
Body ownership as manipulated by a simple social interaction is reflected in hand-specific subregions of primary somatosensory area: an ultra-high 7T fMRI study

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Abstract

The experience that our body and its parts belong to us is a key aspect of the ‘self’ and daily social life and is called body ownership. It has been shown that ownership can experimentally be changed such as in the rubber hand illusion (Botvinick and Cohen, 1998) or the numbness illusion (NI; Dieguez et al., 2009). In these illusions the hand or finger of another person is felt as one’s own and have been linked to primary somatosensory cortex (S1) as well as other parietal and frontal regions. Focusing on the NI and S1 activity, I will first describe a 7T fMRI method for mapping single finger representations in three of the four Brodmann areas (BA) forming S1, namely BA3b, 1, and 2, observing in each BA a complete representation of all fingers. We used this method as a functional localizer and manipulated the timing and the agent (self or other) to study whether and how body ownership relates to finger specific regions. Our results show that BA1 (but not BA3b and 2) of the stroking hand, at each single finger region, reflects body ownership as quantified through the NI. Additionally, BA3b (but not BA1 and 2) of the touched hand showed a reduced response during self-touch (compared to being touched by another person) conditions. These results suggest that well-localized S1 activity reflects body ownership when interacting with other people and that this interaction involves differently BA3b and 1, depending on whether we are touching or are being touched.

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