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Authors

Ruess, Miriam

Thomaschke, Roland

Kiesel, Andrea

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The time course of Intentional Binding

Miriam Ruess

Albert-Ludwigs-Universität Freiburg, Freiburg i. Br., Germany

Roland Thomaschke

Albert-Ludwigs-Universität Freiburg, Freiburg, Germany

Andrea Kiesel

Albert-Ludwigs-Universität Freiburg

Abstract: Environmental stimuli caused by actions (i.e., effects) are perceived earlier than stimuli not caused by actions. This phenomenon is termed intentional binding (IB), and serves as implicit measure of sense of agency. We investigated the influence of effect delay and temporal predictability on IB, measured with the classic clock procedure as the bias to perceive the effect as temporally shifted towards the action. For short delays, IB increased with delay (Experiment 1: 200 ms, 250 ms, 300 ms) and this initial increase declined for longer delays (Experiment 2: 100 ms, 250 ms, 400 ms). These results extend previous findings showing IB to decrease with increasing delays for delay ranges of 250 ms to 650 ms. Further, the indication that IB, that is, sense of agency, might be maximal for different delays depending on the specific characteristics and context of action and effect, has important implications for human-machine interfaces.