Components of Variance
D. R. Cox AND P. J. SOLOMON, 2002
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This is, in my opinion, a splendid book. Its title might, at first, sound narrow, boring and old fashioned; far from it, the content of the book ranges far and wide over much of mainstream statistics, it is short and sufficiently concise not to be boring and it is 'afashionable' (of which more below), ranging from pre World War II foundations to microarrays and data mining.

There are six chapters. The first, 'Key models and concepts', illustrates by example some 'simple situations involving more than one level of variation' and discusses two key distinctions: that between nesting and cross-classification and that between fixed and random effects. Chapter 2, 'One-way balanced case', discusses balanced one-way analysis of variance with random effects, in considerable detail. Unusually, perhaps, this reviewer can concur wholeheartedly with the cherry-picked prepublication review comments on the back cover of the book (thanks to Vern Farewell):

'A particular strength is attention given to first principles as a prelude to the treatment of many of the technical topics'.

Chapter 3 goes on to 'More general balanced arrangements', covering components of covariance and regression, time effects, empirical Bayes methods, measurement error in regression and design issues. Chapter 4 treats 'Unbalanced situations', first in the one-way case and then in more complex situations, again in considerable detail and clarity; meta-analysis is treated in this chapter. 'Nonnormal problems' is the title of Chapter 5, firstly concerning Poisson and binomial distributions and then survival data, before considering various generalities, including generalized linear mixed models. Finally, Chapter 6, 'Model extensions and criticism', ranges over a variety of topics from outliers to transformations and much more.

This book is not a cookery-book. Vern Farewell again accurately observes that

'What distinguishes this book from other material is the depth of the discussion combined with the use of only essential technical details'.

There is a depth of understanding of the basics that the authors try to get across here, together with a consequent clarity of explanation of where the many more advanced techniques fit in. For a statistician like me who has spent too little of his career in the statistical mainstream, the book is hugely useful in 'reminding' me how all those fancy techniques, so often treated separately, fit together. If you then feel inspired or required to investigate particular methodology in more spelled-out detail, alternative reading will be needed; the authors' bibliographic notes seem very good and provide a starting-point.

And what I also really like about this book is what I called its afashionable nature above. Techniques from all eras of the past 70 years or more that remain relevant are treated in their proper ongoing context and no particular emphasis is given to 2003 fashions. And so the current fads that I mentioned in my first paragraph sit side by side with Tippett's and Daniels's work in the cotton and wool industries respectively in the 1930s and with huge tracts of statistical methodology from the period in between, e.g. multilevel or hierarchical models, clinical trials, longitudinal data analysis, industrial design, meta-analysis and even a little bit of Bayes.

At a presentational level, other nice things include some substantial examples from the authors' experience and a summary of contents at the start of each chapter, denoted 'Preamble'. Four 'Computational/software notes' sections give a good idea of what software can handle which situations. There are also 'Further results and exercises', but these seem somewhat an afterthought and it is unclear whom the exercises (without solutions) are for; short 'Further results' sections without the exercise format might have been better. That is my only (minor) criticism of the authors. A criticism of the publishers is that my copy of the book, at least, has been printed in rather faint type, bringing home to this 40-something reviewer that reading glasses are becoming necessary.

Professor Cox has certainly not lost his book writing touch and Professor Solomon has clearly contributed mightily also. The result is a book that every statistical modeller and many serious users of statistics should have on their shelves. To quote from Vern Farewell one more time:

'This is a superb book on a topic of central importance in a wide variety of areas of research'.

I strongly agree!

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