

Out of body and in the body experience: Psychophysiology of bodily self-consciousness

Results:

The present research investigated the psychophysiology of "out of body" and "in the body experiences". There are four main results of the research:

1. To investigate "out of body" experience, we provided a psychometric decomposition of the structure underlying bodily self-consciousness in the context of the so-called rubber hand illusion, and demonstrated selective links between individual components of self-consciousness and mental body representations (Longo et al., 2008).

2. We found that transcranial magnetic stimulation (TMS) to the temporo-parietal junction of the right — but not the left — hemisphere reduced the magnitude of interactions between visual and tactile body representations. This suggests that the TPJ is involved in detection of cross-modal conflict, and that this function is lateralised to the right hemisphere.

3. To investigate "in the body experiences", we developed a simple behavioural method for measuring the implicit representation of the structure of the body, and documented systematic distortions in this structure. We have, furthermore, collected normative data from a large and diverse sample, which can potentially be used to analyse abnormalities of bodily experience.

4. We found that vision of bodies in intrinsic (1st person) and perspectival (3rd person) perspectives had distinct effect on touch. TMS to the EBA, furthermore, had opposite effects on these two perspectives, suggesting that this region is involved in distinguishing bodily reference frames.

Published work resulting from the project supported with the present grant:

Tsakiris, M., Longo, M. R., & Haggard, P. (2010). Having a body versus moving your body: neural signatures of agency and body-ownership. *Neuropsychologia*, *48*(9), 2740–2749. doi: 10.1016/j.neuropsychologia.2010.05.021

Haggard, P., & Jundi, S. (2009). Rubber hand illusions and size-weight illusions: Self-representation modulates representation of external objects. *Perception*, *38*(12), 1796–1803. doi:10.1068/p6399

Kammers, M. P., Longo, M. R., Tsakiris, M., Dijkerman, H. C., & Haggard, P. (2009). Specificity and coherence of body representations. *Perception*, *38*(12), 1804–1820. doi: 10.1068/p6389

Longo, M. R., & Haggard, P. (2008). Sense of agency primes manual motor responses. *Perception*, 38(1), 69-78. doi: 10.1068/p6045

Longo, M. R., Cardozo, S., & Haggard, P. (2008). Visual enhancement of touch and the bodily self. *Consciousness and Cognition*, 17(4), 1181-1191. doi: 10.1016/j.concog.2008.01.001.

Longo, M. R., Schüür, F., Kammers, M. P. M., Tsakiris, M., & Haggard, P. (2008). What is embodiment? A psychometric approach. *Cognition*, 107, 978-998.

Tsakiris, M., Costantini, M., & Haggard, P. (2008). The role of the right temporoparietal junction in maintaining a coherent sense of one's body. *Neuropsychologia*, 46(12), 3014-3018. doi: 10.1016/j.neuropsychologia.2008.06.004

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