Rubber hand illusion

The rubber hand illusion (RHI) is a perceptual experience that often occurs when an administered tactile stimulation of a person's real hand hidden from view, occurs synchronously with a corresponding visual stimulation of an observed rubber hand placed in full vision of the person in a position corresponding to where their real hand might normally be. The perceptual illusion is that the person feels a sense of “ownership” of the rubber hand which they are looking at. Most studies have focused on the underlying neural properties of the illusion and the experimental manipulations that lead to it. The illusion could also be used for exploring the sense of limb and prosthetic ownership for people after amputation. Cortical electrodes such as those used in sensorimotor stimulation surgery for pain may provide an opportunity to further understand the cortical representation of the illusion and possibly provide an opportunity to modulate the individual's sense of body ownership. Thus, the RHI might also be a critical tool for the development of neurorehabilitative interventions that will be of great interest to the neurosurgical and rehabilitation communities [1)].

The widely used rubber hand illusion (RHI) paradigm provides insight into how the brain manages conflicting multisensory integration regarding bodily self-consciousness. Previous functional neuroimaging studies have revealed that the feeling of body ownership is linked to activity in the premotor cortex, the intraparietal areas, the occipitotemporal cortex, and the insula. Matuz-Budai et al. from Pécs, investigated whether the individual differences in the sensation of body ownership over a rubber hand, as measured by the subjective report and the proprioceptive drift, are associated with structural brain differences in terms of cortical thickness in 67 healthy young adults. Matuz-Budai et al. found that individual differences measured by the subjective report of body ownership are associated with the cortical thickness in the somatosensory regions, the temporoparietal junction, the intraparietal areas, and the occipitotemporal cortex, while the proprioceptive drift is linked to the premotor cortex and the anterior cingulate cortex. These results are in line with functional neuroimaging studies indicating that these areas are indeed involved in processes such as cognitive-affective perspective-taking, visual processing of the body, and the experience of body ownership and bodily awareness. Consequently, these individual differences in the sensation of body ownership are pronounced in both functional and structural differences [2)]

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2)
Matuz-Budai T, Lábadi B, Kohn E, Matuz A, Zsidó AN, Inhóf O, Kállai J, Szolcsányi T, Perlaki G, Orsi G, Nagy SA, Janszky J, Darnai G. Individual differences in the experience of body ownership are related to cortical thickness. Sci Rep. 2022 Jan 17;12(1):808. doi: 10.1038/s41598-021-04720-8. PMID: 35039541.