Effects of Rate and Pulse Manipulations of the Spectral Maxima Speech Processor Upon Speech Production. Emily A. Tobey, Department of Communication Disorders, LSU Medical Center, New Orleans, LA, Peter Blamey, Hugh McDermott, and Colette McKay, Australian Bionic Ear and Hearing Research Institute, East Melbourne, Australia.

Postlingually deafened adults experience many changes in their speech as a consequence of late-onset deafness. Previous studies have indicated changes in fundamental frequency, duration, intensity, and vowel formant frequencies in postlingually deafened adults. Postlingually deafened adults who receive multichannel cochlear implants demonstrate improved control of fundamental frequency and intensity. Shifts in formant frequencies to values similar to normal hearing speakers also appears in some adult implant users. In order to examine how adult implant users adjust their vowel production in response to map changes, we examined vowel production following manipulations to the processing strategy of the Spectral Maxima Speech Processor. This processor uses a speech processing scheme in which six spectral maxima from the outputss of 16 bandpass filters stimulate the cochlea on a place basis at a constant rate. The rate of sampling of the filterbank output is 250 Hz, so six biphasic pulses are presented every 4 msec and there is no attempt to extract fundamental frequency or to find the formant peaks in the speech signal. Two manipulations to the scheme were examined. In the first condition, the rate of sampling remained at 250Hz but eight biphasic pulses were presented rather than six. In the second condition, six biphasic pulses were presented but the rate of sampling of the filterbank output was increased to 400 Hz. Speech samples also were acquired using the standard spectral maxima processor and with no auditory feedback when the processor was turned off. Speech samples from three subjects were acquired immediately after receiving the manipulated speech processors and after two weeks experience with the various processors. Preliminary data indicate one subject experienced increased fundamental frequencies while using the 400 Hz high rate strategy. No significant changes were observed in fundamental frequency between the normal SMSP processor and the eight pulse variation. Elimination of feedback resulted in significantly lower fundamental frequencies. The high rate and eight pulse variations resulted in significantly higher first formant frequencies. Second formant frequencies also appear to be influenced by the processing strategies. Comparisons of values produced immediately after receiving a new strategy versus those produced after two weeks use show shifts in primarily first formant values. Data will be presented for all three subjects and discussed in regard to sensitivity to variations in speech processing schemes and the influence of experience with manipulated schemes. (Work supported by the NIH-NIDCD).

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