BIMODAL LISTENERS ARE SENSITIVE TO INTERAURAL TIME DIFFERENCES IN MULTICHANNEL STIMULI

Tom Francart, Anneke Lenssen and Jan Wouters

ExpORL, Dept. Neurosciences, K.U.Leuven, Leuven, Belgium

Sensitivity to interaural time differences (ITDs) is important for localization of sound sources and is related to binaural unmasking of speech in noise. We measured sensitivity to ITD of users of a cochlear implant (CI) and a contralateral hearing aid (HA) to speech-like, ecologically relevant stimuli.

Recently, it was shown that users of a cochlear implant (CI) and a contralateral hearing aid (HA) are sensitive to ITDs in simple stimuli that consist of a low-rate pulse train (100pps), presented on a single electrode, together with an acoustically presented filtered click train with F0=100Hz [1]. We investigated ITD sensitivity of bimodal listeners to different stimulus types that are more ecologically relevant.

One stimulus consisted in one ear of an acoustic sinusoid of various frequencies that was modulated with a half wave rectified low-frequency sinusoid, and in the other ear of a high-rate electric pulse train (900pps) that was modulated with the same half wave rectified low-frequency sinusoid. JNDs in ITD were comparable to those measured with the 100pps pulse train.

Another stimulus consisted in one ear of an acoustically presented filtered click train and in the other ear of the same filtered click train processed by a CIS-like algorithm into a multichannel electric signal. Care was taken to maintain the correct temporal relationships between the signals presented to different electrodes. The original filtered click train and the electric signal were presented simultaneously. JNDs in ITD were again comparable to those measured with the 100pps pulse train.

Results of several bimodal listeners using the Nucleus CI will be presented and the influence of various stimulus parameters on ITD perception performance will be discussed.

Support provided by IWT-Vlaanderen and Cochlear, project 080304 and the EU-ITN project AUDIS.

[1] Francart T, Brokx J, Wouters J., Sensitivity to interaural time differences with combined cochlear implant and acoustic stimulation. J Assoc Res Otolaryngol. 2009 Mar;10(1):131-41