

# Preface

Erich L. Lehmann's legacy is profound and extensive. His scholarly contributions, as partially presented and commented upon in this volume of selected works, clearly demonstrate his broad interests and the widespread impact that his "system building" life-long work had on the discipline. Stephen Stigler (2009), writing about Erich's honorary degree from the University of Chicago, states that the citation on Erich's degree read as follows:

*Your research on the application of decision theory to statistical problems has helped create and organize modern mathematical statistics; your elegant treatises have guided the curricula of a majority of the nation's graduate programs and given shape to the discipline, and your teaching has inspired a generation of scholars.*

The present collection of selected papers shows Erich's multifaceted contributions. His work on concepts of dependence in 1966 has created a substantial literature and continues to have a large impact on applied probability. His joint work with Joseph L. Hodges on the efficiency of rank tests, and the corresponding work on efficiency of estimators derived from rank tests, helped to assuage the fears of the nonbelievers of nonparametric methodologies. The Lehmann alternatives, with its implicit connection to the proportional hazards model of Cox, and its spillover into the modeling of ROC curves literature, has been used both in the applied and theoretical statistical camps. Erich's work on unifying concepts, ideas, and results in decision theory under an overarching structure hinged on his use of concepts of unbiasedness and invariance applied in the context of exponential and group families of distributions, a literature to which he contributed substantially and extensively. In this regard, Erich's role was one of a system builder. But he also found himself as the originator of ideas in a very substantive way. One example is a concept that serves as one of the main pillars of the statistical decision theory of Wald. Wald, in his book *Statistical Decision Functions* (1950), on page 29 credits Erich with the concept of a complete class. Here is the exact text:

*The concept of a complete class of decision functions was introduced by Lehmann, and the first result regarding such classes is due to him [30]. . . .*

Wald then proceeds to discuss the first result on complete classes proved by Erich. The citation [30] refers to Erich's "On Families of Admissible Tests" published in the *Ann. Math. Stat.* in 1947.

Erich's books, translated into several languages, continue to have a large impact on the education of the next generations of statisticians. His enjoyment for teaching one-on-one is reflected in the large number of Ph.D. students that he mentored.

Erich also served the broader statistical community well. He was Editor (1953-1956), and Associate Editor (1956-1968) of the *Annals of Statistics*. He served as President of the Institute of Mathematical Statistics (1960-1961) and chaired the Department of Statistics at Berkeley (1973-1976). He was a member of committees of visitors to the department of statistics at Harvard (1974-1980) and Princeton (1975-1980) Universities.

Many honors were bestowed upon him. Among others, there are the following: Guggenheim Fellow (1955-1956, 1966-1967, 1980-1981); Research Professor, Miller institute for Basic Research (1962-1963, 1972-1973); IMS Wald Memorial Lecturer (1964); Elected to the American Academy of Arts and Sciences (1975) and to the National Academy of Sciences (1978); He received honorary degrees from the University of Leiden (1985) – this was the first honorary degree awarded by Leiden to a mathematician since 1884 when Stieltjes received it. An honorary degree from the University of Chicago followed in 1991; He was elected Honorary Fellow of the Royal Statistical Society (1986) and was the COPSS R. A. Fisher Memorial Lecturer (1988); He received the American Statistical Association (ASA) Wilks Memorial Award, and he was the first ASA Goffried Noether Awardee and lecturer. Posthumously, he received the 2009 best paper award from the *Journal of Nonparametric Statistics*.

In addition, Erich's gentle and unselfish spirit and mentorship did not go unnoticed by his students who organized several meetings in his honor and published collections of works related to Erich's interests. These include: A Festschrift for Erich L. Lehmann (1983), and four Erich L. Lehmann Symposia on optimality (2002, 2004, 2007 and 2011).

In planning this volume, Erich and I met several times to decide on the organization of the papers into the various chapters, and who the contributors would be. Clearly, the chapters cannot be defined sharply as there are papers that could very easily have been placed in a different group. The careful reader will notice two surprises in the collection. The first one is easy to detect. Sections 3.10 - 3.12 of *Testing Statistical Hypotheses* 1959, are being included here. This is happening thanks to Lawrence D. Brown who suggested, and Erich agreed, that they should be reproduced here.

The second pleasant surprise is the inclusion of Erich's work on the history of confidence statements (1958). Stephen Stigler was kind enough to point out this paper to us.

I would like to thank Jim Pitman for his patience and encouragement during the preparation of this volume. John Kimmel and Eric Strauss have been very supportive of this project. Thanks also go to the contributors to this work. The requests for contributions, as it always happens, came at a busy time for everyone. The contributors' special efforts in helping to bring this project to fruition is greatly appreciated.

My deep gratitude goes to Juliet Shaffer. Julie was a great source of information during the preparation of this work. In addition, the many invitations to join her and Erich for lunch or dinner, were great opportunities to get to know them better. Erich's and Julie's concern for my family will always be appreciated.

Erich Leo Lehmann passed away in the early morning of September 12<sup>th</sup>, 2009. I first learned of his death as I waited for my wife at the Oakland airport so that, together, we could visit Erich – but it was not to be. I and my family were very fortunate to get to know Erich and enjoy his and Julie's company. Erich will always be in our thoughts.

Houston, TX

Javier Rojo

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