

## **165/06 - "The sense of self in the brain: neural correlates of self-recognition"**

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Duração/*Duration*: 2007/09 - 2010/01

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**Objectives:** Two important aspects of self-consciousness are the sense of one's own body (so-called 'body-ownership') and the sense that one controls one's own bodily actions (agency). The exact relation between these has been the focus of much speculation, but remains unclear. We distinguish two models of their relation. On an 'additive' model, agency and body-ownership are strongly related, because the ability to control actions is a powerful cue to body-ownership. This view implies a component common to the senses of body-ownership and agency, plus possible additional components unique to agency. An alternative 'independence' model holds that agency and body-ownership are qualitatively different experiences, triggered by different inputs, and recruiting distinct brain networks.

**Methodology:** We developed a paradigm to investigate sensory and motor aspects of body representation in the brain using fMRI. Participants either made self-generated finger-movements, or remained passive while similar movements were applied to their fingers by an external force, while seeing a video image of their hand either in real-time or with a systematic delay that generated a conflict.

**Results:** Activations in midline cortical structures were associated with a purely sensory-driven sense of body-ownership, and were absent in agency conditions. In contrast, activity in the pre-SMA was linked to the sense of agency, but distinct from the sense of body-ownership. Importantly, no shared activations that would support the additive model were found.

**Conclusions:** The results support an independence model of agency and body-ownership, and do not support the additive model. Agency and body-ownership appear to be qualitatively different experiences, representing two distinct components of self-recognition. The feeling of ownership over one's body involves a psychophysiological baseline, linked to activation of the brain's default mode network. Agency over one's body is linked to premotor and parietal areas involved in the generation of motor intentions and subsequent action monitoring.

### **Publication:**

Tsakiris M, Longo M & Haggard P. Having a body versus moving your body: neural signatures of body-ownership and agency., *under review*

**Keywords:** agency, body-ownership, supplementary motor area, angular gyrus, cortical midline structures, self-recognition