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In This Issue

In the standard multiple linear regression models, the expectation $E(Y)$ of the dependent variable Y is represented as a linear combination $\sum_{j=1}^{p} \beta_j X_j$ of the covariates $X_1, \ldots, X_p$. Similarly, in the standard logistic regression models, the log odds $\log[\Pr(Y = 1)/\Pr(Y = 0]$ of a dichotomous response variable Y is also represented as a linear combination of the covariates $X_1, \ldots, X_p$. In their article, "Generalized Linear Models," Trevor Hastie and Robert Tibshirani study a broader class of models in which the linear combination $\sum_{j=1}^{p} \beta_j X_j$ is replaced by a sum of smooth functions $\sum_{j=1}^{p} s_j(X_j)$. Their technique for estimating the functions s_j, which they call the "local scoring algorithm," uses scatterplot smoothers to generalize the usual procedures for computing maximum likelihood estimates.

In his discussion, David R. Brillinger emphasizes both the artistic merit and the usefulness of nonparametric regression models of the type considered by Hastie and Tibshirani, and presents his views about directions for future research on different aspects of these models. He states that this kind of work "makes being a statistician these days a joy—it seems approaches are now available to attack most any applied problem that comes to hand." J. A. Nelder considers the possibility of including terms such as the product $s_1(X_1)s_2(X_2)$ in the model. Charles J. Stone describes some of his work using cubic splines in a similar class of models. Peter McCullagh asks whether the authors can justify their implicit assumption of "zero interaction."

Peter C. Fishburn, a world-renowned expert on subjective probability and utility, reviews "the axiomatic foundations of subjective probability from the pioneering era of Ramsey, de Finetti, Savage, and Koopman to the mid-1980's." In his discussion, I. J. Good explains his view that in some applications, a theory of upper and lower—or partially ordered—probabilities is appropriate, while in others a sharp theory is appropriate. Patrick Suppes also discusses the question of whether probabilities are unique; asks whether expectation or probability is more fundamental; and considers exchangeability. He states that, "It is an unfortunate and paradoxical fact that the concept of exchangeability, which many people consider perhaps the most important single concept of the subjective theory of probability, has played almost no role in the formulation of the qualitative axioms of subjective probability." James O. Berger considers "what the axiomatic approaches have to say about statistical practice and, conversely, what reality has to say about axiomatics." When considering ways of representing uncertainty other than probability, he states that, "It would be nice if any proposer of non-probabilistic uncertainty reasoning would be required to publically announce which axioms he is rejecting; we would all be saved a good deal of nonsense." He also stresses Good's view and its relation to the robust Bayesian approach. Terrence L. Fine focusses his remarks "on the themes of extension, tolerance for limited precision, the restricted applicability of the familiar concept of numerical probability, and the possibilities for other concepts of probability that are suggested by the axiomatic measurement-theoretic approach to comparative probability." Teddy Seidenfeld considers the changes that occur in the Ramsey-de Finetti-Savage program when it is not assumed that the decision maker has a complete ordering by preference among all possible lotteries and the decision maker is allowed to abstain from certain bets. Mervyn Stone describes some of the difficulties that arise if one gives up the restriction to countable additivity and requires only finite additivity. Finally, William D. Sudderth reviews the approach to axiomatization in which a "direct economic interpretation" is given to probabilities as well as the approach in which axioms for how rational beliefs should be modified in the light of new evidence are presented.

Stephen M. Stigler presents an English translation of Laplace's first major article on mathematical statistics, as it was published in 1774. He gives an enlightening introduction to his translation that includes the description of a "subtle error" that Laplace makes in finding an explicit expression for the median of the posterior distribution of the location parameter of a double exponential distribution with unknown scale parameter.

The central purpose of the article by Samprit Chatterjee and Ali S. Hadi is to describe some of the relationships that exist among the "bewilderingly large number of statistical quantities" that have been proposed to study outliers and the influence of individual observations in regression analysis. In his discussion of this article, Roy E. Welsch points out that, "Since the field of regression diagnostics now includes the work of many people, there are naturally different viewpoints, different notations, and even heated discussions." All these aspects of the field are reflected in the contributions of the seven discussants. R. Dennis Cook reinforces the admonition of Chatterjee and Hadi that the goals of an analysis must guide the choice of methodology, but disagrees with their conclusions regarding the routine use of certain sufficient configurations for the detection of

influential observations. A. C. Atkinson describes "several recent developments which reflect important aspects of diagnostic regression analysis" and illustrates these methods with a detailed example. Welsch describes how his ideas on diagnostics "grew out of theoretical work on robust estimation and applied work on econometric models," and indicates some of the important challenges that remain. While commending the authors for "providing a convenient and compact summary of the currently available measures," Rollin Brant also finds that their efforts fall short "in failing to provide guidance in the practical application of these measures." David C. Hoaglin and Peter J. Kempthorne consider rules of thumb for cutoff points in identifying influential observations, propose some simple but effective residual plots, and "sketch a step by step diagnostic strategy that should be useful in practice." Paul F. Velleman, along with other discussants, congratulates the authors on an excellent survey but feels that they have exacerbated the problem of the lack of a standard terminology in this area. He also feels that much of any future progress in having regression diagnostics used by consumers of statistics in their practical problems must come from improved statistical computing techniques. In his critical comments, Sanford Weisberg indicates how the important features of the data presented by the authors in their example can be discovered using a straightforward analysis.

A highlight of this issue is a conversation with Persi Diaconis, Professor of Statistics at Stanford University, who came into the field of statistics from a rather unusual background and, at the age of 41, has distinguished himself through his publications and honors as one of the world's leading statisticians.