Statistical Science
1992, Vol. 7, No. 1, 3–4

In This Issue

This issue begins with three articles dedicated to Sir Ronald A. Fisher, whose ideas underlie so much of modern statistics. George Barnard, who knew and worked with Fisher, and also was one of Fisher's correspondents, reviews a new volume, *Statistical Inference and Analysis: Selected Correspondence of R. A. Fisher*, edited by J. H. Bennett (Clarendon Press, 1990). Fisher's letters concern the theory, method, history and teaching of statistics, and also other scientific areas. Of course, such a volume automatically introduces the thinking of many of the best-known developers of statistics over a 50-year period.

Several statisticians spoke at the 1990 AAAS meeting in commemoration of Fisher's centenary. Two of these, Samuel Karlin and C. R. Rao, have prepared their addresses for inclusion in this issue. Fisher was a founder of modern genetics as well as of modern statistics, and Karlin concentrates on that aspect of Fisher's evolutionary theory, including covering Fisher's key studies on natural selection, the sex ratio, and polygenic inheritance. Karlin's enjoyable paper and penetrating insights will serve as a valuable introduction to many of the ideas of genetics, in addition to giving marvelous insights into Fisher's mind and legacy.

C. R. Rao, one of Fisher's relatively few statistics students, concentrates on Fisher's contributions to modern statistics. Likelihood, the F test, information, randomization and experimental design are among the long list of topics Rao covers. Special sections are devoted to reviews of Fisher's books, *Statistical Methods for Research Workers* (1925), and *The Design of Experiments* (1935). Rao also relates some of his own pioneering work to Fisher's developments.

Fisher's works were voluminous, covering 300 papers and six books. It should come as no surprise that there is still more to say about him, and we expect to publish some additional reviews of Fisher's work, also in honor of his 100th birthday, in another *Statistical Science* issue this year.

The development of chaos and fractals is relatively recent within scientific theory. Although chaos theory has affected thinking in other fields, it has not yet widely affected statistical thinking. Should it? Presented here are two reviews of chaos theory, one by Sangit Chatterjee and Mustafa Yilmaz, and the other by Mark Berliner, that introduce these ideas to a statistical audience and interpret their significance for our field. Connections with chaos theory are established with ergodic theory, with nonlinear time series, with stationary processes, with randomness and with prediction. The authors and the discussants (Colleen Cutler, John Geweke, Clive Granger, David Griffeath, Richard L. Smith and Ruey Tsay) consider both the effect of chaos theory and statistics upon one another and the relationship between interpretations of chaos and randomness. As the discussants note, a growing interest and involvement in the field of chaos is taking place among statisticians. Their bibliographies will help our field to expand, to embrace and, ultimately, to come to terms with this new perspective.

Larry Shepp interviewed Yuri Vasilyevich Prokhorov at the Steklov Mathematical Institute in Moscow in 1990. We are grateful to Abram Kagan for the English translation published here. Prokhorov, a professor at Moscow University since 1957, has contributed to probability and the asymptotic theory of statistics, and is the only academic statistician/probabilist in the USSR Academy of Sciences. Prokhorov interacted with all the great Russian probabilists and statisticians since getting his degree after World War II, and he had numerous relationships with leading western statisticians when the Iron Curtain made that difficult. Glasnost made the Prokhorov interview possible, as it did the earlier for Ildar Ibragimov (*Statistical Science*, August 1990). Another Russian interview, of Boris Gnedenko, will appear in *Statistical Science* later this year. Also recall that we published remembrances of A. N. Kolmogorov by David Kendall and by Albert Shiryaev in the August 1991 issue of *Statistical Science.*

In the final article, Alan Agresti surveys methods for exact inference and contingency tables. Exact methods have been possible for a long time (for example, Fisher's "exact test") when sufficient statistics exist in exponential families. But now computational advances have extended their range greatly. Both testing and estimation are covered, being related through the relationship of confidence intervals to tests. The results reviewed here are likely to affect the way statistics is applied in logistic regression, two-way and higher-way tables and other log-linear models for frequency data, especially in small sample situations. Several types of software already are available, and are described. Agresti further speculates on the continued directions for related future research, which

will be increasingly feasible due to the continued development of computers and their algorithms. Seven enthusiastic discussions are oriented principally toward extensions for model checking, for sensitivity analysis, for Bayesian analysis, for conditioning, for computational methods and for applications. Agresti's review is a timely and rich synthesis of an important area that until now has been under vigorous, but scattered, development.

C. N. Morris