Using Markov models to assess articulation errors in young children

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Digital recordings of children producing the names ``Rhonda'' and ``Wanda,'' and/or ``Toto'' and ``Coco'' were made using the microphone input to a Toshiba laptop computer (16-bit samples, 22<th>050-kHz sampling rate) with an AKG C410/B head-mounted condenser microphone. These names were associated with animated characters in a mock video game running on the laptop under the control of a Speech Language Pathologist. The children, ranging in age from four to six years, were undergoing speech therapy at the Alfred I. duPont Hospital for Children for one or both of two common articulation errors: /w/ substituted for /r/; and/or /t/ substituted for /k/. The initial segment in each recorded utterance was classified by laboratory staff as either r/w or t/k, and assigned a goodness rating. Discrete Hidden Markov phoneme Models (DHMMs) trained using data recorded from normally articulating children were then used to classify the same utterances and results of the automatic classification were compared to the human classification. Results indicate that appropriately trained DHMMs can provide accurate classification of utterances from children in speech therapy. This technology could support articulation drill on home computer systems as an adjunct to speech therapy.

[Work supported by Nemours Research Programs]

The Journal of the Acoustical Society of America -- May 2000 -- Volume 107, Issue 5, p. 2903