

Dissecting the Sense of Agency: Integrating Sensorimotor and Cognitive Cues Across Different Experimental Paradigms

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The sense of agency refers to the subjective awareness of controlling one's actions and their effects on the environment. This experience comprises two distinct dimensions: the explicit metacognitive judgment of agency and the implicit sensorimotor feeling of agency.

Different neurocognitive models have been proposed to explain how the agency experience arises, varying in the weight assigned to low-level (sensorimotor, proprioceptive, exteroceptive) and high-level (cognitive) cues.

To test these models, I designed four experiments to disentangle the contributions of different cues to the two dimensions of agency. Participants (total N=240) were engaged in an ecologically valid task - switching a lightbulb on, either actively or passively - while both explicit and implicit indices of agency were measured. First, I examined the influence of cues rooted in bodily and sensorimotor processing by studying how the agency experience is influenced by (i) ageing-related changes in sensorimotor processing (Study 1), (ii) manipulations of the coherence of sensorimotor feedback in virtual environments (Study 2), and (iii) variations in the spatial distance between actions and their outcomes (Study 3). Finally, I explored the role of high-level contextual and social cues by varying the presence of another agent and nature of interaction (Study 4).

Beyond the specific findings of each study, two overarching insights emerge. First, the implicit and explicit dimensions of agency can dissociate, indicating that they rely on distinct cognitive processes at different stages of the motor hierarchy. Second, the results challenge the rigid dichotomy between low- and high-level cues as uniquely influencing either implicit or explicit agency. Instead, they highlight a dynamic interplay between sensorimotor and cognitive information, which jointly shape the experience of agency in a context-dependent manner.

Building on these insights, I propose a novel neurocognitive model of agency that captures this flexible integration, offering a coherent theoretical framework for future research on this complex phenomenon.

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