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In This Issue

During the past 20 years at the Institute of Psychiatry of the University of London, B. S. Everitt has acted as a statistical consultant to literally hundreds of psychiatrists and psychologists on research projects both large and small. He is one of the world's leading practitioners of the art of "Statistics in Psychiatry." In his article on this topic, he quotes Galton's remark "that until the phenomena of any branch of knowledge have been submitted to measurement and number, it cannot assume the dignity of a science," and describes the struggles of the field of psychiatry over the past four or five decades to achieve that "dignity." He reviews the history and present status of the use of statistical methods in the fascinating world of mental health research, considers the task of teaching statistics to psychiatrists and recounts some of his own experiences as a statistical consultant in a psychiatric institute.

In his discussion, Donald Guthrie reinforces Everitt's views and states that "Psychiatry may be unique among the medical disciplines in the breadth of its scientific collaboration." He cites several further areas of mental health research to which statisticians have made substantial contributions, including the classification of psychiatric illness, psychiatric epidemiology, genetic studies, experimental design for studying the effectiveness of alternate modes of psychotherapy and electrophysiology. Samuel W. Greenhouse raises the question as to "what makes statistics in psychiatric research different from the statistics applied in other areas." His view is that "whatever is unique in the subject of statistics and psychiatry lies as much in the nature of psychiatry and psychiatric research as it does in the need for different and more adequate statistical procedures." Joseph L. Fleiss cites examples of the influence that psychiatry has had on statistical methodology, including the development of measures of diagnostic agreement and cluster analysis. He raises the "heresy" that a statistician with "extensive experience in a medical or scientific specialty" may know better than the psychiatrist what type of research on a given psychiatric topic would make the most useful contribution to knowledge.

We are proud to be able to include in this discussion the comments of Joseph Zubin on the biometric approach to psychiatry. Zubin, who is now 86 years old, was one of the pioneers in the field and continues to work full time and to carry out his research studies related to schizophrenia. (Don't miss the delightful anecdote about Zubin and Sigmund Freud with which Joe Fleiss begins his own discussion.)

Juan E. Mezzich and Chul Woo Ahn feel that "Among the emerging areas of psychiatry presenting the greatest methodological challenges and opportunities for statistical contributions is clinical information systems. Issues such as the formalization and quantification of psychiatric concepts to make them amenable to efficient information processing are fundamental here." Joel B. Greenhouse finds that there are "several levels of involvement" with investigators in psychiatry "where a statistician can make important contributions," ranging from "helping an investigator to carefully articulate a set of research questions" to "encountering new problems, unique to psychiatric research, that lead to interesting statistical and methodological research." He describes some examples of the latter pertaining to survival times and the analysis of sleep patterns.

Craig D. Turnbull reviews the considerable advances that have been made in psychiatry and psychiatric epidemiology since 1800. He discusses "various efforts to develop a nosology (or classification) of mental disorders" and concludes that "the American Psychiatric Association has recognized that progress in mental health research depends on adequate methods to collect, organize and analyze data." Joseph S. Verducci acknowledges "the enormity of the work that psychiatric researchers have undertaken" and states that "psychiatry has been developing much too rapidly to accommodate the slow scrutiny of physical scientists.... Psychiatry would have probably evolved much differently if Freud had waited for a statistician to analyze the data he had amassed on 'free' word-associations."

A final noteworthy aspect of the discussion, and a first for *Statistical Science*, is that two of the contributors, Sam and Joel Greenhouse, are father and son.

In summary, the article by Everitt and the contributions of the discussants give us the rare opportunity of learning the views of a large group of influential researchers working at the interface of statistics and psychiatry.

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E. J. Hannan has been a major contributor to the statistical analysis of time series and related topics for more than 30 years. In his article, "Rational Transfer Function Approximation," he considers the problem of approximating the structure of a stationary process generating a vector time series by an autoregressive-moving average (ARMA) system. In an interview

published in *Econometric Theory* (Volume 1, 1985, pp. 263–289), Hannan states that "this problem has some significance, because once you adopt the idea that you are going to be concerned with finding good approximations to the structure of the process using a class of models, such as rational transfer function models, you then recognize that, as the amount of data increases, the order will increase—as it always does in practice. That is, you will use more and more parameters as you've got more and more data, which is a sensible idea. Then, of course, since the number of parameters is going to increase with the order, uniformity problems arise." That interview is recommended to readers who would like to learn more about Hannan and his work.

In his comments, David R. Brillinger expresses the view that "State space representations and corresponding ARMA models seem destined to be in the forefront of time series research for many future years in much the same way that linear regression is so pervasive in traditional statistics research. On a surprising number of occasions, techniques developed to handle time series problems have gone on to become central to statistics generally, so all statisticians may gain from paying some attention to the problems studied here."

R. J. Bhansali considers the properties of the order of the ARMA model that is selected when that model is thought of as an approximation and its order is not regarded as an estimator of some underlying "true" order. J. Rissanen also comments on the purpose and properties of low-order approximations, and clarifies his own minimum description length principle. R. Dahlhaus discusses the problem of estimation in the case of a one-dimensional process which is approximated by an autoregressive process. Ritei Shibata agrees with Hannan that the choice of the order estimation procedure should be related to the purpose of the analysis and discusses the choice of an appropriate procedure. V. Solo expands on some of the topics mentioned by Hannan, including Hankel norms and moving averages.

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One of the central purposes of *Statistical Science* is to bring to the attention of our readers important and interesting new areas of application to which the methods of probability and statistics can contribute. The article by Daniel Barry and J. A. Hartigan serves to open the field of molecular evolution to us as they bring statistical analysis to bear on the intriguing fundamental question of the evolution of the primates—humans, chimpanzees, gorillas, orangutans and gibbons. The basic question is posed in their opening sentence: "Since Darwin, man has been relegated from the angels to the apes, but exactly where in the apes?" They present a variety of statistical models and methods that might be used for making inferences about evolution based on DNA sequences, the "core data of molecular biology."

Both of the discussants of this article, Stephen Portnoy and Joseph Felsenstein, commend the authors for bringing these problems to the attention of statisticians. Each of them has his suggestions for further work, including the accommodation of various types of dependence that may be present in the data.

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Two feature articles in this issue focus on Morris Hansen, the distinguished statistician who was one of the main developers of survey sampling at the United States Bureau of the Census from the 1930s on, and who is presently Chairman of the Board of Westat, Inc., a statistical consulting firm. In one article, Hansen presents "Some history and reminiscences on survey sampling." This article formed the basis of the videotaped Pfizer Colloquium lecture that Hansen gave at the University of Connecticut in October 1985. In the other article, Hansen is interviewed by Ingram Olkin, an editor of *Statistical Science*. This enlightening interview took place in May 1986.