# E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

## Freitag, 30. Mai 2008, 14 Uhr c.t.

Raum G26.1 – 010, Rechenzentrum der Universität Magdeburg und
Raum W2 1-143, Universität Oldenburg
(per Videokonferenz)

# *fMRI noise and pitch discrimination*

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Loud acoustic noise accompanies fMRI studies and may compromise the imaging results in the auditory domain. The presence of noise hampers the comparison of the ERP results inside and outside the MR scanner. Since the noise is an inherent by-product of the MRI method, control noise-free condition can only be investigated with other brain research techniques. In a series of studies we used EEG and MEG outside the scanner to appreciate the effects of pre-recorded fMRI noise on brain activity during passive and active pitch discrimination. In the first study the noise has been shown to prolong the latency of the ERP components reflecting sound onset, while the ERP components related to automatic pitch-change detection were not affected. In this study we used the sounds with fundamental frequency in the lower part of the spectrum. In the second study the subjects discriminated actively the tones, which were presented in the silent interval between the noise bursts as if in the sparse imaging technique. The sound-onset ERPs were suppressed, but the ERP difference between working-memory types was preserved. There were no difference in ERP in the behavioral responses between noise and no-noise condition in this study. In the third study MEG was used to estimate the effect of noise on passive pitch discrimination, while the effect of noise on active pitch discrimination was evaluated with behavioral responses. The spectral range of the target sounds was spreading across and below the major spectral peaks of the fMRI noise. Pitch change-related MEG responses during passive discrimination and the accuracy of the active discrimination were diminished in the fMRI-noise background for the sounds with the spectral contents higher 500 Hz. There were no effects of noise on discrimination of low-pitch sounds – the ones within spectral range that did not overlap with the major spectral peaks of the noise. The results of the three studies suggest that the main effect of noise is acoustic masking since the noise affects sound feature detection more than cognitive processes. It is recommended to use the sounds of low frequency or to employ sparse-sampling paradigms in the auditory fMRI studies.