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LEO BREIMAN: AN IMPORTANT INTELLECTUAL AND PERSONAL FORCE IN STATISTICS, MY LIFE AND THAT OF MANY OTHERS[1]

BY PETER J. BICKEL

University of California, Berkeley

I first met Leo Breiman in 1979 at the beginning of his third career, Professor of Statistics at Berkeley. He obtained his PhD with Loéve at Berkeley in 1957. His first career was as a probabilist in the Mathematics Department at UCLA. After distinguished research, including the Shannon–Breiman–MacMillan Theorem and getting tenure, he decided that his real interest was in applied statistics, so he resigned his position at UCLA and set up as a consultant. Before doing so he produced two classic texts, *Probability*, now reprinted as a SIAM Classic in Applied Mathematics, and *Statistics*. Both books reflected his strong opinion that intuition and rigor must be combined. He expressed this in his probability book which he viewed as a combination of his learning the right hand of probability, rigor, from Loéve, and the left-hand, intuition, from David Blackwell.

After a very successful career as a consultant in which he developed some of the methods in what is now called machine learning, which became the main focus of his research he came as a visiting professor to Berkeley in 1980 and stayed on in a permanent position till his death in 2005. As a visiting professor he taught a course on nonparametric methods which I sat in on. It was a question he raised in that course that led to our closer acquaintance and subsequent collaboration. Leo had proposed goodness of fit statistics based on the empirical process of the nearest neighbors sphere volumes, $S_1, \ldots, S_n$ of an i.i.d. sample $\mathbf{X}_1, \ldots, \mathbf{X}_n \sim F$ on $\mathcal{R}^d$.

Heuristics suggested that the limiting distribution of the statistic would be "distribution free" under the null if f is positive and continuous. I proposed an approach based on a variant of the "little block," "big block" technique used by Rosenblatt (1956) for stationary mixing sequences.

During the year or so that we ended up spending on the paper, we found that the heuristics were much harder to make real than I thought. As time passed and I became testy and grumbled to Leo, he would always comfort me with the comment that we were plowing "hard new ground." The editor of *The Annals of Statistics*, whom I shall not name, was on a crusade to eliminate all but what he viewed as genuinely applied papers from the journal, so he swiftly rejected the paper. The

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