person’s sense of acceptance of a virtual body as his or her own is generally called virtual body ownership (VBOI). Having such a mental model of one’s own body transferred to a virtual human surrogate is known to play a critical role in one’s sense of presence in a virtual environment. Our focus in this dissertation is on top–down processing based on visual perception in both the visuomotor and the visuotactile domains, using visually personalized body cues. The visual cues we study here range from ones that we refer to as direct and others that we classify as indirect. Direct cues are associated with body parts that play a central role in the task we are performing. Such parts typically dominate a person’s foveal view and will include one or both of their hands. Indirect body cues come from body parts that are normally seen in our peripheral view, e.g., legs and torso, and that are often observed through some mediation and are not directly associated with the current task.

This dissertation studies how and to what degree direct and indirect cues affect a person’s sense of VBOI for which they are receiving direct and, sometimes, inaccurate cues, and to investigate the relationship between enhanced virtual body ownership and task performance. Our experiments support the importance of a personalized representation, even for indirect cues. Additionally, we studied gradual versus instantaneous transition between one’s own body and a virtual surrogate body, and between one’s real-world environment and a virtual environment. We demonstrate that gradual transition has a significant influence on virtual body ownership and presence. In a follow-on study, we increase fidelity by using a personalized hand. Here, we demonstrate that a personalized hand significantly improves dominant visual illusions, resulting in more accurate perception of virtual object sizes.

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The public is welcome to attend.