

Albert Leon Whiteman (1915–1995)

Solomon Golomb, Theodore Harris, and Jennifer Seberry

Albert Leon Whiteman died on December 9, 1995, after a lengthy struggle with cancer. He is survived by his devoted family: his wife Sally, his brother and sister-in-law, Irvin and Shirley, and nieces and nephews.

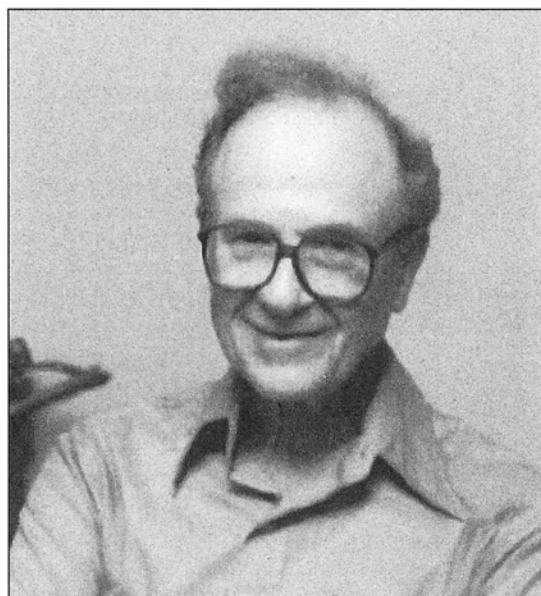
Al, as he was known to his colleagues at USC, was born February 15, 1915, in Philadelphia, PA. Sally and Al met on September 1, 1944, while they were serving in the Navy. They were married on June 3, 1945.

Al came from a poor family who wanted his education but did not have the financial resources. Even at school he loved number theory and wished it to be his life's work. When he was given a Harrison Scholarship, he was able to pursue his dream. He was elected to Phi Beta Kappa, Sigma Xi, and Pi Mu Epsilon, and was a Harrison Fellow, 1936–38. The interim scholarship he received before being awarded the Harrison Scholarship and Fellowship had a proviso that the recipient must not drink, smoke, or become a minister of religion. Al upheld these provisions throughout his life. Al received his B.A., M.A., and Ph.D. (1940) from the University of Pennsylvania, completing his dissertation [1] under the supervision of Hans Rademacher. (He was Rademacher's first American student.)

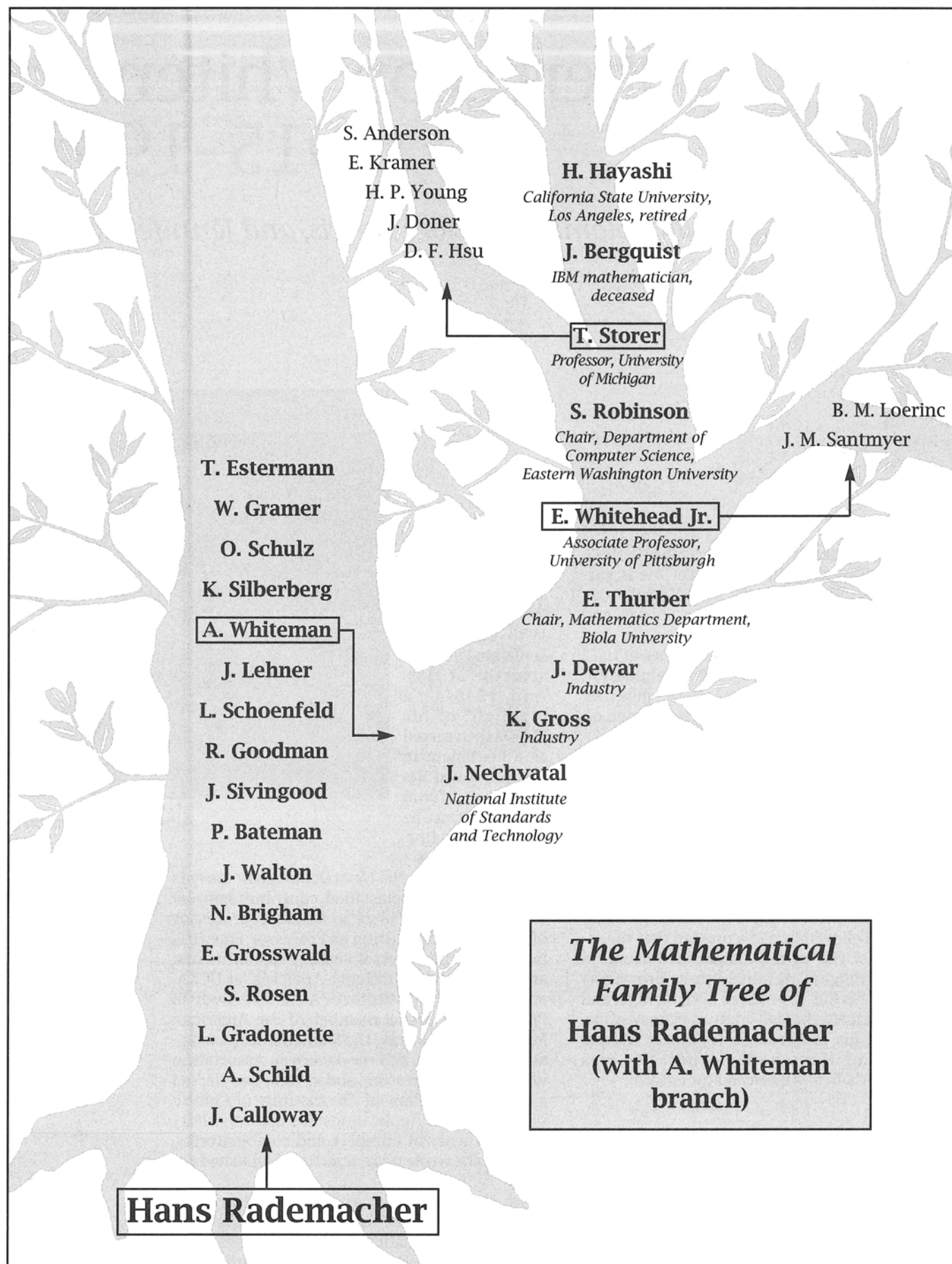
Solomon Golomb is university professor and Theodore Harris is professor emeritus and lecturer, both at the University of Southern California. Jennifer Seberry is professor of computer science, head of the Department of Computer Science, and director of the Centre for Computer Security Research at the University of Wollongong, Australia.

After holding an instructorship at the University of Pennsylvania, 1938–40, he was a Benjamin Peirce instructor at Harvard, 1940–42, a highlight of his life. He then served as a lieutenant in the U.S. Naval Reserve from 1942–46, where he taught navigation. After serving as a mathematician in the Navy Department (he was proud of his still-classified contributions), he came to USC in 1948 as an assistant professor of mathematics, retiring as Professor Emeritus in 1980. He had several visiting appointments: at the Institute for Defense Analyses, at UCLA, and three at the Institute for Advanced Study in Princeton. He was a member of the American Mathematical Society, the Mathematical Association of America, and the American Association of University Professors, and in 1990 was elected a Foundation Fellow of The Institute of Combinatorics and Its Applications. His main specialty was the theory of numbers and combinatorics, on which he wrote more than forty published papers.

He served as editor of the *Pacific Journal of Mathematics*, editor of *Theory of Numbers* (an American Mathematical Society Symposium volume), associate editor of the *Duke Mathemat-*



Albert Leon Whiteman



***The Mathematical
Family Tree of
Hans Rademacher
(with A. Whiteman
branch)***

cal Journal, and of the *Journal of Mathematical Analysis and its Applications*, and as a reviewer for many mathematical publications. He served as a consultant to Tom M. Apostol and Ivan Niven in the preparation of their article, "Number Theory", for the *Encyclopedia Britannica*. He gave numerous invited lectures, including a one-hour invited address at the American Mathematical Society meeting in Berkeley (1957), and organized or chaired a number of conferences, including two National Science Foundation research conferences in number theory held at the California Institute of Technology (1955 and 1963).

At USC he received research grants from the ONR and the NSF. He produced nine Ph.D. students. Of the eight who are living, five have tenured university positions, and three have positions in industry or government. His Ph.D. students have among them produced seven Ph.D. students, Al's "academic grandchildren". He received a commendation as a "superlative teacher" from Vice Provost John Cantelon of USC in 1971.

Al's early work heavily involved identities and sums, of great importance in number theory. After the war his work turned to the properties of elements of prime number fields. He was instrumental in solving the cyclotomy equations for orders 10, 12, 16, and 20 [5, 6, 4, 8]. While continuing his work on cyclotomy, he started to understand the power of finite fields when applied to combinatorics. His paper, "A Family of Difference Sets" [7], showed that if p and $q = p + 2$ are both prime powers, then a cyclic Hadamard difference set exists for pq elements. This powerful result, which is very widely quoted (it was also proved independently about the same time by D. A. Sprott), has yielded many combinatorial designs and structures and a new family of rate one-third codes found by V. Bhargava (current president-elect of IEEE). In the seventies he saw that Galois theory could be used to construct Hadamard matrices and started to correspond with Jennifer Seberry (Australia) and later with Christos Koukouvinos (Greece), communicating partial results and questions with lengthy handwritten calculations and examples. These collaborations were highly successful, yielding one of only three known families of conference matrices [9], the brilliant discovery of the second family of D -optimal designs [10], groundbreaking work in relative difference sets [11, 12], and a four-continent collaboration [13] with surprising new results on multipliers.

Al was always interested in mathematics and the history of mathematics. He showed Seberry a footnote in the papers of the Royal Society regarding the regular contributions of Miss Florence Nightingale to mathematics.

Rademacher himself paid Al the highest compliment, saying his work was, "not cheap...each paper was a serious contribution to the literature." He leaves behind an impressive array of achievements, and through his students (shown on page 218 of this article) is still contributing to the mathematics of the next generation. Sally Whiteman has established the Albert L. Whiteman Memorial Lecture, an annual lecture series honoring research in mathematics, at the University of Southern California Mathematics Department. Contributions to the lecture fund and suggestions for possible guest speakers will gladly be accepted. For more information, please contact the chair of the Mathematics Department, University of Southern California, Los Angeles, CA 90089-1113; telephone 213-740-1717; or e-mail: info@math.usc.edu.

Selected Bibliography

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