactions between particles born at the dawn of time. Somehow the anarchy of genesis has given way to exquisite, intricate order, so that now there are portions of the universe that can reflect upon themselves and ask: Why am I here? What is the purpose of life, consciousness, and reality?"

From the book cover: "How and when did human intelligence evolve? Is

it possible that consciousness will exist after the body has been rendered obsolete? These are the central questions Darling addresses in this mind-bending journey. Along the way the reader is treated to a stimulating discussion of evolution, the relationship between mathematics and physical reality, the genesis of the right and left brains, God, the meaning of language, and the nature of quantum physics."

SIMPLE AND DIRECT. A Rhetoric for Writers. Revised edition. J. Barzun. University of Chicago Press, 1994, pp. xi + 291, US\$14.95.

This offers sound advice to writers old and new. The text begins with three quotations, namely: "Words, therefore, as well as things, claim the care of an author. Every man has often found himself deficient in the power of expression, big with ideas which he could not utter, and unable to impress upon his reader the image existing in his own mind." Dr. Johnson.

"I sometimes think that writing is like driving sheep down a road. If there is any gate to the left or right, the readers will most certainly go into it." C.S. Lewis

"... here and there a touch of good grammar for picturesqueness." Mark Twain

A sample of advice from page 170 is:

"The old cookbook said: "Take enough butter." I say: "Do not take too many notes." Both recommendations are hard to interpret except by trial and error. If you take too many notes, they will swamp you. You will shuffle and review them over and over and be left bewildered. It will be almost as bad as having all the relevant books and encyclopedias piled on your desk. So take notes only upon what you judge to be: the main new points, the complex events or ideas, the striking statements (for quoting), and also your own thoughts as they pop into your mind while reading in preparation. Do not omit these last; they will not come back at will, even when you return to the item that gave them birth, and it is galling to have to say, "Now, what was the bright idea I had about this?" "

EMPIRE OF WORDS. The Reign of the OED. J. Willinsky. Princeton University Press, 1994, pp. viii + 258, US\$22.95.

From the book jacket: "What is the meaning of a word? Most readers turn to the dictionary for authoritative meanings and correct usage. But what is the source of authority in dictionaries? Some dictionaries employ panels of experts to fix meaning and prescribe usage, others rely on derivation through etymology. But perhaps no other dictionary has done more to standardize the English language than the formidable twenty-volume Oxford English Dictionary in its 1989 second edition. Yet this most Victorian of modern dictionaries derives its meaning by citing the earliest known usage of words and by demonstrating shades of meaning through an awesome data base of over five million examples of usage in context. In this fascinating study, John Willinsky challenges the authority of this imperial dictionary, revealing many of its inherent prejudices and questioning the

assumptions of its ongoing revision. "Clearly, the OED is no simple record of language 'as she is spoke,'" Willinsky writes. "It is a selective representation reflecting certain elusive ideas about the nature of the English language and people. Empire of Words reveals, by statistic and table, incident and anecdote, how serendipitous, judgmental, and telling a task editing a dictionary such as the OED can be."

Willinsky analyzes the favored citation records from the three editorial periods of the OED's compilation: the Victorian, imperial first edition; the modern supplement; and the contemporary second edition composed on an electronic data base. He reveals shifts in linguistic authority: the original edition relied on English literature and, surprisingly, on translations, reference works, and journalism; the modern editions have shifted emphasis to American sources and periodicals while continuing to neglect women, workers, and other English-speaking countries.

Willinsky's dissection of dictionary entries exposes contradictions and ambiguities in the move from citation to definition. He points out that Shakespeare, the most frequently cited authority in the OED, often confounds the dictionary's simple sense of meaning with his wit and artfulness. He shows us how the most famous four-letter words in the language found their way, one hundred years later, through a belabored editorial process into the supplement to the OED. Willinsky sheds considerable light on how the OED continues to shape the English language through the sometimes idiosyncratic, often biased selection of citations by hired readers and impassioned friends of the language. Any-one who is fascinated with words and language will find Willinsky's tour through the OED a delightful and stimulating experience."

ON TIME. Lectures on Models of Equilibrium.

P.A. Diamond. Cambridge University Press, 1994, pp. xiii + 120, £18.95/US\$24.95.

From the book jacket: "In these two lectures Peter Diamond explores how time is modeled in theoretical analyses of individual industries and of an entire economy.

In the first lecture he considers equilibrium in a single market by examining the distinction between the short run and the long run in Marshallian analysis. He proposes an explicit modeling of time in place of Marshall's use of different temporal models for different time frames. A model with different expansion paths for different firms and models of price competition with incomplete information are presented. Data on job creating and destruction and data on price changes are examined.

In the second lecture he turns to models of an entire economy, and begins by considering how and why models of an entire economy should differ from models of a single industry. Both cyclical and seasonal data on the behavior of macro-economies are examined. The Arrow-Debreu and Hicksian ISLM models are compared with explicit-time models of the command over purchasing power.

Professor Diamond ends by indicating a direction for future research that might yield a more integrated economics."

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