Bernard S. Finn IEEE History Prize 2020

Recipient 2020

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For "Vocal Features: From Voice Identification to Speech Recognition by Machine," *Technology and Culture*, 60:2, Supplement (April 2019): S129–S160

This article examines machine methods for investigating the essential characteristics of human voices for purposes of individual identification for legal and commercial purposes and the subsequent transition of this research into machine speech recognition.

The authors begin with early efforts to transform acoustic recordings made by early sound-recording technologies of the late 19th and early 20th centuries into voiceprints that could be used to identify criminals in a fashion similar to that of fingerprints. This effort soon intersected with the work of electrical engineers developing technology to record speech as waveforms of electrical oscillations in order to diagnose errors in telephone transmission. Having set the stage for these parallel but intertwined efforts to improve telephone technology and to produce individual voiceprints for criminal forensics, the authors focus on the development of the sound spectrograph, a device developed at Bell Labs in the 1940s that is central to the history that follows. Designed to automatically convert speech waves into their frequency components, the sound spectrograph initially was conceived as a way to enable visual telephony or to serve as a visual speech translator for the deaf. It also emerged as a new tool for use by communications engineers and linguists seeking to identify speech universals. Not surprisingly, during World War II, the spectrograph was applied to research on voiceprint identification and decryption for intercepted radio messages.

The effort to produce individual voiceprint identification, which the authors describe as "a forensic fantasy," continued at Bell Labs after the war and reached its reached its zenith in the 1960s with the controversial efforts of a former Bell Labs researcher to commercialize voiceprint identification. This attempt to turn voiceprints into forensic evidence was challenged by a growing community of engineers and scientists studying the physical nature of speech and ultimately led to its rejection for this purpose.

Instead, spectrographic research increasingly focused on discerning patterns of speech that could be expressed statistically so as to enable it to be recognized by machines through computational pattern recognition. In their last section, the authors explore the vital role played by Bell Labs researchers in this research, which led to the development of speech recognition. For so ably drawing connections between electrical engineering practice, research on speech and criminal forensics, and the emergence of machine speech recognition, the authors are awarded the Bernard S. Finn IEEE History Prize.