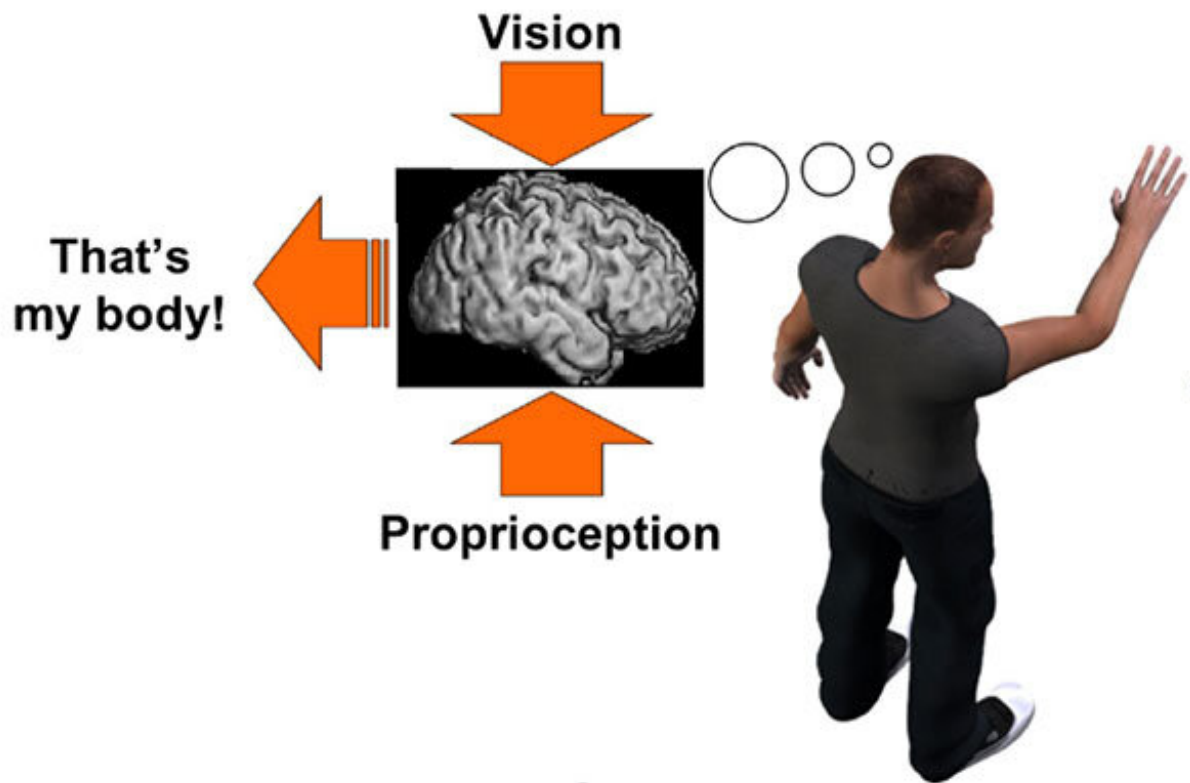


What and where in the processing of body-part information

April 4 2019



Body awareness - Our brain integrates visual, tactile and proprioceptive information to know that seen body parts are part of our own body. Credit: Kazumichi Matsumiya

The brain tracks the location of body limbs in space. This is called

proprioception or body localization. Additionally, the brain is aware of its ownership of body parts, and can control extremities because they are sensed or felt.

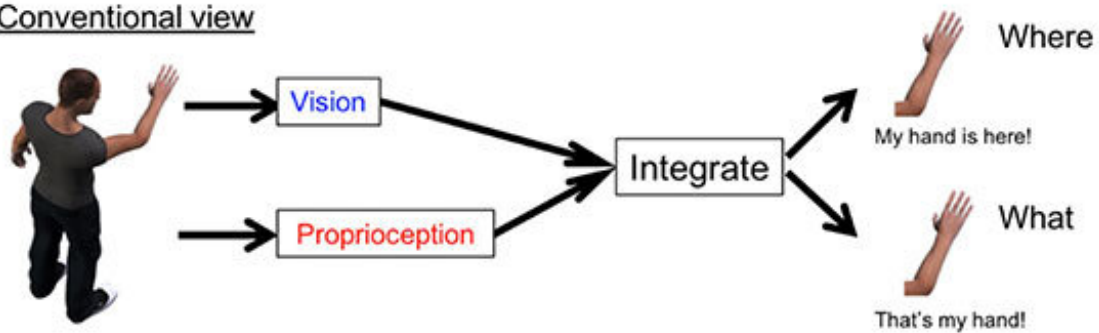
Until now, it has been assumed that the perceived location of [body](#) parts can be used as a behavioral measure to assess the feeling of owning a body part. This means that the experience of where one's body parts are perceived to be located in space (body [localization](#)) and the experience of identifying with the body parts (body [ownership](#)) depend on the same process in the brain.

However, Kazumichi Matsumiya, a researcher at Tohoku University in Japan has identified that there are, in fact, two processes underlying body awareness.

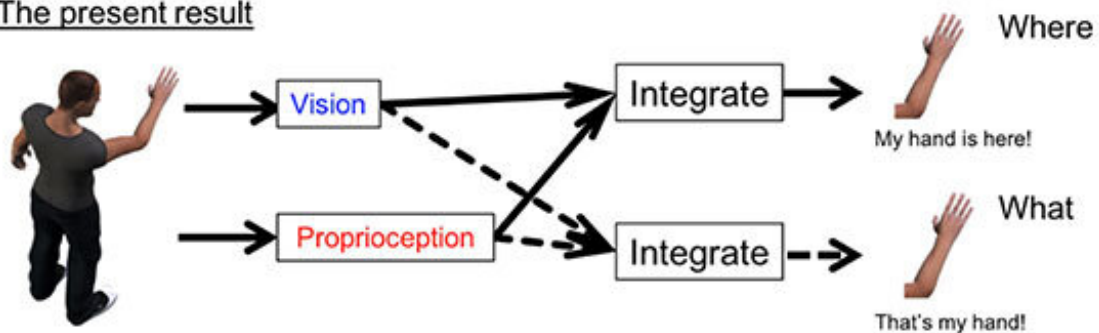
To investigate whether the processing pathway is shared between body localization and body ownership, Matsumiya used a computational model of multisensory integration processes and applied this model to a perceptual illusion in which ownership over an artificial hand is experienced.

He found that variances predicted by the model are similar to those observed in localization of the participant's hand, but systematically diverge from those observed in ownership of the artificial hand. These findings provide strong evidence for separate processes between ownership and localization of body parts, and indicate a need to revise current models of body part ownership.

Conventional view



The present result



The present finding - Initial work assumed that the perceived location of one's body part can be used as a behavioral measure to assess the feeling of owning a body part. However, the present results reveal separate processes between ownership and localization of body parts. Credit: Kazumichi Matsumiya

Results from this study suggest that the neural substrates for perceptual identification of one's body parts—such as [body ownership](#)—are distinct from those underlying spatial localization of the [body parts](#), thus implying a functional distinction between "what" and "where" in the processing of body part information.

These findings may have implications for understanding the underlying mechanisms for body self-awareness that play an important role in rehabilitation to overcome motor dysfunctions.

More information: Kazumichi Matsumiya. Separate multisensory integration processes for ownership and localization of body parts, *Scientific Reports* (2019). [DOI: 10.1038/s41598-018-37375-z](https://doi.org/10.1038/s41598-018-37375-z)

Provided by Tohoku University

Citation: What and where in the processing of body-part information (2019, April 4) retrieved 1 February 2024 from <https://medicalxpress.com/news/2019-04-body-part.html>

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