

The Genesis of Coding Theory

Daniel J. Costello, Jr.

Department of Electrical Engineering
University of Notre Dame

This talk gives an historical overview of the theory of channel coding dating back to the work of Shannon in 1948. The important advances in channel coding in each 10 year period since 1948 are viewed from a common perspective: the power and bandwidth efficiencies needed to achieve certain levels of error performance. The most important contributions of the last half century are highlighted, including Hamming codes, Reed-Solomon codes, convolutional codes, soft decision decoding, trellis coded modulation, concatenated codes, turbo codes, low-density parity-check codes, and iterative decoding. Finally, areas of potential future research in channel coding are briefly discussed.

Biography: Daniel J. Costello, Jr. was born in Seattle, WA, on August 9, 1942. He received the B.S.E.E. degree from Seattle University, Seattle, WA, in 1964, and the M.S. and Ph.D. degrees in electrical engineering from the University of Notre Dame, Notre Dame, IN, in 1966 and 1969, respectively. In 1969 he joined the faculty of the Illinois Institute of Technology, Chicago, IL, as an Assistant Professor of Electrical Engineering. He was promoted to Associate Professor in 1973, and to Full Professor in 1980. In 1985 he became Professor of Electrical Engineering at the University of Notre Dame, Notre Dame, IN, and from 1989 to 1998 served as Chair of the Department of Electrical Engineering. In 1991, he was selected as one of 100 Seattle University alumni to receive the Centennial Alumni Award in recognition of alumni who have displayed outstanding service to others, exceptional leadership, or uncommon achievement. In 1999, he received a Humboldt Research Prize from the Alexander von Humboldt Foundation in Germany. In 2000, he was named the Leonard Bettex Professor of Electrical Engineering at Notre Dame. Dr. Costello has been a member of IEEE since 1969 and was elected Fellow in 1985. Since 1983, he has been a member of the Information Theory Society Board of Governors, and in 1986 served as President of the BOG. He has also served as Associate Editor for Communication Theory for the IEEE Transactions on Communications, Associate Editor for Coding Techniques for the IEEE Transactions on Information Theory, and Co-Chair of the IEEE International Symposia on Information Theory in Kobe, Japan (1988), Ulm, Germany (1997), and Chicago, IL (2004). In

2000, he was selected by the IEEE Information Theory Society as a recipient of a Third-Millennium Medal. Dr. Costello's research interests are in the area of digital communications, with special emphasis on error control coding and coded modulation. He has numerous technical publications in his field, and in 1983 co-authored a textbook entitled "Error Control Coding: Fundamentals and Applications", the 2nd edition of which was published in 2004.