Tactile sensitivity during approach-avoidance movements

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Abstract

Tactile sensitivity is typically reduced during voluntary movements. This phenomenon, known as tactile suppression, is argued to stem from an internal forward model that predicts and down-regulates sensory feedback signals arising from the movement. While predictions are used to suppress movement-related afferences, incoming sensory feedback is used to guide the movement; hence there are task -relevance-dependent modulations of predictive and feedback signals. Here we asked whether anticipated future consequences of a movement, defined in terms of its affective content (approach vs. avoidance), modulate how predictive and feedback signals are utilized. We also examined whether arm extension and flexion modulate tactile suppression, as they were previously shown to facilitate behavioral tendencies of approach and avoidance, respectively. Participants flexed and extended their arm towards a positive or away from a negative stimulus in virtual reality (VR). We probed tactile suppression by presenting brief vibrations during movement through the VR-controller held in the participant's hand. Participants then responded whether they detected this vibration or not. Detection thresholds were significantly larger in all movement conditions compared to when the arm was at rest, indicating tactile suppression. Interestingly, movement goal and movement type modulated tactile suppression additively, in which both avoiding and arm extension resulted in larger detection thresholds. These results highlight the role of affective context on movement-related tactile sensitivity, whereby avoidance results in increased reliance on predictive signals. They also suggest that feedback signals become more important for actions directed towards the body, independent of affective content of the stimulus being acted on.

Keywords: tactile suppression, approach, avoidance, virtual reality

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