Space around others perceived just as our own

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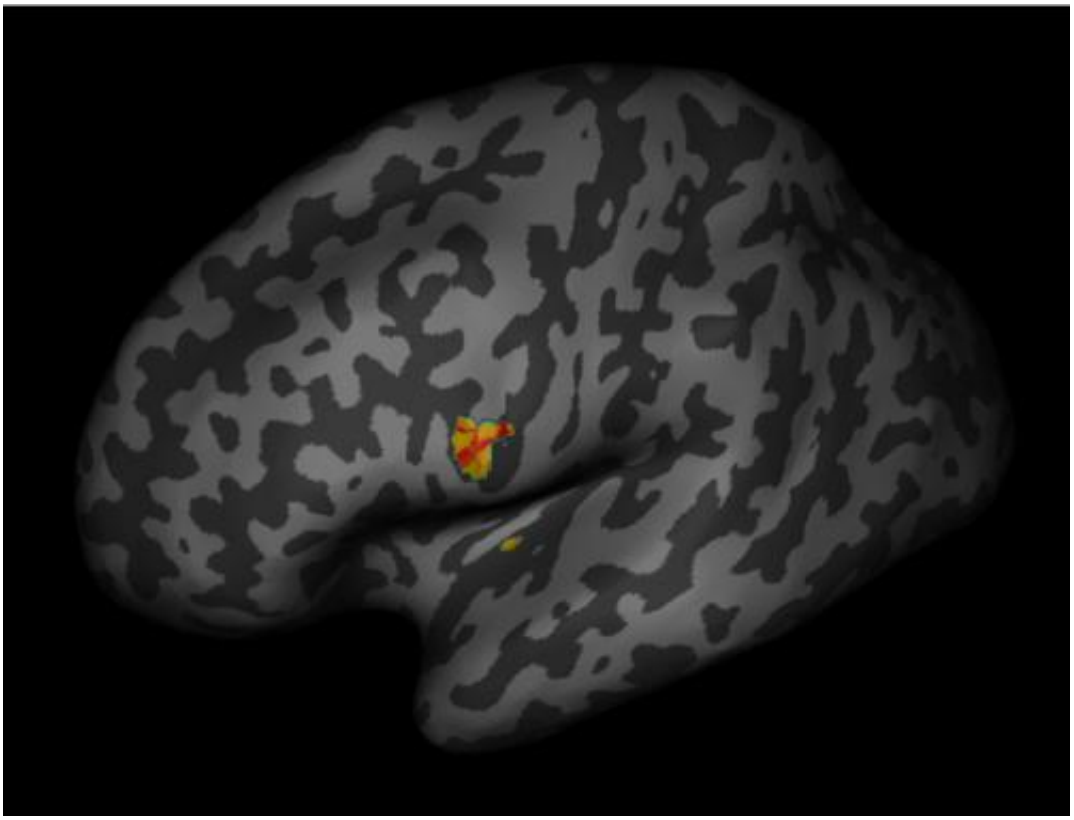

This illustration shows the shared representation of the space near the body in the left ventral premotor cortex. Credit: Claudio Brozzoli

A study from Karolinska Institutet in Sweden has shown that neurons in our brain 'mirror' the space near others, just as if this was the space near ourselves. The study, published in the scientific journal *Current Biology*, sheds new light on a question that has long preoccupied psychologists

and neuroscientists regarding the way in which the brain represents other people and the events that happens to those people.

"We usually experience others as clearly separated from us, occupying a very different portion of space," says Claudio Brozzoli, lead author of the study at the Department of Neuroscience. "However, what this study shows is that we perceive the space around other people in the same way as we perceive the space around our own body."

The new research revealed that visual events occurring near a person's own hand and those occurring near another's hand are represented by the same region of the frontal lobe (premotor cortex). In other words, the brain can estimate what happens near another person's hand because the neurons that are activated are the same as those that are active when something happens close to our own hand. It is possible that this shared representation of space could help individuals to interact more efficiently—when shaking hands, for instance. It might also help us to understand intuitively when other people are at risk of getting hurt, for example when we see a friend about to be hit by a ball.

The study consists of a series of experiments in functional magnetic resonance imaging (fMRI) in which a total of forty-six healthy volunteers participated. In the first experiment, participants observed a small ball attached to a stick moving first near their own hand, and then near another person's hand. The authors discovered a region in the premotor cortex that contained groups of neurons that responded to the object only if it was close to the individual's own hand or close to the other person's hand. In a second experiment, the authors reproduced their finding before going on to show that this result was not dependent on the order of stimulus presentation near the two hands.

"We know from earlier studies that our brains represent the actions of other people using the same groups of neurons that represent our own

actions; the so called mirror neuron system", says Henrik Ehrsson, co-author of the study. "But here we found a new class of these kinds of neuronal populations that represent space near others just as they represent space near ourselves."

According to the scientists, this study provides a new perspective that could help facilitate the understanding of behavioural and emotional interactions between people, since—from the brain's perspective—the space between us is shared. This study was funded by the European Research Council, the Swedish Foundation for Strategic Research, the James S. McDonnell Foundation, the Swedish Research Council, the Söderberg Foundation and Marie Curie Action

More information: 'A shared representation of the space near oneself and others in the human premotor cortex', Claudio Brozzoli, Giovanni Gentile, Loretxu Bergouignan, H. Henrik Ehrsson, *Current Biology*, online 5 September 2013, dx.doi.org/10.1016/j.cub.2013.07.004

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