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In This Issue

For the past three or four years, an informal group of statisticians known as the Statistical Policy Committee has met from time to time, usually at the annual meetings of the professional statistical societies, to discuss ways of increasing the awareness of statistics and the support for statistics in both the public and private sectors. The cochairmen of the committee are Ingram Olkin of Stanford University and Ronald Pyke of the University of Washington. In 1985, in response to a proposal that had been submitted by the Committee under the auspices of the Institute of Mathematical Statistics, the Office of Naval Research awarded a contract to support a Workshop on the Use of Computers in Statistical Research. William F. Eddy of Carnegie-Mellon University was appointed chairman of the six-member Workshop, and the group proceeded toward its goal of providing a timely assessment of the current state of computing resources in statistics departments in the United States and a projection of future needs. The report of that Workshop is published in this issue. It discusses the needs of statistics departments at various stages of development with respect to their computational resources, and concludes with several recommendations directed to statistics departments themselves, university administrations, professional statistical societies, and research sponsors.

In her contribution to the discussion of this report, Jessica Utts describes the responsibilities that accompany the use of computers in statistical research and presents a description of the set-up at her university. Andreas Buja, E. B. Fowlkes, and J. R. Kettenring discuss the question of standardization and describe some aspects of the computing environment at Bell Communications Research. David W. Scott discusses the "feel" of a good computer environment. He states that, "The single most important ingredient for successful statistical computer research is having sufficient resources to engage in experimental computing. The clearest way to do this from a financial point of view is with a personal computer." Prem K. Goel describes the potential benefits of cooperation between the statistics and mathematics departments in a university, and warns departments to give careful consideration to future continuing expenses when acquiring new equipment. Lynne Billard discusses the question of what is meant by statistical computing, and points out the budgetary impact of rapid changes in computer technology. Douglas M. Bates discusses the important use of departmental computers for communications and text processing. Edward J. Wegman describes the governmental programs that support computing in the mathematical sciences and encapsulates the importance of departmentally-owned facilities in the principle "You don't use what you don't own."

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It is obvious from Glenn Shafer's clearly written article, "Savage Revisited," that the foundations of statistics are alive and well, and as controversial as ever. Shafer points out that the postulates published by L. J. Savage in his now classic book, *The Foundations of Statistics*, are often violated by people making actual decisions. Savage argues that it is nevertheless normative to make choices that maximize subjective expected utility, but Shafer believes that his development cannot be completely separated from the empirical findings and that Savage's normative interpretation must be revised. The revision proposed by Shafer is of a constructive nature, whereby a person who has to make a choice constructs his or her preference for that choice alone in a way that may depend on how the alternatives are described and may be inconsistent with other choices that the person makes at other times.

In their contributions to the discussion, both D. V. Lindley and A. P. Dawid argue that in spite of Shafer's criticisms of the axioms, the methods of Bayesian statistics cannot be dismissed. Lindley points out that the bad decision making observed in practice actually gives the maximization of subjective expected utility "an enhanced status" because of the improvement that it can yield. Dawid describes coherence arguments for connecting the decisions in different problems. Peter C. Fishburn discusses recent theories that attempt to blend normative and descriptive approaches to decision making by retaining "many of the traditional normative features while accommodating systematic behaviors uncovered by empirical research," and he points out some constructive aspects of Savage's work. Robin M. Dawes states that we should not abandon normative principles because some particular choices are in conflict with those principles, and describes how individuals do seek to make policy choices that will reduce the conflicts that they experience in their decision-making processes. John W. Pratt feels that the points raised by Shafer have already been recognized by Savage and other statisticians who wrote about the foundations of decision making and the Bayesian view. He concludes that "No new rationality has found widespread acceptance since Savage, nor should have."

In his article, "A Statistical Perspective on Ill-Posed Inverse Problems," Finbarr O'Sullivan describes statistical estimation and model building as inverse problems because "one is interested in making inferences about a phenomenon from partial or incomplete information." He continues, "In modern science there is an increasingly important class of inverse problems which are not amenable to classical statistical estimation procedures and such problems are termed ill-posed." In these problems, least squares or maximum likelihood solutions may not be uniquely defined, and their sensitivity to slight perturbations in the data may be unacceptably large. Algorithms must be developed that yield solutions that are consistent with both "the observed data and prior notions about the physical behavior of the phenomenon under study." The primary goal of O'Sullivan's paper "is to identify some tools for assessing the finite sample performance characteristics" of inversion algorithms or estimators. As D. M. Titterington writes in his discussion, O'Sullivan's article contains "admirable blends of review and new ideas, together with theory and applications."

Titterington goes on to note the relatively late stage at which statisticians have begun to have an impact on the study of ill-posed inverse problems, and stresses the relevance of ridge-regression estimators from both the Bayesian and non-Bayesian approaches. In her discussion, Grace Wahba points out that there are many interesting open questions, some of which are at the intersection of statistics and numerical analysis. John A. Rice mentions different types of prior information that can be useful, and the insights that can be gained by plotting appropriate vectors. Freeman Gilbert describes improved methods for estimating bias in a typical geophysical inverse problem.

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Harald Cramér, who is famous for his many books and articles in the field of probability and statistics, was born on September 25, 1893, and died on October 5, 1985, at the age of 92. In 1970, Cramér visited the University of North Carolina, and Edward J. Wegman had the opportunity to tape-record a lecture that Cramér gave describing his personal recollections of the development of statistics, as well as to record some subsequent conversations that he had with Cramér on this topic. These recordings, transcribed and edited by Wegman, form the basis for his article in this issue.

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Finally, a highlight of the issue is an interview with Charles Stein, Professor of Statistics at Stanford University, whose work on such topics as the inadmissibility of various standard estimators, invariance, and confidence intervals of fixed length is well known.