that speech can be understood through the skin. This level of performance has not been realized with current tactile aids. The ability of Tadoma users to understand conversational speech from feeling the articulatory movements of the talker suggests that speech understanding might be possible if devices delivered a richer speech signal to the user. This and other issues related to device development will be discussed.

10:10

6SP6. Issues in evaluating wearable multichannel tactile aids. Janet M. Weisenberger (Dept. of Speech and Hearing Sci., Ohio State Univ., Columbus, OH 43210)

The viability of the tactile system to convey information about speech sounds to hearing-impaired persons has been substantiated in a number of laboratory studies. In particular, the addition of multichannel tactile devices to lipreading can provide considerable additional information in speech perception tasks, as compared to lipreading alone. Further, studies of Tadoma have demonstrated the ability of the tactile system to transmit speech information even in the absence of visual input. The recent introduction of a number of wearable multichannel tactile devices has made it possible to extend the findings from laboratory studies into everyday clinical and educational settings. A number of factors must be considered in attempting to obtain results from these wearable devices in nonlaboratory settings that will equal or even surpass findings from laboratory studies. These include the level of background noise in the environment, the number of channels and speech processing strategy of the device, the nature and consistency of the training procedure employed, and the correlations between the physical stimulus and perceptual confusions. In addition, subject factors that permit one to define what makes a successful user of a tactile aid must be delineated. Each of these considerations will be discussed in light of recent data. [Work supported by NIH.]

10:35–10:50

Break

Poster Papers

All papers will be on display and all authors will be at their posters from 10:50 a.m. to 12:00 noon.

6SP7. An analysis of errors in lipreading sentences. Marilyn E. Demorest (Dept. of Psychol., Univ. of Maryland Baltimore County, Catonsville, MD 21228-5398), Lynne E. Bernstein (Ctr. for Auditory and Speech Sci., Gallaudet Univ., Washington, DC 20002), Silvio P. Eberhardt (Jet Propulsion Lab., Pasadena, CA 91109), and Gale P. De Haven (Dept. of Psychol., Univ. of Maryland Baltimore County, Catonsville, MD 21228-5398)

The long-range goal of this research is to understand the visual phonetic and cognitive/linguistic processes underlying the lipreading of sentences. Bernstein *et al.* [J. Acoust. Soc. Am. Suppl. 1 **85**, S59 (1989)] described development of a sequence comparison system that produces a putative alignment of stimulus and response phonemes for lipread sentences. Such alignments permit sentences to be scored at the phonemic level and also permit examination of the types of errors that occur. In this study the sequence comparator was applied to a database containing responses of 139 normal-hearing subjects who viewed the 100 CID everyday sentences [Davis and Silverman, 1970], spoken by a male or a female talker. Analysis of the alignments was made possible by the development of a powerful parsing program that tabulates the frequency of user-specified stimulus or response patterns and generates confusion matrices for selected portions of these patterns. To examine the impact of sentence environment, vowel and consonant confusion matrices derived from the sentences were compared to those obtained from nonsense syllables. To probe for context effects, performance on individual sentences was examined as a function of sentence, word, and syllable characteristics. [Work supported by NIH.]

6SP8. Lipreading sentences with vibrotactile vocoders: Performance of normal-hearing and profoundly deaf subjects. Lynne E. Bernstein (Ctr. for Auditory and Speech Sci., Gallaudet Univ., Washington, DC 20002), Marilyn E. Demorest (Dept. of Psychol., Univ. of Maryland Baltimore County, Catonsville, MD 21228-5398), David C. Coulter (Coulter Associates, Vienna, VA 22180), and Michael P. O'Connell (Central Inst. for the Deaf, St. Louis, MO 63110)

Three vibrotactile vocoders were compared in a training study involving aided and unaided lipreading: (1) the Queen's University/Central Institute for the Deaf vocoder, with one-third octave filter spacing and logarithmic output compression (CIDLog) [Engebretson and O'Connell, IEEE Trans. Biomed. Eng. **BME-33**, 712–716 (1986)]; (2) the same vocoder with linear output equalization (CIDLin); and (3) the Gallaudet University vocoder designed with greater resolution in the second formant region, relative to the CID vocoders, and linear equalization (GULin). Nine normal-hearing and four profoundly hearing-impaired adults participated in the training study. Four of the normal-hearing subjects were assigned to either of two control groups, a group that received no vocoder, and a group that received the previously studied CIDLog vocoder [Brooks and Frost, J. Acoust. Soc. Am. **74**, 34–39 (1983); Weisenberger *et al.*, J. Acoust. Soc. Am. **86**, 1764–1775 (1989)]. The remaining subjects were assigned to the linear vocoders. GULin was the only vocoder significantly effective in aiding open-set sentence identification, and benefit extended to each subject who received that vocoder. [Research supported by NIH.]