



Franklin S. Cooper

FRANKLIN S. COOPER

1908–1999

Elected in 1976

“For originality in speech instrumentation and its application to human communication, including aids for the handicapped.”

BY KENNETH N. STEVENS

FRANKLIN S. COOPER, pioneer and educator in the field of speech science, died on February 20, 1999, at the age of 90 in Palo Alto, California. He was one of the founders, and for most of his career president or research director, of Haskins Laboratories.

Born on April 29, 1908, in Robinson, Illinois, Frank grew up with his mother and grandparents on his grandfather's farm in central Illinois. He attended a rural elementary school and supplemented his education by reading the books in his grandfather's library, including an old physics textbook. In high school, he pursued his early interest in physics and also became interested in electrical engineering. Frank won the competitive examination in his county, which earned him a scholarship to the University of Illinois worth \$210 for four years. For financial reasons, however, he postponed his entry to the university and spent a year teaching in a one-room elementary school with just a few students. He found dealing with discipline problems and lukewarm interest from his students very frustrating.

Frank entered the University of Illinois in 1927 and completed a B.S. degree in engineering physics in 1931. He remained at the university until 1934 with a teaching fellowship and doing some graduate research in the Physics Department. From 1934 to 1936, he worked at Massachusetts Institute of Technology

(MIT) on a project setting up a newly designed vacuum spectrograph (with P.G. Kruger) and another project in medical radiology (with R. Evans). In 1935, he got a summer job at the General Electric (GE) Research Laboratories in Schenectady, New York. That summer he also spent some weekends back in Cambridge finishing the Evans project.

That same summer, he met Caryl Haskins and became interested in a project of Caryl's on the biological effects of fast electrons, as an alternative to x-ray radiation. This project became the basis for Frank's doctoral thesis at MIT. At about this time, Caryl Haskins and Frank formed Haskins Laboratories, a private, not-for-profit research group that would conduct research in biophysics. In the early days, Haskins Laboratories was located primarily at Union College in Schenectady, but it also had some involvement with Harvard and MIT. Frank's work at the laboratories was focused on radiation therapy.

In 1935, Frank married Frances Edith Clem, whom he had known as a girl some years earlier; their relationship had been rekindled when Edith came for a visit to Schenectady. Edith died in 1991.

After completing his doctorate in 1936, Frank was recruited as a full-time scientist/engineer at GE Research Laboratories, where he worked on high-voltage insulation, a project that involved testing various chemical compounds to develop an improved compressed-gas insulator. At the same time, he continued to pursue his interest in nuclear methods for radiation therapy at Haskins Laboratories and published several papers on this topic.

During World War II, from 1941 to 1946, Frank served as a liaison officer and senior liaison officer in the Office of Scientific Research and Development (OSRD). His interest in speech began near the end of World War II, when OSRD requested that Haskins Laboratories coordinate a program for the development of prosthetic devices, including a reading machine, for blinded veterans. This project sparked Frank's interest in the process of human speech communication—an interest that was to be the focus of his research for the rest of his life.

Early in his work on speech communication, Frank realized

that human speech was not just a concatenation of sounds, one for each phoneme. Experiments that he and his colleagues carried out in the 1950s and 1960s showed that the acoustic manifestation of a phoneme was dependent on the context in which the phoneme occurred. For example, the same sound could be interpreted as one consonant when followed by one vowel and another consonant when followed by a different vowel.

Frank's background as a physicist and engineer was evident in the device he developed for synthesizing speech-like sounds, called the pattern playback. He understood that research on speech was interdisciplinary, and he recruited scientists from a variety of fields to work at Haskins Laboratories. Under Frank's guidance, researchers used the pattern playback to study how human listeners extract cues from speech waves and organize them into linguistic units. Several classic papers emerged from Frank's collaboration with Pierre Delattre, a linguist at the University of Colorado, and Alvin Liberman, an experimental psychologist at the University of Connecticut.

These early experiments were the basis for a variety of speech-perception studies at research laboratories around the world. They also led to the development of rules for controlling a speech synthesizer from a phonetic transcription; thus, the original goal of a reading machine for the blind became a reality. Frank was a leader in the development of the reading machine, and his early work catalyzed similar research at several other laboratories.

This seminal research on speech perception was carried out by a small group of researchers at Haskins Laboratories, which was then located in midtown Manhattan. In the summer of 1970, the laboratories moved to New Haven, Connecticut, where a formal connection with Yale University was established. For Frank, this was an important linkage that led to closer interaction with students, particularly in linguistics and psychology, from both Yale and the University of Connecticut.

At about the time of the move to New Haven, Frank began to conduct research on speech production, which brought him closer to understanding the linguistic units that underlie speech sounds. Researchers under his direction used cineradiography, electromyography, and other techniques to examine the move-

ment of articulators, including the larynx. Haskins Laboratories attracted scientists from around the world to this research. For example, Frank arranged for a series of young Japanese otolaryngologists to work with staff and students on projects using electromyography and other techniques to understand how the muscles of the larynx and other articulators are coordinated during speech production. Over the years, Haskins Laboratories produced a cohort of researchers who have contributed to our understanding of the production, acoustics, and perception of speech.

Drawing on his background in physics and engineering, combined with his insights into linguistics, psychology, and physiology, Frank developed a unique research style. He was instrumental in bringing the interdisciplinary study of speech perception and production into the domain of quantitative science. As president and research director of Haskins Laboratories for many years, his gentle encouragement engendered enthusiasm for research and led to direct associations with many academic institutions in the Northeast.

In addition to his administrative and research activities, Frank served on a number of academic and scientific boards and committees, including the National Advisory Neurological and Communicative Disorders and Stroke Council, an advisory panel on the White House tapes, and for a number of years, the visiting committee of the Department of Linguistics of MIT. He was also an adjunct professor of phonetics at Columbia University.

He is survived by two sons, Alan of Palo Alto, California, and Craig of Nellysford, Virginia, four grandchildren, and five great grandchildren.

