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PHANTOM TOUCH ILLUSION UNEXPECTED PHENOMENOLOGICAL EFFECTS OF VISUAL TOUCH IN THE ABSENCE OF TACTILE INPUT

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Background: You can't tickle yourself. If you try sliding a finger along your forearm, the tickle sensation will be much weaker than if there was an insect crawling down your skin. This is because the nervous system attenuates the predicted sensory input caused by your own movements (Blakemore et al., 2000). This mechanism is called tactile suppression.

Aims: What happens with tactile attenuation if there is no afferent tactile signal?

Method: We tested our question using an immersive virtual reality (VR) scenario in which subjects touched their body using a virtual object.

Results and conclusions: The virtual touch resulted in a tingling sensation corresponding to the location touched on the virtual body. We called it phantom touch illusion (PTI). The subjectively-reported intensity of the illusion has different strength across different parts of the hand. Interestingly, the illusion was also present when subjects touched invisible (inferred) parts of their limb. We reason that PTI results from the tactile gating process during self-touch. We additionally tested this hypothesis while comparing PTI to self-touch using different laser pointers and pantomimed (no visible effector) touch. These conditions were reported as touch sensation by a significantly lower proportion of subjects. Importantly, subjects did not yield tingling in these laser stimulation conditions, but rather other sensations, consistent with prior literature e.g. on "butcher tongue illusion". The presence of PTI when touching invisible body parts suggests that tactile attenuation is not exclusively based on vision, but rather on multi-sensory input involving body schema. Lastly, the presence of different phenomenal qualities during self-touch using a laser pointer might indicate top-down influences on phantom touch through cognitive mechanisms such as phenomenological control or sensory suggestibility. It remains to be determined, to what degree PTI is controlled by such cognitive mechanisms.

Keywords: Tactile suppression, Virtual reality, Illusory touch

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