FIG. 1. *Morris H. DeGroot* 1931–1989. *Founding Executive Editor, Statistical Science.*

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Biography of Morris H. DeGroot[1]

Morris H. DeGroot, the founding Executive Editor of *Statistical Science*, died on November 2, 1989, after a long struggle with lung cancer. Morrie DeGroot was born on June 8, 1931 in the industrial city of Scranton, Pennsylvania. His father, Archibald DeGroot, was a civil engineer and an avid bridge player, coach and tournament organizer. His mother, Florence Dinner DeGroot, was active in numerous community organizations. Those who knew Morrie in his professional career for his brilliance in mathematics and clarity in writing can find the seeds of these characteristics in his father's career as an instructor and textbook author at the International Correspondence School. Those who know of Morrie's staunch support of liberal ideals and individual freedom also would find some influences from his early years. Religion created some social barriers in Scranton during that era. Observing these divisions, as well as racial barriers, might have been responsible for inspiring Morrie's lifelong devotion to the ideals of fairness toward all individuals.

Among Morrie's hobbies as a boy were baseball and music. A highlight of his experience as a young baseball fan was the day he opened a package of two baseball cards to discover his hero, Joe DiMaggio, on *both* cards. Morrie played the trumpet in the Scranton Central High marching band and in a jazz band; his love of music, especially jazz, lasted his whole life. It was in high school that he met Marilyn Dallolio, a gifted musician who would occasionally sing with the band. Social pressures prevented him from dating Marilyn during high school. They did date the next two years when Morrie would return home from college, but it was to be another 30 years before fate would bring them back together in marriage.

As a high school graduate in 1949, Morrie was ready to leave the confining Scranton environment. His older sister, Phyllis, had moved to Chicago with her husband, Bernard Weinstein, a student at the University of Chicago. Following their example, Morrie enrolled at the University of Chicago as well. One benefit of attending college near his sister became clear when Morrie learned that the college cafeteria did not serve meals on Sundays. He (and several of his friends) solved this problem by showing up at the Weinsteins' for dinner and lively conversation when the cafeteria was closed. Morrie discovered another family connection during his first days at Chicago. Glancing at a manual on how to locate books in the library, he came to a section on alphabetizing last names that contain two capital letters. The author provided by the manual as an example was Archibald DeGroot, Morrie's father.

While living in Chicago was a liberating experience, the "great books" approach to learning practiced at the university during the Robert Hutchins era was not well suited to Morrie. At the start of his first year, he learned that he had placed out of some mathematics and science courses, leaving him enrolled in courses that interested him somewhat less. After one year of study, he enrolled in nearby Roosevelt University, a change that was to be decisive in determining his future. It was at Roosevelt that Morrie took courses from Jack Silber, Professor of Mathematics, and a person who was a great influence on Morrie's life. He took calculus courses and a first statistics course taught out of the text by Mood. This initial introduction to statistics was enough to suggest that Morrie had a unique talent for the subject and wanted to pursue it in graduate study. In 1952, Morrie enrolled as a graduate student at the University of Chicago in the Committee on Statistics, it not yet having achieved the status of a full-fledged Department of Statistics. That same year, he married Dolores Pine, a top student at Roosevelt. While she finished college, Dolores helped support Morrie through his graduate studies, working as a typist and singing in numerous choirs, including on occasion the chorus of the Chicago Civic Opera.

Morrie returned to the University of Chicago at an exciting time when one of the great departments of statistics was being created and during which there was an amazing concentration of statistical talent. The two senior figures were W. Allen Wallis, who served as chairman, and L. J. Savage. Moreover, the younger faculty who came approximately at this time included the future heart of the

[1]This biography was created from the recollections of Marilyn, Jenny and Jeremy DeGroot, Phyllis Weinstein, Joseph Auslander, M. J. Bayarri, James Berger, Richard Cyert, Lester Dubins, Donald Gaver, Prem Goel, William Kruskal, James MacQueen, Albert Madansky, Paul Meier, Jack Nadler, Ingram Olkin, Jack Silber, A. F. M. Smith, David Wallace, Arnold Zellner and Morrie's colleagues in the Departments of Statistics and Mathematics of Carnegie Mellon University. The final synthesis and editing was done as a cooperative effort of the Department of Statistics faculty at Carnegie Mellon University.

FIG. 2. *Morrie, 1950, at the University of Chicago.*

Chicago Statistics department: Raj Bahadur, Patrick Billingsley, Alec Brownlee, Leo Goodman, William Kruskal, Paul Meier and David Wallace. Other faculty present during this period included Murray Rosenblatt and Charles Stein. There was also a distinguished set of visitors during Morrie's time at Chicago including Joseph Hodges, Esther Seiden, Henry Daniels, Frederick Mosteller, Dennis Lindley, John Pratt, Ingram Olkin, Kai Lai Chung and Donald Darling. Jacob Marschak, a person who was later to have a profound influence on Morrie's research, was also a faculty member in the Department of Economics.

While the department was a hotbed of intellectual activity, the group was to have an inconsistent record in setting standards for the early Ph.D. students. A number of outstanding statisticians were able to complete the program including: Herbert T. David, Morrie DeGroot, Robert Ellison, John Gilbert, Albert Madansky, Roy Radner and Robert Tsutakawa; however, other gifted students were not able to finish. Morrie selected L. J. Savage as his advisor, a decision of great and indelible consequences. Savage was, on the one hand, a man of great brilliance and questing intellect who influenced all who knew and worked with him. On the other hand, Savage had exceptionally high expectations, and he demanded much from his students. While Morrie was eventually able to finish his Ph.D. dissertation under Savage, he required great perseverance. This early experience is very likely one of the reasons that, as a faculty member, Morrie was especially concerned about students, their welfare and academic progress. He was always encouraging and was regarded as an excellent and dedicated advisor by all his students. The Savage influence was especially profound in introducing Morrie to Bayesian ideas and the foundations of statistical inference, in involving Morrie in the application of statistics to genetics problems (the subject of his first statistical publications), and in the importance of clear writing. One of Morrie's greatest gifts was his ability to write clearly. His textbooks and research articles are models of clarity. Furthermore, his skill for writing would have a great impact on the profession later in his career through his editorships of major statistical journals.

As a student at Chicago, Morrie was partially supported by a contract from the Office of Naval Research administered by Allen Wallis and William Kruskal. The contract supported Morrie's research in sequential analysis, and he wrote "Some aspects of the use of the sequential probability ratio text" [3] with Jack Nadler, a fellow graduate student and future Fellow of the American Statistical Association. It is interesting to note that years later, as a faculty member of Carnegie Mellon University, Morrie steadfastly refused to seek or accept research support from Department of Defense sources.

While Morrie was finishing his studies at Chicago, he sought an academic position. He accepted a position in 1957 with the Department of Mathematics at the then Carnegie Institute of Technology (CIT), which became Carnegie Mellon University (CMU) in 1968. Lester Dubins played a significant role in Morrie's decision to move to Pittsburgh. Dubins, who had received a Ph.D. in mathematics from Chicago, was a close colleague of Jimmie Savage. While Dubins was in the Department of Mathematics of CIT, he was working closely with Savage on research that ultimately led to the publication of their book, *How To Gamble If You Must*. Morrie did move to Pittsburgh, but Dubins had received a three-year research fellowship and spent 1957–1959 at the Institute of Advanced Study in Princeton, followed by the third year at University of California at Berkeley. Thus Morrie and he never overlapped in Pittsburgh.

Morrie joined a mathematics department at CIT, which was moving toward pure mathematics. The department had a single statistician, Edwin G. Olds, renowned for his work in industrial statistics and quality control and former president of the IMS. The move to pure mathematics did not allow for hiring statisticians and even resulted in the departure of several distinguished researchers in operations research and optimization including

Abraham Charnes and Carlton Lemke. During his early years in Pittsburgh, Morrie continued the work in genetics which he initiated in Chicago, in collaboration with the geneticist C. C. Li of the University of Pittsburgh, and he continued his research on sequential methods. His early work in mathematical statistics was surprisingly frequentist given that his advisor was L. J. Savage.

By coincidence, Jacob Marschak spent the 1957–58 academic year at Carnegie Tech's Graduate School of Industrial Administration (GSIA). Morrie and Marschak began to discuss research problems, and as a result Morrie became acquainted with the faculty of GSIA. Marschak invited Morrie to spend the 1960–61 academic year at UCLA. This year had a profound influence on Morrie, and it spurred him to study decision theory, especially as it applied to economic behavior of individuals and the firm. He began to study utility theory and the delicate interaction between utility, information and sequential methods. This work laid the foundation for his now classic advanced textbook, *Optimal Statistical Decisions*, a book that had an important influence on a generation of statisticians. During this year, Marschak and Morrie, together with the psychologist Gordon Becker, produced several papers on utility theory including one [9] on random utility that has become a classic in the field of utility measurement as it has been developed by psychologists. During this period, Morrie also tackled a Bayesian version of the famous "search problem" and obtained the sharpest results [19] available for the Bayesian version. These results led to several publications and form an interesting part of his beautiful treatment of sequential decision making in *Optimal Statistical Decisions*. The year at UCLA also marked the birth of Dolores and Morrie's first child, Jenny.

Upon returning from UCLA, Morrie's interests diverged from those of the CIT mathematics department. Although M. M. Rao joined the department in 1964 and collaborated with Morrie on several papers, Morrie yearned for a larger group of statisticians, some of whom would share his passion for research in decision making. Here, Richard M. Cyert, then Dean of GSIA and later President of Carnegie Mellon University from 1971–1990, played a central role in keeping Morrie in Pittsburgh. Cyert recognized that both GSIA and Carnegie Tech needed a group of statisticians and that this could not happen within the mathematics department. He convinced Edward Schatz, then the Vice President for Academic Affairs, of the importance of statistics for CIT, and the two developed a plan for a department. The department was created in 1966 with Morrie as its first head and Donald Gaver, who held a joint appointment in GSIA and the Department of Mathematics, as the other senior faculty member. The department was unusual, because it had a free floating status and was not in any college under the control of a particular dean. Of course, Cyert played a major role in budget, personnel and strategic directions, a role that continued even when he rose to the presidency of the university. The free floating status was continued until 1981 when the department finally joined the College of Humanities and Social Sciences. Along the way, Morrie was the guiding intellectual force and was instrumental in hiring two other senior statisticians, Jay Kadane who came in 1971 and Stephen Fienberg who came in 1980.

In the early days of the department, it was very small, consisting of only six faculty members. In spite of the small size, the department did have some outstanding graduate students who went on to notable careers in statistics. This group included Prem Goel who became a major collaborator with Morrie and who is now Chairman of the Department of Statistics of Ohio State University; David Hildebrand, who has been Chairman of Statistics of University of Pennsylvania; and Benjamin Kedem, Professor of Mathematics at the University of Maryland and winner of the IEEE Baker Prize.

Morrie developed a lifelong research relationship and friendship with Richard Cyert, who was a Fellow of the ASA for his research in statistics, especially on sampling methods in auditing. On Saturdays, they would leave their administrative responsibilities behind and would work on applying Bayesian analysis to economic theory and the theory of the firm. Their talents were a perfect match and helped to make the collaboration enormously productive [21,22,27,30,33,34,37,41,44,45,61]. Their research culminated with their 1987 book, *Bayesian Analysis and Uncertainty in Economic Theory*.

Morrie also had a very productive collaboration with Prem Goel. This collaboration began when Goel was a graduate student at Carnegie Mellon writing his dissertation under Morrie's guidance. In the summer of 1969, Morrie and Prem together with Paul Feder became involved in an investigation of the problem of matching the observations in a broken sample [24]. Morrie and Prem continued to work on this problem [39,46] after Prem had left Pittsburgh, and they also initiated new projects involving the Bayesian approach to hierarchical models and comparison of experiments among many projects [42,43,50,51,97]. Even toward the end of Morrie's valiant fight with cancer, Prem visited Pittsburgh often, and Morrie was cheerful and

FIG. 3. *Lawn bowling with Dick Cyert and Morrie's children, Jenny and Jeremy, at a conference in Sweden in* 1969.

would always crack jokes during their discussions. He even found the energy to discuss statistical problems. Based on these discussions, two joint papers were finished [101,102]. Chandra Gulati, the coauthor of [101], was also Morrie's Ph.D. student during the early days of the CMU Department of Statistics and is now a faculty member at the University of Wollongong in Australia.

In the 1960s, Morrie's research was principally on the mathematical aspects of statistics; however, in 1970 he became involved in applying statistics to an important public policy question concerning the health effects of low level radiation, especially from nuclear reactors. Working with Ernest Sternglass, a physicist at University of Pittsburgh, Morrie studied infant mortality rates in areas with varying exposure levels. This study was reported in the Sixth Berkeley Symposium, "Statistical studies of the effect of low-level radiation from nuclear reactors on human health" [29]. The study results were inconclusive, but the unanswered questions raised serious concerns. One consequence of this work was that, in 1973, Morrie was appointed by Pennsylvania Governor Milton Shapp to a committee to study the health effects of nuclear reactors. Ultimately, the standards for emissions were raised, a result which Morrie felt justified his substantial personal involvement.

In 1971, with the department thriving and his career in full bloom, Morrie and his family, which

now included son Jeremy, age 8, went to Brussels for a year at the European Institute for Advanced Studies in Management. They traveled abroad by ocean liner, and on the voyage over, Dolores DeGroot fell ill with what was later diagnosed as multiple sclerosis. As bright as the future had seemed to the DeGroots, their lives took a tragic turn. Over the next three years, Morrie devoted himself to Dolores, and in 1972 he turned over the position of Department Head to Jay Kadane. Many individuals recall his loving efforts first to help Dolores maintain her activities and later to comfort her. In spite of all of his efforts, Dolores died in 1974.

The ensuing years were difficult for Morrie. The carefree days seemed to be gone forever. He could no longer spend a weekend in Cleveland as he and Dolores had with Joe and Ruth Auslander in 1958 indulging all his joys: an art museum, a Bach festival and a Yankees vs. Indians doubleheader. No longer could he and Dolores entertain newcomers to Pittsburgh by introducing them to a stimulating mix of personalities over dinner. It was not until he began courting and in 1979 married Marilyn, his Scranton High School classmate from some 30 years before, that he returned to his career with renewed enthusiasm. He had become widely respected for his notable editorial work as Book Review Editor (1971–1975) and Theory and Methods Editor (1976–1978) of the *Journal of the American Statistical Association*. Still, it was his marriage to Marilyn, and the stability it brought to him and his family, that allowed Morrie to accept positions associated with the professional societies and on governmental statistics committees and panels.

The last 15 years of Morrie's career were marked by a rise to the front rank of the profession. He became a leader of the movement in Bayesian statistics, he was engaged in major editing projects and he participated in leadership roles in the statistical societies and on governmental statistics committees and panels for the National Institutes of Health, the National Science Foundation and the National Research Council. All who came in contact with Morrie were affected not only by his wisdom and the force of his arguments but also by his diligence, thoroughness, integrity and good humor. His quick wit could equally well deliver an illuminating insight or a well-timed joke.

In 1984, Morrie was named University Professor, the highest honor Carnegie Mellon University bestows on a faculty member. A study of Morrie's research contributions prepared by Jim Berger and displayed in Table 1 clearly shows the wide range of areas in which he worked. Although Morrie is best known for his leadership in Bayesian statistics, he published on a surprisingly diverse set of problems. The table also clearly shows that Morrie sustained his research in particular topics over a very long period of time. Thus, the research on information and likelihood or on choice and consensus that was initiated in early 1965 was being continued in 1989.

Morrie took great pride in the way that the Bayesian paradigm was achieving increasingly wide acceptance among statisticians. Beginning in 1971, he was an active participant in the NBER-NSF Seminar on Bayesian Inference in Econometrics and Statistics. He made many presentations to the seminar, contributed valuable constructive criticism to others' papers and contributed to seminar volumes [21,44,70,71]. He helped to foster the acceptance of Bayesian methods by joining with José Bernardo, Dennis Lindley and Adrian Smith in organizing the first three Valencia International Meetings on Bayesian Statistics in 1979, 1983 and 1987. Morrie was also the guiding force in organizing the first "Indo-U.S. Workshop on Bayesian Analysis in Statistics and Econometrics" held in Bangalore, India in December 1988. This workshop was an attempt to help popularize the Bayesian paradigm in India. Unfortunately, Morrie's illness had been recently diagnosed and he was unable to attend the workshop.

All these meetings have given young Bayesians from around the world an opportunity to interact with the leading figures in the field. Morrie had a passionate belief in the Bayesian paradigm, and he had a deep feeling that this approach was widely applicable and the only scientifically sound approach to statistics. Yet, as an extremely effective communicator, he avoided counterproductive dogmatic zeal in presenting the case to skeptics; indeed, he delighted in talking to skeptics who could pose legitimate challenges to the paradigm and was extremely patient and understanding with younger statisticians who had been trained in other paradigms. This patience had a limit, and he viewed inability or unwillingness to eventually appreciate the Bayesian paradigm as a serious scientific failing, even if he could appreciate the value of work done under other paradigms. Morrie would give no quarter in an intellectual debate, but he was very gentle in his criticism and would never attack anyone personally. Morrie also encouraged others to work on problems that would help to develop Bayesian methods, even if they were not directly of interest to him. For example, he was supportive of the heavy investment that the CMU Department

TABLE 1
Research papers of Morris H. DeGroot classified by topic and year
(the numbers refer to the listing in DeGroot's bibliography)

Area	1956	1958-1962	1963-1966	1967-1972	1973-1976	1977-1982	1983-1985	1986-1990
Genetics and Applications	1, 2	5		29		38	65	75, 93, 100
Sequential Analysis		3, 4, 6, 7, 8		19, 20, 28		37, 40, 41, 47	60	101
Choice and Consensus			9, 12, 13, 14		32, 35			92, 99
Information and Likelihood		8		17, 18, 23		43	61, 63, 69	84, 89, 97
Utility and Decision			10, 15		34	44, 54, 58	62	83, 87
Bayesian Methodology			11, 16	26	31, 36	42, 46, 48, 50, 51, 52, 53	70	78, 86, 102
Economics				21, 22, 25, 27	30, 33	45		81
Matching and Selection Models				24		39, 49	59	73, 79, 80, 85, 96
Calibration						55, 56	57, 64	71, 88, 90, 94, 95, 98
History of Statistics								66, 67, 68, 72, 74, 76, 77, 82, 91

of Statistics made in computer facilities and research in statistical computing, because he believed in the importance of computing in statistics in general and in Bayesian statistics in particular, even though he himself had little interest in the subject until his last few years.

Morrie was interested in and excited by challenging problems. He always was more interested in the answer itself, no matter who found it, than in receiving credit for it. He was an ideal colleague off of whom to bounce ideas, because of his great desire to understand, which invariably stimulated other good ideas and enthusiastic encouragement. Morrie was always accessible and took a genuine interest in the research of his younger colleagues. Of course, his energy, appetite for life, love of parties and wit helped endear him to all. He is even reported to have shared his musical passions, both jazz and classical, with his colleagues. The passion was so great that the opening chords of Mahler's Third Symphony on the car radio kept him with Adrian Smith in the parking lot outside a local Columbus, Ohio, bar for the duration of the entire symphony. He was also known to have proposed that Bayesian meetings be held at the top of skyscrapers, because not only did "Bayesians belong at the top of the world," but it would also bring them closer to Reverend Thomas Bayes and would permit easier communication with him.

Morrie was very spontaneous in his research interests. An airplane flight with Jay Kadane led to a series of papers on the optimal use of peremptory challenges in jury selection [40,47,75] and later on a general approach to how Bayesians model decisions involving many decision-makers [60].

In July 1981, the Carnegie Mellon Statistics Department and the entire statistical world was stunned by the death of Wen-Chen Chen, a very promising young faculty member in the department. Wen and his wife had returned home to his native Taiwan to visit his family and to show off their new child to the relatives. While in Taiwan, he was picked up by the government police for questioning concerning political activities in the United States. Although he was later released, the next morning, he was found dead under mysterious circumstances. The official finding was designated as suicide, but few who knew Wen put any credence in that explanation. The incident sparked an enormous outcry, both in Taiwan and in the United States. Morrie was very deeply moved by this event, as it offended his great concern for individual rights and freedom. He spearheaded a movement to have a thorough investigation conducted by the authorities in Taiwan. Eventually, Morrie traveled to Taiwan with Dr. Cyril Wecht, a coroner, to oversee an official autopsy and to review the government investigation. While no resolution of the mystery was ever reached, this episode left an indelible mark on Morrie and on all of his colleagues.

In the last 10 years of his professional life, Morris was increasingly sought out to serve on professional committees, to advise on statistical policy, to perform editorial functions and to help

other departments to improve by serving on visiting committees. He served as member of the Commission on the Behavioral and Social Sciences and Education of the National Research Council and as chair of the NRC's Committee on Applied and Theoretical Statistics. He also continued a very active research program. Morrie preferred research directed towards fundamental understanding of new phenomena or unresolved old phenomena.

Many of Morrie's long-term research efforts also reflected this attempt at fundamental understanding. One of the most noteworthy was the series of articles, many with Stephen E. Fienberg, on calibration and evaluation of forecasters [56,57, 64,71,90,98]. The work with Fienberg began rather innocently with an exchange between Morrie and Steve that followed a critical discussion by Morrie of someone else's paper on calibration at the first Valencia conference. After Steve joined the CMU faculty, their collaboration flourished. Morrie's initial insight led to the concept of the least-refined calibrated forecaster, and he was able to tie a seemingly new class of problems back to the Blackwell notion of sufficiency in the comparison of experiments. Morrie collaborated with Steve and Jay Kadane during this same period to develop an up-to-date perspective on the use of statistics in legal settings, and this resulted in their edited volume *Statistics and the Law*. Morrie also contributed significantly to statistical methodology. For example, in response to a growing interest in the statistical literature towards selection models, Morrie decided to develop Bayesian methodology for the problem. Selection models involve data that have in some way been selected: a famous example is the "file-drawer" problem, in which one analyzes all published data that exists on a given subject, but must recognize that such data is often selected, say because it is statistically significant in testing. Bayesian analysis of selection models is particularly appealing, because knowledge of the selection mechanism (for example, of the degree of publication bias toward statistically significant results) is often quite subjective. Morrie, in a series of papers with M. J. Bayarri [79,80,85,96], made a significant start on the development of Bayesian methodology for analysis and comparison of such selection models. One of the most recent examples was the paper written with M. J. Bayarri and J. B. Kadane, "What is the likelihood function?" [84]. Reacting to an upsurge of interest in the statistics profession to likelihood-based foundational and methodological developments, they investigated the extent to which it was even possible to define unambiguously the central elements of the approach, such as likelihood. The examples and insights he developed are must reading for anyone interested in a thorough understanding of the foundations of likelihood-based methods.

Morrie was very much a concerned citizen of the profession. He often met with others to discuss policy issues. It was at one such meeting that the idea of a journal such as *Statistical Science* was formulated. Later, together with Ingram Olkin and Bruce Trumbo, he helped to prepare a proposal for approval by the IMS. It was natural for Morrie to be its first Executive Editor. He and Prem Goel, who was serving as Managing Editor of the IMS, worked together on the layout of the journal and chose the bright orange cover design with the intention that the journal would be visible from a distance on every IMS member's bookshelf. The journal became his greatest love and his biggest source of pride. He, together with his co-editors David Brillinger, John Hartigan, Ingram Olkin, Stephen Stigler, Paul Switzer and James Zidek, labored endlessly to find appropriate material and to have it written in a lively style. By presenting material to a broad segment of the profession, *Statistical Science* has served a unique function. Its success is due in large part to Morrie's ingenuity and effort.

The interviews of prominent statisticians were a particularly interesting part of *Statistical Science* and one greatly enjoyed by Morrie. In the last year of Morrie's life, his colleagues tried to persuade him to be interviewed. In characteristically modest fashion, Morrie steadfastly refused. He would never submit his research papers to any journal he edited, and he refused to make any exception for *Statistical Science*. It is because of this that the foregoing biography has been created, a poor substitute for the lively interviews Morrie was able to create, but one done with the greatest admiration for a most important contributor to modern statistics.

TABLE 2
Ph.D. students of Morris DeGroot

Robert E. Odeh, 1962
F. Beckley Smith, 1963
Milton C. Chew, Jr., 1965
M. A. H. Dempster, 1965
Ronald Paul Hackleman, 1967
Kenneth R. Waugh, 1970
Prem K. Goel, 1971
Chandra M. Gulati, 1971
Charles A. Holt, 1977
Bradley Novic, 1979
Mark A. Ciancutti, 1981
Kon K. Fung, 1982
Kathryn M. Chaloner, 1982
Avital Cnaan, 1982
Sybil L. Crawford, 1988

HONORS

Elected Fellow, American Statistical Association
Elected Fellow, Institute of Mathematical Statistics
Elected Fellow, Econometric Society
Elected Fellow, American Association for the Advancement of Science
Elected Member, International Statistical Institute
Recipient, 1985 Otto Wirth Award for Outstanding Scholarship, Roosevelt University Alumni Association
Pittsburgh Statistician of the Year, Pittsburgh, ASA Chapter, 1975

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11. Bayes estimation with convex loss. *Ann. Math. Statist.* **34** (1963) 839–846 (with M. M. Rao).
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