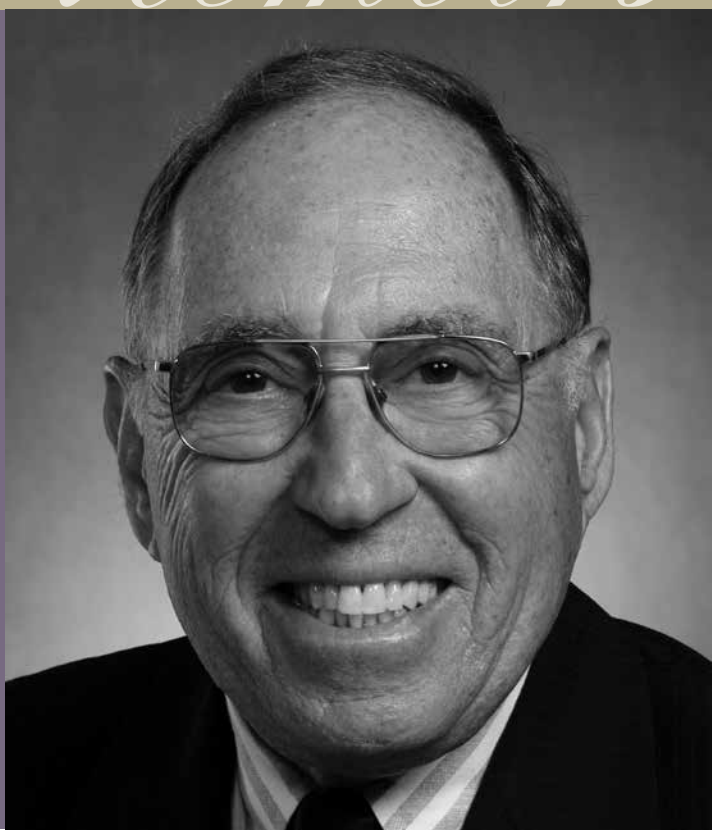
Jack Keil Wolf

1935–2011

BIOGRAPHICAL *Memoirs*



A Biographical Memoir by
Roberto Padovani,
Paul H. Siegel,
and Andrew J. Viterbi

NATIONAL ACADEMY OF SCIENCES

JACK KEIL **WOLF**

March 14, 1935–May 12, 2011

Elected to the NAS, 2010

Jack Keil Wolf

By Roberto Padovani, Paul H. Siegel, and Andrew J. Viterbi

Jack Keil Wolf[1] was a pioneer and technical leader in information theory, coding theory, and communication theory and their applications in modern information technology. He was born in Newark, New Jersey, on March 14, 1935. After "surviving" high school, as he would say with a smile, Jack received his B.S. in electrical engineering from the University of Pennsylvania in 1956. He completed his graduate studies at Princeton, where he received M.S.E, M.A, and Ph.D. degrees in 1957, 1958, and 1960, respectively. Jack's first job was as a lieutenant in the U.S. Air Force, working at the Rome Air Development Center in Rome, New York. At the same time, he was a part-time instructor at nearby Syracuse University, which offered graduate courses at Griffiss Air Base, where he was stationed.

After leaving the Air Force he began a long and illustrious academic career, first at New York University, where he was a member of the Electrical Engineering Department from 1963 to 1965. He then joined the Polytechnic Institute of Brooklyn in 1965 and taught there until 1973, when he became a member of the Electrical and Computer Engineering Department at the University of Massachusetts, Amherst, until 1984, serving as department chair from 1973 to 1975. In 1984 he moved to the Department of Electrical and Computer Engineering at the University of California, San Diego, taking an endowed chair at the newly established Center for Magnetic Recording Research. In 1993, at Jack's suggestion, the chair was renamed the Stephen O. Rice Chair in Magnetic Recording Research in honor and memory of Stephen Rice, another pioneer in communication theory and a colleague of Jack's at UC San Diego. Jack was also Vice President

1. This memoir originally appeared, in slightly different format, in *Memorial Tributes of the National Academy of Engineering* 17 (2013):330-336 and is reprinted with permission.

of Technology at Qualcomm Incorporated, which he had joined as a consultant in 1985, becoming a part-time employee in 1991. Over the course of his career he published more than a hundred journal papers and was granted patents on 23 inventions in communications and storage technology, many of which were embodied in commercial products. Jack received many awards recognizing his technical contributions in a broad range of areas, as encapsulated in a citation of the National Academy of Engineering: information theory, communication theory, magnetic recording, and engineering education. In 1975 he was co-recipient (with David Slepian) of the Information Theory Group Paper Award for the paper "Noiseless Coding for Correlated Information Sources." The main result of the paper, generally known as the "Slepian-Wolf" theorem, was the establishment of fundamental limits on efficient distributed source coding, a finding that is considered one of the pillars of information theory. It has inspired numerous advances in both the theory and practice of data compression, with new and unforeseen applications—such as in sensor network design—emerging even today. In 1990 Jack was honored with the IEEE Communications Society's E. H. Armstrong Award for "outstanding contributions over a period of years in the field of communications technology." He also shared (with Brian Marcus and Paul Siegel) the same organizaton's 1993 Leonard G. Abraham Prize Paper Award for "Finite-State Modulation Codes for Data Storage." In 2001 he was awarded the highest technical honor bestowed by the IEEE Information Theory Society, the Claude E. Shannon Award, and in 2007 his long record of leadership and service to this organization was acknowledged with the Aaron D. Wyner Distinguished Service Award.

Jack's sustained accomplishments in the two engineering disciplines of digital communications and magnetic recording were recognized with major IEEE-level awards, namely the 1998 Koji Kobayashi Computers and Communications Technical Field Award, for "fundamental contributions to multi-user communications and applications of coding theory to magnetic data storage devices," and the 2004 Richard W. Hamming Medal, for "fundamental contributions to the theory and practice of information transmission and storage." In 2005, he was elected as a Fellow by the American Academy of Arts and Sciences. Jack was elected to the National Academy of Engineering in 1993 and the National Academy of Sciences in 2010, earning him the rare distinction of being a member of both of these organizations. In 2011 he and Irwin M. Jacobs were named the winners of the Marconi Society Fellowship and Prize in recognition of "lasting scientific contributions to human progress in the field of information technology."

Jack dedicated time and energy to professional service on numerous committees of the IEEE, URSI, and NAE. He served on the Board of Governors of the IEEE Information Theory Society (then "Group") from 1970 to 1976 and again from 1980 to 1986 and became president of the group in 1974. He was also International Chairman of Committee C of URSI from 1980 to 1983. His committee work with the academies included participation in the Committee on Telecommunications Research and Development, the 2003 Nominating Committee, Electronics Engineering Section Liaison to the NRC, Section 07 Executive and Peer Committees, member of the Committee on Tactical Battle Management, Committee on the National Communications Systems Initiative, and U.S. National Committee for the International Union of Radio Science. Jack was not only an outstanding researcher but also a dedicated and wonderful educator. He was passionate about teaching, and he had a gift for expressing in simple and clear terms even the most difficult subjects. He brought to the classroom a wealth of practical experience gained through his many years of consulting and employment in the telecommunications and storage industries. Using his unique perspective, Jack inspired his students by successfully linking elegant theory with exciting technological applications. In 2000, Jack's excellence in teaching was recognized with the UCSD Distinguished Teaching Award.

Jack maintained a close relationship with his alma mater, the University of Pennsylvania. In fact, studying at Penn was somewhat of a family tradition: 17 other members of Jack's extended family—including his father, two uncles, numerous cousins, and daughter Sarah—received degrees from Penn, and a grandson and granddaughter are carrying the torch for the next generation. Jack and Sarah also made philanthropy at Penn a tradition: a number of endowed scholarships and student awards bear the Wolf family name, and two laboratories are named in honor of Jack. In 2006 he received the D. Robert Yarnall Award, presented annually to a distinguished member of the University of Pennsylvania Engineering School alumni for outstanding contributions to society in the field of engineering or technology.

Following a battle with amyloidosis, Jack died on May 12, 2011, in San Diego at the age of 76. He is deeply missed by his family, friends, and colleagues, including his many students, past and present, affectionately known as the "Wolf Pack." What he brought to the classroom and to research advising was much more than his gift and passion for teaching: he inspired generations of students to excel, to work hard and with integrity, and, most of all, to have fun in the process. Jack will long be remembered for the friendship and support he offered so freely, his smile and sense of humor, his vision and

wisdom, his words of encouragement, and his contagious optimism. He was a generous, thoughtful, and unpretentious man, an exceptional human being dedicated to bettering our world through progress in engineering.

A devoted husband, father, and grandfather, Jack is survived by his wife Toby, his children Joe, Jay, Jill, Sarah and her husband Charles, and his grandchildren, Rachel, David, Rebecca, Aaron, and Julia.

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