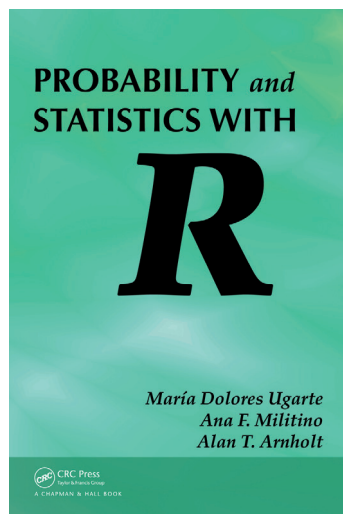


## Probability and Statistics with R



María Dolores Ugarte, Ana F. Militino and Alan T. Arnholt; Chapman & Hall/CRC, Boca Raton; xxvi + 700 pp.; 2008; US\$89.95, £46.99; ISBN 978 1 584 88891 8 (hardback)

This is an impressive book built around R, the free software environment for statistical computing and graphics. The authors should be congratulated for their gentle, thorough and accessible coverage of a large amount of material relevant to undergraduate programmes in statistics, and undergraduate and graduate service courses. After a brief introduction to R exploratory data analysis, including lattice graphs, is discussed. Next follow three chapters covering probability, random variables and probability distributions. I particularly enjoyed the simulation-based discussion of the Monte Hall problem. These chapters, as is the case for all 12 in fact, are very well illustrated and contain many detailed derivations, worked examples and problems for the reader. The next five chapters deal with key topics of statistical inference: sampling distributions with ideas being reinforced by simulations, point estimation up to properties of maximum-likelihood estimators, confidence intervals, hypothesis testing including the exact binomial and Fisher's exact tests, and non-parametric methods

with coverage of the bootstrap and permutation tests. The authors provide useful R functions to check the assumptions underlying the inferential procedures. Test procedures and confidence interval calculations are carefully illustrated with many real data examples and are reproduced in R, with results being confirmed using R's own functions. This cohesive incorporation of statistical theory with R implementation is a great strength of the book. The next chapter discusses experimental design up to randomised complete-block and two-factor factorial designs, with topics such as power and multiple comparisons clearly presented. Chapter 12 provides a very thorough coverage of linear regression and ends with three of the book's four case studies.

**Gentle, thorough and accessible coverage for undergraduates.**

The authors supply a lot of on-line material to support their book. Data and special functions are in the PASWR package available from the Comprehensive R Archive Network and the book's website has up-to-date *errata* and R scripts. A solutions manual will shortly be available for the 350 problems, which provide extensive material for practising both theoretical and practical concepts.

My only criticism of this very good book concerns the fact that most readers, especially students working at home, will now use R and so may find the many references to S-PLUS distracting. The removal of this material to a web-based complements document would allow the authors to expand on topics such as random-effects models and to provide more detailed explanations for some of the R functions.

This book represents good value for money. It contains a vast amount of interesting material that is well integrated with R, and provides a strong basis for a number of modules such as those on probability, basic statistics, mathematical statistics,

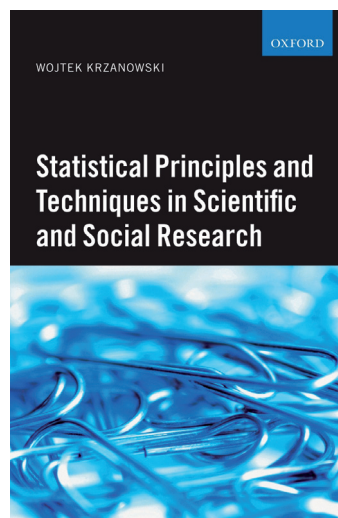
experimental design and linear regression. Students of statistics and many other disciplines could make use of it throughout their university studies and into their careers, although it may need to be supplemented by the excellent texts by Dalgaard<sup>1</sup> and Venables and Ripley<sup>2</sup>, for example. I very much enjoyed *Probability and Statistics with R* and have already recommended it to both students and colleagues.

### References

1. Dalgaard, P. (2008) *Introductory Statistics with R*, 2nd edn. New York: Springer.
2. Venables, W. N. and Ripley, B.D. (2002) *Modern Applied Statistics with S*, 4th edn. New York: Springer.

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## Statistical Principles and Techniques in Scientific and Social Research



Wojtek Krzanowski; Oxford University Press, Oxford; 241 pp.; 2007; US\$175.00; ISBN 978 0 199 21310 8 (hardback)

This book covers a very wide range of statistical topics, starting from the very basic notion of probabilities and finishing with a brief introduction to topics such as "time series" and "survival analysis". In

between, statistical areas that would be of interest to numerous scientists with very different professional application requirements are explicitly explained. Throughout the book, historical elements of the evolution of statistics accompany the description of most of the statistical concepts.

I believe that the book has, overall, managed to meet its objective of helping "graduates and researchers increase their understanding of the statistical tools they use", whether they belong to the stereotype of those who "collect endless facts" or those who "compile large tables of figures" (or neither of the above). It contains several examples for each statistical concept it describes, although these are sometimes hard to absorb. Greater use of graphs, pictures and emphasising techniques (such as underlining or bold font) would have helped.

Some parts of the book require an understanding of quite an advanced level of statistics, which may be beyond the novice reader. Chapter Five, in particular, is highly theoretical and the final two chapters cover a great deal of ground. Some of the issues dealt with in those later chapters are of more general use and it would be a shame if the reader were to give up before reaching these. For example, the section on "missing values" is of importance to social researchers who are often interested in sensitive topics, such as income and disabilities, information on which may not be available for all subjects. This section would be better read, initially, together with the brief descriptions of differing data forms given in the later chapters. Researchers need to address issues of data collection and form prior to applying techniques and therefore I think it would be more logical to introduce these first.

Overall, this is a good reference book with comprehensive coverage of the details of statistical analysis and application that the social researcher may need in their work. I would recommend it as a useful addition to the bookshelf.

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