SFB1315 Lecture Series 2019 − 2020

Klaus Gramann

Biological Psychology and Neuroergonomics (TU Berlin)
School of Computer Science (UTS Sydney)
CANE (UC San Diego)

Imaging brain activity

in moving humans

Tuesday March 10, 2020

3:30 pm ▪ BCCN Lecture Hall ▪ Philippstr. 13, Haus 6

Deutsche Forschungsgemeinschaft

SFB1315 Mechanisms and Disturbances in Memory Consolidation: From synapses to sys-

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Spatial cognitive processes make use of multimodal information that is the outcome of movement and, at the same time, the input to the cognitive system. Using vestibular information about translational and rotational acceleration, for example, provides important input to the efficient updating of egocentric spatial representations. To better understand the neural foundations of multisensory integration for spatial cognitive processes, imaging methods have to be used that allow for active behaviors of participants. Established imaging modalities, however, prohibit participant movement for fear of movement-related artifacts to distort the feeble signal of interest. As a consequence, decades of human brain imaging studies have investigated the neural foundation of complex navigation and orientation behaviors based on only visual flow. The brain dynamics underlying actively navigating participants are hitherto unknown because of the restrictions of established brain imaging modalities. To overcome these restrictions, new mobile brain imaging methods can be employed. Recent years have shown a remarkable shift in using established EEG technologies to leave the traditional lab environments and to record brain dynamics in actively behaving participants in complex laboratory setups and even the real world. Combining higher density electroencephalography (EEG) with motion capture and head mounted virtual reality (VR) the methods of Mobile Brain/Body Imaging (MoBI) allows for investigating realistic sensory and brain dynamic processes in actively moving participants. The results of mobile MoBI experiments show remarkable differences in behavior and neural dynamics as compared to identical protocols using only visual flow information. These studies demonstrate that new technological developments make it possible to use mobile brain imaging approaches to allow for a better understanding of the brain dynamics underlying spatial cognitive processes in the real world.

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