Sonderforschungsbereich/Transregio 31
“Das aktive Gehör”

E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

Freitag, 16. Januar 2015, 14 Uhr c.t.

im Raum H28 / R 2.31 des Med. Campus Magdeburg
und Raum W2 1-143 der Universität Oldenburg
(per Videoübertragung)

"Computational modelling of temporal integration in auditory cortex”

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Incoming sounds are represented in the context of preceding events, and this requires a memory mechanism which integrates information over time. In this presentation, I demonstrate the possibility that adaptation, the suppression of neural responses due to stimulus repetition, might in fact reflect a computational solution that auditory cortex uses for temporal integration. Adaptation is observed in single-unit measurements as two-tone forward masking effects and as stimulus-specific adaptation (SSA). In non-invasive EEG and MEG observations, the amplitude of the auditory N1(m) response adapts strongly with stimulus repetition, and is followed by response recovery (the so-called mismatch response, MMN) to rare deviant events. I present a raft of computational simulations describing the serial core-belt-parabelt structure of auditory cortex and replicating response adaptation through the short-term, activity-dependent depression of excitatory corticocortical connections. The simulations showed that the presence of synaptic depression allowed for the emergence of temporal integration, which was expressed as the combination sensitivity of responses to tone pairs, complex tone sequences, and speech stimulation. Further, the complexity of the stimulus was reflected in the proportion of combination-sensitive columns across the different regions of the model. The results suggest that while synaptic depression produces facilitation and suppression effects, including SSA and the modulation of the N1/MMN response, its functional significance may actually be in its contribution to temporal integration. This integration also seems to benefit from the serial structure of auditory cortex.