# “Gießener Abendgespräche Kognition und Gehirn“

Mittwochs, 18.00 bis 20.00 Uhr, Raum F009

**11.12.2013**

## *“Multisensory integration in selfmotion perception: fMRI and behavioral results”*

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Vision appears to be stable despite almost constant movements of the eyes and head. Moreover, we can effortlessly discriminate between self motion and motion in the environment, although these visual (retinal) cues are often ambiguous. Using fMRI we (Frank et al., under review) explored brain activations underlying the integration of visual and vestibular information in self-motion perception. Participants viewed limited-lifetime randomly moving dots in the dark (with 10% left or right coherent direction). Using a custom-built MRI-compatible, micro-pump system, hot (48°), cold (5°) or warm (32°) water flowed through left and right ear pods leading to differential caloric vestibular stimulation simultaneously with the visual stimulation. The BOLD response (3-Tesla Siemens Allegra) was contrasted between two conditions of visual motion (coherent leftwards or rightwards) and three conditions of caloric stimulation (both sides neutral, left hot – right cold, left cold – right hot) using FreeSurfer. Localizer runs with purely (100%) coherent motion vs. static dots was conducted to define MT+ and MST. Caloric stimulation in the dark was used to localize posterior insular vestibular cortex (PIVC) and related areas. In the main experiment, participants responded on each trial in a 4-alternative forced-choice manner whether they experienced no sense of self motion with coherent visual motion to left or right, self motion in the same (in-phase) or opposite (out-of-phase) direction as the coherent visual motion. The results indicate that motion direction was reported reliably (>90% correct) for visual and vestibular stimuli. Increased BOLD activity was observed in posterior insular cortex (including areas PIVC and PIC) in MT/MST, STS, in the supramarginal gyrus and in the intraparietal cortex when participants reported self-motion, with slightly greater BOLD responses for the out-of-phase (congruent with real-world stimulation) condition. Together with the results of earlier studies we use these findings to elaborate on a theory of multi-sensory self-motion perception that describes how the brain tracks movements of the head in space.

Frank, S.M., Baumann, O., Mattingley, J.B., Greenlee, M.W. (under review) Functional specialization at the core of the human vestibular cortex.

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