

Sonja A. Kotz (Dept. of Neuropsychology and Psychopharmacology, Maastricht University & Dept. of Neuropsychology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig)

Title: Timing and Prediction in Audition: From Sound to Speech

Abstract: To detect and adapt to dynamic changes in the environment we need to trace the temporal structure of auditory (next to other) events. While sound duration is considered as an inherent property of sounds, regularity and order of perceived acoustic events define contextually extracted, statistically sampled temporal relations among sounds. These relations constitute the backbone of prediction in audition, determining both “when” an event is likely to occur (regularity), and “what” type of event can be expected at a given point in time (order). In line with these assumptions, I will present a novel cortico-subcortical neurofunctional model of temporal processing in audition that involves the division of labor between the cerebellum and the basal ganglia in the predictive tracing of acoustic events. Specifically, the cerebellum and its associated thalamo-cortical network appear to play a role in pre-attentive encoding of event-based temporal structure, while the attention-dependent basal ganglia-thalamo-frontal system is involved in reanalysis and re-sequencing of potentially incongruent or unexpected temporal structure of a stimulus. I will discuss electrophysiological, fMRI data and patient data consistent with our model and will give an outlook on higher cognitive functions such as speech and music.