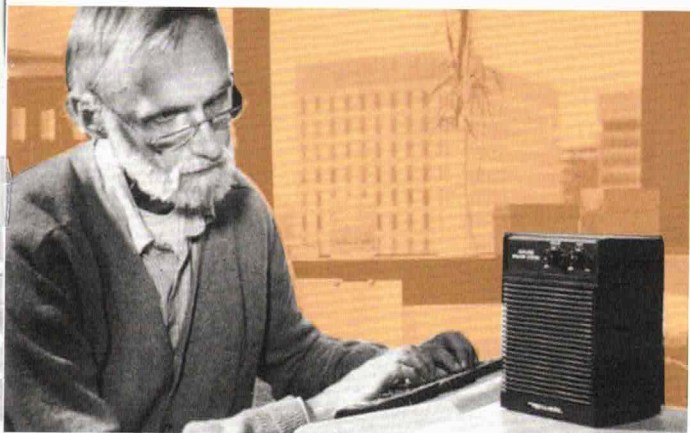




FOUNDATION FOCUS

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Inspiring Speech Science Innovation



Dennis H. Klatt, PhD

Sparkling innovation is at the heart of the ASH Foundation's mission to elevate the potential of individuals facing communication challenges and enable them to participate fully in life. Author Walter Isaacson, in speaking about innovation, explains that the innovators whom he has studied and interviewed share a common trait,

that of curiosity. He explains that curiosity is an essential ingredient of creative thinking, a distinguishing factor of genius.

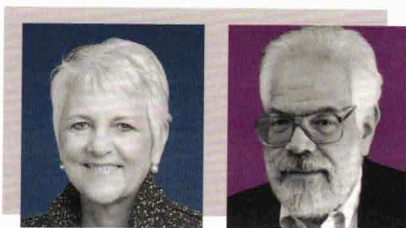
One such example of a pioneering innovator in communication sciences is Dennis Klatt, a speech and hearing scientist, whose memory and work is kept vibrant through the ASH Foundation. Klatt is perhaps most widely known as the pioneer of computerized speech synthesis and created an interface which allowed for speech for non-expert users for the first time. The renowned English theoretical physicist, cosmologist, and author Stephen Hawking used a version of this speech synthesizer, based on Klatt's own voice, and which Hawking chose to keep even after other voices became available.

In 1989, the ASH Foundation, with support from the Acoustical Society of America, established the Dennis H. Klatt Memorial Fund to recognize the transformative impact of Klatt's work and to support investigators studying human speech perception and speech synthesis.

Former ASH Foundation trustee Karen Iler Kirk recently sat down with David B. Pisoni, a colleague and friend of Dennis H. Klatt.

KIRK: What was your connection to Dr. Klatt?

PISONI: Dennis and I were friends and colleagues beginning when I was a graduate student at the University of Michigan, in the late 1960's. At that time, I was interested in synthesizing vowels for some experiments I was doing on auditory memory in speech perception. There were only a few places in the world possible to do this work. Because the Massachusetts Institute of Technology (MIT) had a hardware synthesizer I went there to generate synthetic vowels for my research and met Dennis, who helped me use the MIT synthesizer.



Karen Iler Kirk, PhD David B. Pisoni, PhD

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A Message From The President

TOMMIE L. ROBINSON, JR. PHD

It is an extraordinary distinction to become the American Speech-Language-Hearing Foundation's President after a year of 75th anniversary celebrations and achievements. In its historic anniversary year, our beloved ASH Foundation awarded its largest disbursement of scholarship and research funding in history—nearly \$1 million—to support 77 passionate and promising innovators.



"It's the magic within each of us that gives us the potential to inspire the world."

KOBE BRYANT

We surpassed epic fundraising goals through the Annual Giving Campaign, our second Virtual 5K Walk/Run, 75 Days of Giving Back campaign, and special anniversary corporate support—raising hundreds of thousands of dollars to spark bold breakthroughs and new discoveries to improve the lives of people living with communication disorders. Nearly 8,000 generous people and organizations were involved with this life-changing work, and together, we set the ASH Foundation on its path for a future bound to elevate and surpass its past.

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Inspiring Speech Science Innovation

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After completing my PhD, I moved to Indiana University (IU) as an assistant professor, but returned to MIT for a postdoc to learn about speech acoustics, perception, and synthesis with Dennis Klatt and Ken Stevens. At the time, Dennis was developing a speech synthesis system that would generate highly intelligible speech from a set of rules embodied in a computer program and he asked me if I could collect some speech intelligibility data on his synthesis system.



KIRK: Like many, I was moved by a 2019 BBC interview with Dr. Joe Perkell (one of Dr. Klatt's colleagues) who reflected on the role of Klatt's pioneering research that ultimately gave Stephen Hawking his computerized voice (<https://www.bbc.co.uk/sounds/play/w3csywyd>). How familiar were you with Dennis' early work in computer-generated speech synthesis?



PISONI: I am very familiar with the basic research carried out by Dennis in the 1970s on speech synthesis by rule. Dennis was a member of a multidisciplinary team headed by Jon Allen that was researching aids for people with disabilities. Dennis' work on synthesis was a central part of the MITalk text-to-speech system.

Stephen Hawking's wheelchair used a system called DECTalk that had four different voices that Dennis developed. There was Perfect Paul, modeled after Dennis' own voice, Beautiful Betty, Kit the Kid, and Huge Harry. This system produced highly intelligible speech and was also able to sing.

Most people don't realize that the coding algorithms used in today's cell phones are heavily dependent on the pioneering work done at MIT in acoustic theory. Sadly, Dennis did not live to see how the availability of speech technology—speech input/output (i/o) devices—has changed our lives dramatically.

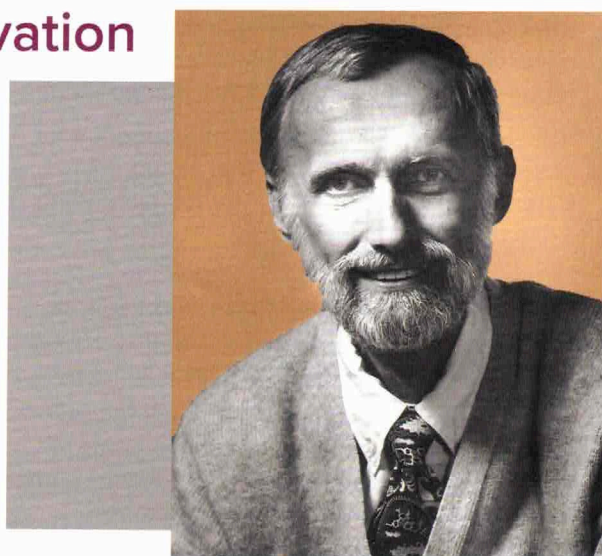


KIRK: I feel proud that Dr. Klatt was committed to nurturing so many scientists and that we were able to establish a fund in his memory. What inspiration do you draw from Dennis? How do you think his work fits into the larger frame of moving our researchers toward innovation?



PISONI: Dennis was committed to evidence-based science. He encouraged me to carry out perceptual tests with large numbers of undergraduates at IU to evaluate the intelligibility of the synthesized speech and then he used the error data and perceptual confusions to fine-tune the rules in his system.

As a basic scientist working on the leading edge of speech science and technology, Dennis loved his work. He told me once, "You know, I actually get paid to do this stuff. I'm having so much fun."



Dennis H. Klatt, PhD

Dennis was first an electrical engineer and computer scientist. He liked to build and fix things. His work provided many of the foundational elements of how speech works. His synthesis by rule system helped formalize his knowledge of acoustic phonetics and provided the foundation for the current generation of speech synthesis systems widely used today.



KIRK: As an innovator yourself, how do you view Dennis' achievements in the context of our discipline in 2022? What are the major accomplishments that build upon his research and what do you see moving forward?



PISONI: Dennis' accomplishments in the field of speech and hearing science, along with those of other pioneers like Ken Stevens, Gunnar Fant, Frank Cooper, and Al Liberman, were truly monumental and have various implications in today's complex world where speech is used seamlessly to interact with computers. Today, the field is wide open with many opportunities for rewarding careers.

But it's also important to appreciate that Dennis was a unique scientist who worked at the intersection of many fields, not just engineering or acoustics, but also computer science, linguistics, cognitive psychology and neuroscience. He would probably be considered a cognitive scientist today, a discipline that didn't exist in his time.

His most significant accomplishment, and the one for which he is most well-known, was the development of the "Klatt Synthesizer"—software available free and worldwide that could run on a desktop computer, today on a PC or Mac. Dennis also wrote many highly influential papers expanding the scope of basic and applied research on speech recognition and synthesis.

Many longstanding problems in hearing and speech disorders can now be addressed, thanks to Dennis' pioneering work.

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KIRK: Can you offer a final note of guidance to our new scientists who are thinking about submitting a request for funding from the ASHFoundation?



PISONI: The ASHFoundation offers money for novel and pioneering work that would not otherwise be supported by traditional funding agencies like the National Institutes of Health or the National Science Foundation.

The Klatt Fund is specifically targeted toward speech science, a vital attribute of the Fund, which also supports work at the intersection of several different sub-fields.

The ASHFoundation has an impressive track record of identifying significant, novel, and innovative areas of research. For those interested in communication sciences and disorders, the ASHFoundation is an excellent investment in the future.



KIRK: The ASHFoundation is receiving an increasing number of interdisciplinary/multidisciplinary proposals and not just from speech and hearing researchers, but also cognitive scientists and linguists and engineers who want to pursue meaningful work to help people.



PISONI: Yes, the field of speech technology has taken off. People now see it as a career path open even beyond academia, to industry. Today, all technology companies have some kind of voice i/o component thanks to the early work of scientists like Dennis Klatt.

Dennis could have had any job in any technology company anywhere in the world but chose to stay at MIT for his entire career. He wanted to solve problems at his own pace. He wanted to stick to basic speech and hearing science and work on long-term projects like synthesizing speech automatically by rule. He did what he loved. Today we're his inheritors and beneficiaries of his dedication to helping people with communication disorders use technology to improve their communication and live fuller lives.



Karen Iler Kirk, PhD, Shahid and Ann Carlson Khan Professor Emerita, Dept. of Speech & Hearing Science, University of Illinois Urbana-Champaign

David B. Pisoni, PhD, Distinguished Professor, Psychological & Brain Sciences; Chancellor's Professor, Cognitive Science, Indiana University; Adjunct Professor, Otolaryngology—Head and Neck Surgery, Indiana University School of Medicine

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Seeking Curious and Creative Speech Scientists



By funding innovators, the ASHFoundation plays a unique role in accelerating new knowledge and discovering novel treatments and tools. We invite new investigators to consider our biennial competition for a \$10,000 grant underwritten by an ASHFoundation endowment fund in memory of Dennis Klatt, noted researcher and scientist in speech communication. Until his death in 1988, Dr. Klatt conducted research at the Massachusetts Institute of Technology on the acoustic properties of speech production and perception.

The Speech Science Research Grant is designed to further research breakthroughs in speech science. Priority is given to areas reflecting Dr. Klatt's broad interests, such as speech perception, synthesis, and acoustics, with an emphasis on an interdisciplinary research approach. Proposed studies can be used to initiate new research or supplement an existing research study. Funds may be requested for a variety of purposes—for example, equipment, subjects, research assistants, or research-related travel. Learn more or apply: on.asha.org/ashf-speech-science.

ASHFoundation Vision

The ASHFoundation supports innovators and sparks innovation in the communication sciences. We give early support to promising students, researchers, and clinicians exploring bold ideas to transform the field and improve people's lives.

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