ALS and Speech synthesis, voice banking and message banking: HISTORY, CURRENT AND FUTURE TRENDS

Platform (45 minutes)

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Sessions

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Speech output has been a critical component of independent augmentative communication technology since the 1970s. The development of computer generated speech or synthetic text to speech, approximating the clarity and richness of the authentic human voice has been a goal of developers since the early 20th century. The production of the VODER (Voice Operated Demonstrator) in 1939 by Homer Dudley (Bell Telephone Laboratories, Murray Hill, New Jersey), was the first device that could generate continuous human speech electronically (Dudley H., 1939) (Dudley H. R., 1939). Even before that, as far back as the second half of the 18th century, efforts were made to

mechanically create human speech sounds (Kempelen, 1791). Yet it was the development of computer technology in the 1970s, with larger scale electronic storage becoming more robust and less expensive, that realized the introduction of a considerable amount of commercial text to speech and speech synthesis products. (Klaat, 1987).

The most important qualities of a speech synthesis system are naturalness and intelligibility (Taylor, 2009). While the early electronic speech synthesis was robotic and frequently barely intelligible, contemporary speech synthesis much more closely approximates the sound and clarity of natural speech. Despite this, speech synthesis continues to remain distinguishable from authentic human speech.

As intelligibility and naturalness of speech synthesis has continuously improved, focus has shifted to the personalization of voice and the impact on the communication and comprehension of intent with one's personal voice (Higginbothom J., 2010). In his work focused on capturing and preserving banked messages of people at risk of losing the ability to speak, Costello has suggested that one's voice is an acoustical fingerprint (Costello, 2013). When message banking was first introduced in the early 1990's in the pediatric intensive care unit, Costello reported that hearing authentic voice was powerful for not only the speaker but for family, loved ones and care providers (Costello, 2000). He asks, "How many times have you heard someone say, 'It is so good to hear your voice!'? Through authentic voice, we are able to provide comfort, establish personal connection and bring the spectrum of emotions to people around us through our voice and our unique intonation, prosody and passion. Portnuff asserted "I want to be able to be sensitive or arrogant, assertive or humble, angry or happy, sarcastic or sincere, matter of fact or suggestive and sexy" (Portnuff, 2006).

Through the ALS AAC Program at Boston Children's, message banking has been introduced to hundreds of people with ALS, terminology has been coined (Boston Children's Hospital Augmentative Communication Website, 2006) and a free and technology agnostic message banking web-based tool has been developed to manage the labor of message banking. Leading manufacturers of AAC software have modified their software to auto integrate the messages downloaded from the message bank website while voice bank options such as Acapela can now use those authentic messages to create a custom voice synthesizer.

This session will, review history of speech synthesis. It will detail the history, current trends and new directions in voice banking and message banking highlighting the newest options for one to 'double dip' by banking authentic messages with personal prosody, intonation and emotion while potentially using the same corpus to create a custom voice with voice banking. Examples of custom voice banked synthesizers created by the authors will be demonstrated and compared to message banked messages. Finally, the free to all web-based

process will be demonstrated and videos of many people functionally using their personalized voices will be reviewed.

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