E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

Freitag, 23. Oktober 2009, 14 Uhr c.t.

im Raum W2 1-143, Universität Oldenburg

und im Raum G26.1 – 010, Rechenzentrum
der Universität Magdeburg (per Videoübertragung)

“Envelope vs. temporal fine structure in reverberant environments”

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Cochlear implants (CIs) often restore speech understanding in quiet, but most patients complain that with reverberation or noise present speech understanding is more difficult or even impossible. The precedence effect is thought to help in those situations as it shows the perceptual suppression of sound reflections while localization is maintained at the leading, the direct sound. For longer duration sounds this is has been shown to be based on the evaluation of information in the temporal fine structure which is not accurately transmitted by CIs. Because of the strong information transmission limits at the neural interface in CIs, knowledge of the essential information to function in complex environments is crucial for a targeted development of future CI-strategies.

We have developed the Simulated Open Field Environment, a loudspeaker setup to reproduce the reverberant sound field of multiple sources in the free-field of an anechoic chamber, to investigate hearing mechanisms in difficult listening situations with normal-hearing participants and patients alike.

In our study of the precedence effect about half of the tested bilateral CI-patients showed no precedence effect; instead a single sound source was localised in-between the leading and the lagging source. This suggests that those patients can not distinguish the binaural information in lead and lag, resulting in an average. However, selected patients showed the precedence effect even for temporally overlapping stimuli while instead the simulation of the paradigm with normal hearing listeners using a noise-band vocoder resulted in a breakdown such that the reflection was always audible.

Subsequent studies were aimed at finding the information needed to evoke the precedence effect with diminished acoustic information as in CIs. Results show that it is possible to evoke the precedence effect with speech sounds without encoding ITDs in the carrier. The precedence effect can solely be based on interaural level and time differences conveyed in the envelope. However, carrier frequencies need to be similar in both ears, suggesting that accurate place matching of CI-electrodes would help the analysis of concurrent sounds. Further results suggest that envelope fluctuations are even essential.