DFG research grant (FI 1624/3-1) within the Priority Program “Multitasking” (SPP 1771) 2015-2019, "Embodied Cognition in Multitasking: Stimulus-Hand Proximity and Cognitive Control in Dual-Task Performance"

Principal investigator: Rico Fischer (Co-PI: Roman Liepelt, PhD)

Multiple task performance has become an increasing prevalent phenomenon of the modern world, as we face a constantly growing demand on multitasking abilities in everyday and work life. For example, the development of modern technical devices more and more demand visual-manual interactions within a shared visuo-spatial region (e.g., hand-held devices, tablet control), which are continuously implemented in complex real life multitasking environments, such as in cockpits of trains and aircrafts. From research in embodied cognition, however, it is known, that cognitive processing is not independent of the body. Recent research demonstrated that the presence of hands close to a visual stimulus (e.g., within the visuo-spatial attentional focus) biases the allocation of attention to the area near the hand and enhances the engagement of cognitive control for stimuli in near hand space.

In the special context of dual tasks, with multiple stimuli being presented in near hand space, we aim at specifying which control parameters are affected in proximal stimulus conditions. We therefore ask, whether altered visuo-spatial attention targets S1 and S2 equally within left- and right-hand space and how hand position determines cognitive control parameters relating to central switching operations, i.e.,task set shifts at the bottleneck. A more thorough and in-depth processing of the currently relevant stimulus under proximal stimulus conditions might delay disengagement and shifts to secondary task component processing. Furthermore, we assess the impact of privileged stimulus processing in near hand space on priorization of task order and the flexibility of reconfiguration of task order switches. By measuring hand proximity effects on dual-task performance, we aim to provide a new research perspective on human multitasking behavior by emphasizing the role of action-perception interaction for determining cognitive control in dual-task situations. An embodied cognition approach to multitasking will, therefore, not only provide important theoretical scientific information concerning the flexibility of cognitive control for the coordination and scheduling of task sets in dual-task situations but might provide fertile grounds for transfer into applied cognitive sciences and technical developments. Finally, we think that this project will provide a valuable asset to the SPP 1772 in furthering the understanding of flexible priorization and shifting between component processing of multiple task sets.