SUMMARY

In the past, mechanisms of sensory and perceptual processes have been studied intensively by both psychologists and neuroscientists. However, recent research investigated mostly just single senses (i.e. vision or audition or touch, whereas real-world events often stimulate more than one single modality concurrently. Moreover, parts of information arising from one and the same object need to be joint together across distinct sensory modalities, as when we both feel and see an object in our hand or both see and hear someone speak. The way how information is bound across modalities determines perceptual judgments. For example, temporal perception of external bimodal events does not coercively correspond to their actual physical relations. Rather, perception of subjective simultaneity is determined by implicit knowledge, stimulus properties and dynamics of the perceptual apparatus. Previous studies demonstrated the existence of a temporal window that can flexibly be widened or tightened. Bimodal events will be temporally bound as long as they both fall within this temporal window. This thesis investigates the neural basis of audiovisual perception of temporal relations. Therefore, by means of three fMRI-studies neural modulations of perceived temporal relations were identified when participants judged both semantic and non-semantic stimuli. In doing so, influences of unisensory and bimodal cortices were investigated. Furthermore, neural correlates of temporal plasticity during audiovisual perception were studied with the aid of an adaptation paradigm. This allowed for separating perceptual and stimulus-driven effects of audiovisual temporal perception. Finally, temporal percepts of audiovisual speech were captured by ecologically valid stimuli and the according functional basis was located within bimodal areas. Results revealed distinct activation patterns for perceptual synchrony compared to asynchrony. Moreover, it was shown that different cortical networks are involved in the establishing of subjective synchrony vs. asynchrony by means of dynamic adaptation. In the end, it was demonstrated that bimodal areas can be separated functionally by different time percepts. To conclude, these results indicate that audiovisual temporal information of stable synchrony percepts and stable asynchrony percepts seem to be related to enhanced activity in distinct multisensory cortices. Beyond, the relevant activation patterns were found to be chronotopically arranged.