that boys and girls do not differ very much in amplitude acceleration but do differ in the amount of phase variation, with amplitude acceleration occurring earlier in girls. A differential equation that models the growth process is presented.

Chapter Seven examines amplitude and phase variation in two different sets of data: repeat printings by hand of the word "fda" and daily temperature measurements in Montreal, Quebec, for 34 years. The need to register the curves so that they vary only in terms of amplitude is discussed. Registration of the temperature curve, for example, will essentially remove impact of early or late arrival of some seasons, so that a better indication of long-term seasonal variation can emerge. Interestingly, residuals from registered Montreal temperature data are examined for any long-term linear trend that could suggest global warming. The standard error (.0016°C) of the regression coefficient (.0024°C/year) leads the authors to conclude that this trend is not significant. [As an aside, the average day that leaves change color on Mont Royal in Montreal is September 30 (day 273), not September 30 (day 303) as the authors state (p. 103).]

Chapter Eight revisits the analysis of bone shape data discussed in Chapter Four. The authors introduce parameterization by arc length, which is a more meaningful way of depicting functional observations than looking at the means alone, because mode variability that distinguishes osteoarthritic from normal bones may be quite different. Functional discriminant analysis is introduced as a way of distinguishing these two classes of bones. To remove erroneous features, a finite representation of the data by considering the first few principal components is used. The authors term this approach regularization. After regularization, functional discriminant analysis can distinguish groups better than analysis of the group mean curves alone. For example, this analysis shows that the extent of twist in the notch shape effectively differentiates osteoarthritic from normal bones.

Chapter Nine discusses functional models for test items, such as examinations or surveys. FDA is applied to log odds-ratio functions derived from test scores. Principle components analysis can then be applied to these curves. The resulting dimensionality may be quite small and readily interpretable. Chapter Ten examines the impact of electromyographic (EMG) recordings on muscle contraction in the lower human lip. A correlation plot and a feed-forward linear model support covariation of EMG activity with the timing/intensity of phonemes which are single distinctive sounds in a language. The feed forward linear model shows the relationship between lip acceleration (dependent variable) and EMG activity (independent variable), and takes into account the lag between neural activation onset and lip muscle contraction.

Chapter Eleven discusses the development of differential equations to model an individual's handwriting. Such empirically derived equations can be used to identify, for example, forgeries. By examining the residuals obtained by applying the dynamic models estimated for two individuals, the "legitimate" person and the potential forger, to both sets of handwriting samples, one can determine whether the two estimated differential equations are from the same individual. Chapter Twelve describes the development of a linear differential equation to model juggling, which generates more complex biomechanical data than does the handwriting data cited in Chapter Eleven. The juggling data are fit quite well with a second-order linear homogeneous differential equation without the need to use a "forcing" function or to model nonlinear effects.

I highly recommend this well-written and reasonably priced text for any statistician or mathematician who uses multivariate analyses and for anyone who may work with functional data. As the authors emphasize, FDA is still a new field, and they encourage readers to expand the scope of this field by thinking about their data from a functional standpoint. Potential applications of FDA to the physical, social, and economic sciences will almost certainly multiply rapidly over the next decade, and this text will provide a solid introduction to this field.

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Predictions in Time Series Using Regression Models, by Frantisek STULAJTER, New York: Springer-Verlag, 2002, ISBN 0-387-95350-7, viii +231 pp., $69.95.

This book is essentially a collection of theorems for treating time series via regression models. In particular, it describes numerous theorems concerning the estimation of parameters for such models, and predictions therefrom.

Chapter One (50 pp.), "Hilbert Spaces and Statistics," presents the usual results on projection and estimation, with sections devoted to double least squares estimators, invariant quadratic estimators, and unbiased invariant estimators. Chapter Two (22 pp.), "Random Processes and Time Series," defines the usual constructs (e.g., covariance stationary and the spectral distribution function). Chapter Three (74 pp.), "Estimation of Time Series Parameters," has sections on the estimation of mean parameters, estimation of the covariance function, and maximum likelihood estimation. Chapter Four (50 pp.), "Predictions of Time Series," has sections on predictions from both linear and nonlinear models, as well as on the effect of model choice on prediction and multivariate predictions. The book's final chapter, "Empirical Predictors" (26 pp.), presents numerical examples that illustrate some of the methods for which theory is presented in the previous chapters.

The book uses a bewildering array of acronyms (e.g., MLRM, WELSE, DOWELSE, DONRM, RLTM). A table defining them all in the front of the book would have been a big help. Also, some sort of numbering system for the equations would have made it easier on the reader. None of the equations is numbered, which makes it difficult to reference an equation on the same page, let alone on a different page. The Preface suggests that the book will be useful for four categories of readers: "students of mathematical statistics" as well as "students and researchers of economical and finanical mathematics and management." In truth, this book is so narrowly focused that it will almost certainly not be of interest to the latter three categories. Specialists in time series who have an interest in regression-based models may wish to have their institutional libraries order this book.

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Statistical Process Adjustment for Quality Control, by Enrique DEL CASTILLO, New York: Wiley, 2002, ISBN 0-471-43574-0, xviii +357 pp., $89.95.

I like this book. As the author states in the Preface, "The purpose of this book is to present process adjustment techniques based on EPC (engineering process control) methods and to discuss them from the point of view of controlling the quality of a *product*, emphasizing the relation with traditional SPC methods." Applied statisticians and process control engineers will find this text of particular interest; it should be more appealing to them than to quality engineers. But the reason that I like this book is that this subject is finally coming of age. This is one of the first books that attempts to apply the techniques of EPC and SPC in a format that allows both statisticians and control engineers to find a common, yet applied ground for adjusting processes. Another excellent book on this topic is the recent text by Box and Luceno (1997).

The book consists of nine chapters:

1. Process Monitoring Versus Process Adjustment
2. Modeling Discrete-Time Dynamical Processes
3. ARIMA Time-Series Models
4. Transfer Function Modeling
5. Optimal Feedback Controllers
6. Discrete-Time PID Controllers
7. EWMA Feedback Controllers and the Run-to-Run Control Problem
8. Recursive Estimation and Adaptive Control
9. Analysis and Adjustment of Multivariate Processes

Chapter One presents a review of SPC charts for the case where the data are independent and uncorrelated. The idea of autocorrelation is then introduced, and the effect on SPC chart performance is demonstrated. Deming's infamous funnel experiment is used to illustrate control via different strategies. This discussion leads to the introduction of EPC as a means of continual process adjustment, and concludes with a proposed EPC–SPC combined approach.