could be a useful adjunct for those giving a taught course on bootstrap methods. Particular aspects of the book, such as its emphasis on helping practitioners to gain insight into sensible choices when bootstrapping, its discussion of the limitations of bootstrap methods, and the bibliography, will appeal to many people.

A. W. KEMP
Mathematical Institute
University of St Andrews
St Andrews, Scotland

CHENG, C.-L. and VAN NESS, J. W. **Statistical Regression with Measurement Error**. Edward Arnold, London, and Oxford University Press, New York, 1999. xiv + 262 pp. £35.00/$55.00. ISBN 0-340-61461-7.

(Linear) regression is, of course, one of the most commonly used statistical techniques. Apart from its obvious relevance to problems which often occur, it is simple to apply and its theory is, at least under normality, very straightforward. And yet its relevance is not always quite so clear. A common, simple, and indeed important, situation which often arises is that in which two variables η and ξ are related by the equation $\eta = \beta_0 + \beta_1\xi$, but one can only measure these with error, as $y = \eta + \epsilon$ and $x = \xi + \delta$; one can also allow equation error so that the relationship between η and ξ is not exact but contains another random error q. Under natural assumptions such as normality and independence, the usual regression estimates of β_0 and β_1 are not unbiased, or consistent, or generally well-behaved. Such measurement error models are the subject of the book under review, which is intended to be accessible to readers who have a background equivalent to a year's course in probability and theoretical statistics. It replaces, and enormously expands, chapter 29 of Kendall and Stuart's *Advanced Theory of Statistics*.

Problems of this type have been recognised for over a century, and have often been referred to in books, but mostly rather briefly, so that most students, and perhaps many working statisticians, never realise how widespread they are, and do not in practice realise the difficulties they present (for example, without more assumptions than are needed for regression, the parameters cannot be identified or estimated). The only previous textbook in English devoted to the topic is that by Fuller (*Measurement Error Models*, Wiley, 1987). There has, however, been a noticeable expansion of interest in the area in recent years, with many papers filling in the theory, or extending it to new areas.

The book covers the simple case already mentioned, and goes on to deal with vector ξ (corresponding to multiple regression), with models in which η is a polynomial function of ξ, with a number of other methods of estimation which have been proposed, and with robust estimation. These models are closely connected with some other topics, such as factor analysis, and the use of instrumental variables as in econometrics, and this is noted and discussed at the appropriate point. The most obvious omission is of diagnostic methods, although it must be said that this area is not highly developed for these models.

The book has some shortcomings, both of detail and more broadly. There are a number of misprints, some of which are sufficiently striking that one might have expected that they would have been picked up — there are two obvious ones on page 3, for example. I was surprised that the usual mnemonic, that *f*unctional models have *f*ixed components, while *s*tructural models have *s*tochastic ones, does not appear. In a pedantic vein, the discussion on page 4 confuses estimators with sequences of estimators. I do not think that the style reads easily, especially, for example, the Appendix on Identification, although I would not wish to exaggerate; this is unfortunate, since it will be less appealing to students and others who wish to get to grips with the area.

But, notwithstanding any shortcomings, the book is greatly to be welcomed, for it will be very useful; I am glad to have a copy on my shelves.

R. M. LOYNES
Department of Probability and Statistics
University of Sheffield
Sheffield, England

DRYDEN, I. L. and MARDIA, K. V. **Statistical Shape Analysis**. Wiley, Chichester, England, 1998. xvii + 347 pp. £50.00/$139.95. ISBN 0-471-95816-6.

KENDALL, D. G., BARDEN, D., CARNE, T. K., and LE, H. **Shape and Shape Theory**. Wiley, Chichester, England, 1999. xi + 306 pp. £60.00/$120.00. ISBN 0-471-96823-4.

These two books on the same topic differ considerably in their aims. The first stresses the statistical and practical aspects of shape analysis, while the second concentrates more on the mathematical underpinnings of shape theory. The following summaries should provide some idea of their contents.

Dryden and Mardia (DM) begin by introducing the subject in their first chapter through its applications in agriculture, archaeology, biology, genetics, geography, geology, and image analysis. They define shape, size-and-shape, three types of landmarks, and labels, and briefly mention traditional and geometric methods of shape analysis.

In their second chapter, they discuss size measures and various shape coordinate systems including those due to Bookstein and Kendall. There follows in Chapter 3 an account of planar Procrustes analysis, Procrustes matching, and the full Procrustes estimate of mean shape. Ordinary and generalized Procrustes analysis (OPA and GPA) are defined, and shape variability is considered with the help of illustrative examples.

Chapters 4 and 5 are devoted to extensions and formalizations of geometrical aspects of shape. Pre-shape and shape spaces are described, and various shape distances obtained; choices of distance in the shape space are discussed, and further advanced shape coordinate systems such as tangent space coordinates, and Goodall-Mardia QR coordinates are considered. Various methods based on Procrustes superimposition are outlined; Procrustes methods such as GPA and variants of the Procrustes analysis are shown to be useful in estimating an average shape and exploring the structure of shape variability in a dataset. Several examples are given as illustrations.

The following two chapters consider shape models and inference. Chapter 6 is concerned with shape models for 2-dimensional data, and probability distributions in shape spaces. The uniform, real and complex Bingham, complex