Abstract:

In daily life our brain receives multiple Information of different sensory modalities because events and objects in the real world are generally comprised multiple sensory attributes. Humans and all higher vertebrates evolved a unique nervous system to process information from different sensory modalities, and even sub-modalities, independently. Our brain is undeviating combined this sensory information to create a unified percept of our environment. However, combining information across modalities can also affect sensory performance. This combining or interaction among the senses and the fusion of their information is described as “multisensory integration”. The goal of this thesis is to investigate audio – visual interaction and especially how auditory stimuli modulate behavioral performance to visual stimulus detection of higher or lower saliency. Behaviorally, we found significantly higher detection performance for low salient stimuli paired with sound, reflected by hit rate and d-prime, but no changes for high salient stimuli paired with sound. To determine the neural correlate of this effect event related fMRI was used. In addition to cortical multimodal convergence zones associated visual and auditory areas were also modulated in congruence with the behavioral effect. Furthermore, thalamic structures of visual and auditory pathways showed a similar interaction, as well. To identify the temporal dynamics of the sound – induced salience enhancement for low intensity stimuli event related potential (ERP) was used. The ERPs grand-average signatures indicate that this multisensory integration is associated with early neural activations over central and parieto-occipital electrodes. Together these results implicate a thalamo-cortical functional network in enhanced perceptual sensitivity due to multisensory interplay.