Statisticians in history

Tribute to Jerome Cornfield
A legacy in the field of statistics

Adapted from Jerome Cornfield's obituary in The American Statistician (1980), written by Samuel W. Greenhouse and Max Halperin

Jerome Cornfield, a former president of the American Statistical Association (1974) was the director of the biostatistics center and a professor of statistics in the department of statistics at The George Washington University. He is also known as one of the world’s leading statisticians.

Cornfield was born in New York City and attended New York University, graduating in 1933 with a BA in history.

In 1935, Jerry (as he was called by almost all who knew him) entered the federal civil service as a statistician in the Bureau of Labor Statistics of the Department of Labor. He transferred to a statistical unit of the old Public Health Service in 1947, which subsequently became a branch of the National Cancer Institute, National Institutes of Health (NIH). He left NIH in 1958 to serve as chair of the department of biostatistics at The Johns Hopkins University. In 1960, he returned to the NIH as assistant chief of the Biometrics Research Branch of the National Heart Institute. He became branch chief in 1963 and served in that capacity until his retirement from the federal government in 1967. He then joined the Graduate School of Public Health of the University of Pittsburgh as a research professor of biostatistics. In 1972, he became a professor of statistics at The George Washington University and also director of the biostatistics center and served as chair of the department of statistics from 1973 to 1976.

Cornfield made many major contributions to statistical methodology in two areas of application: economics and the biomedical sciences.

At the Bureau of Labor Statistics from 1935–1947, Cornfield made important contributions to the development of probability sampling, economic statistics, and input-output analysis.

In the area of probability sampling, he designed the sample for “Family Spending and Saving in Wartime” in 1942. In economic statistics, he played a major role in the revision of the Consumer Price Index, 1938 to 1940. He spent three years (1944–1947) developing and introducing (in cooperation with Duane Evans and Marvin Hoffenberg) the ideas and techniques of input-output analysis into the federal government. In the areas of biology and medicine, Cornfield contributed to statistical methodology for a broad variety of fields of application, both in laboratory and clinical research, and was extremely active and valued as a data analyst. He achieved recognition for his work on problems of photosynthesis, the toxicity of the essential amino acids, the statistics of bioassay, the effects of irradiation in animals, chemical kinetics problems related to the use of marker substances, carcinogenesis in animals, the related problems of safe-dose estimation, and computer diagnosis of electrocardiograms.

Cornfield gained recognition from a broader audience for his contributions to the field of epidemiology. His writings enabled epidemiologists studying possible etiologic factors in disease to estimate the relative risk of those exposed to that factor from retrospective case-control studies. In the area of controlled clinical trials, Cornfield was a pioneer in recognizing and studying the problems of design and data analysis that arise in the conduct of clinical trials of therapies for
An Account from Susan Ellenberg, author of Standing on the Shoulders of Jerome Cornfield

I went to work for Jerry Cornfield in the summer of 1971 as a statistical programmer. (I had been teaching high-school mathematics for three years, but was pregnant with our first child and planning to take time off from teaching. Janet Wittes, who was working for Jerry as a research associate at that time, approached me about doing some computer programming for them during the summer before the baby was born, and it worked out well enough that I continued afterward.) Jerry was a delight to work with, but he traveled a lot and so I didn’t see him all that often. He was a pipe smoker at that time, and although I was asthmatic and allergic to smoke, I developed a Pavlovian positive reaction to the smell of pipe smoke as I approached our office because that meant Jerry was there!

Jerry was a wonderful mentor, making me aware of the emerging clinical trial issues and controversies of the day, supporting my attendance at a series of annual conferences on clinical trials (whose organizers soon formed the Society for Clinical Trials), and introducing me to the statisticians and clinicians who were playing leadership roles in the then-emerging discipline of clinical trials. This was such an interesting world that I soon embarked on graduate studies in statistics so I could become part of it.

Several years after I began to work with Jerry, he assigned me the task of managing a small clinical trial being conducted by The George Washington University Medical School. Under his general supervision (but allowing me to work largely independently), I created the randomization plan, designed the case report forms, entered the data, wrote and ran the programs to edit the data, performed the analyses, and contributed to the writing of the manuscript. No experience could possibly have better prepared me for a career in clinical trials.

In addition to his wide-ranging interests in applications, Jerry was constantly interested and involved in statistical theory and methodology. In one of his very early papers, he invented a method for easily obtaining the unbiased estimate of the variance when sampling from finite populations without being aware that he was using indicator functions. Reference has already been made to his work on the analysis of bioassay and to the theoretical work leading to the use of the cross-product ratio found in retrospective studies as an estimate of the relative risk. Independent work on the analysis of variance for the different models subsequently led to a collaborative effort with John Tukey that yielded an important unifying paper on the subject. As a result of his involvement in the Framingham Study, he developed the multiple logistic risk function based on a discriminant function approach. Finally, as a Bayesian, in addition to lectures and publications on the philosophical aspects of the Bayesian approach to statistical reference, he contributed technically to multivariate analysis, sequential clinical trials, and life table analysis. As quoted from Joel B. Greenhouse in “On Becoming a Bayesian: Early Correspondences Between J. Cornfield and L. J. Savage,” Jerry Cornfield was arguably the leading proponent for the use of Bayesian methods in biostatistics during the 1960s.

Cornfield was active in many scientific societies. He was president of the American Statistical Association, 1974; president of the American Epidemiologic Society, 1972; vice president of the American Heart Association, 1970; and president of the Eastern North American Region of the International Biometrics Society, 1959–1960. He was a Fellow of the Institute of Mathematical Statistics, American Statistical Association, American Association for the Advancement of Science, and Council on Epidemiology of the American Heart Association, as well as a member of the International Statistical Institute.

He served in various editorial capacities and was a member of many advisory committees. Specifically, he served as a statistical advisor to the State of Pennsylvania in regard to the Three Mile Island incident.

Among his awards were the Superior Service Award from the Department of Health, Education, and Welfare (1967) and the National Institutes of Health Director’s Award (1978). Behind all the scholarly and intellectual achievements, there was a warm, sociable human being, always inquisitive, always prepared to engage in conversation. He, himself, was very witty, but also enjoyed the wit of others, whether in conversation, literature, or the theater. Jerry was a great teacher, particularly in explaining statistical concepts and reasoning to clinicians and medical students. He was very gentle with graduate students and young statisticians, exercising great patience in introducing them to the insights he had in the solution of problems.

major chronic diseases. He was a major influence in the development and application of new methods for estimating the risk for a disease based on more than one potential etiologic factor.

In the span of three decades, Cornfield was a major contributor to resolution or partial resolution of a number of major public health issues (e.g., smoking and lung cancer, the safety of the polio vaccines, and, most recently, the difficult issues relating to the estimation of low-dose carcinogenic effects of food additives). Rick Wicklin mentions in his article, “Jerome Cornfield: The Statistician Who Established Risk Factors for Lung Cancer and Heart Disease,” that Cornfield’s true legacy is that today’s statisticians continue to use the methods he introduced to understand the connection between risk factors and disease.

The controversies surrounding the nature of the studies providing evidence for the causes of disease led Jerry into the philosophical areas of the nature of proof and causation as applied to medicine, and he wrote several highly regarded papers on these issues.