A Comparison of the Sense of Agency in One-Step and Multi-Step Actions

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The sense of agency (SoA) is the sense of controlling our actions and their outcomes. While there are many studies on the SoA for actions that require one step to trigger an effect, there is a lack of evidence on actions that require more than one step to achieve an outcome. In the present experiment, we sought to compare the SoA between one-step and multi-step actions. Participants (convenience sample of n = 36; age 19-31 years; 24 women) executed one-step, two-step, and three-step actions in which they pressed one, two, or three keys on a computer keyboard to generate a tone (74 dB) and compared its loudness to a second, externally produced tone (random: 71-77 dB). We used sensory attenuation as an implicit measure of the SoA, which means that self-produced sensory effects are perceived as less intense than externally generated effects. Based on "second tone louder" responses, we calculated the point of subjective equality (PSE) for each of the three action conditions and submitted these PSE values to a repeated-measures 3x1 ANOVA. PSEs were lower in multi-step actions compared to the one-step action, indicating stronger sensory attenuation in multi-step actions. This could be due to increased effort or more accurate sensorimotor predictions of action effects. In contrast, participants rated the amount to which they felt that they had generated the tone higher in the one-step action than in the multi-step actions. This decrease in explicit ratings for multi-step actions might be attributed to a reduced perception of causality.

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