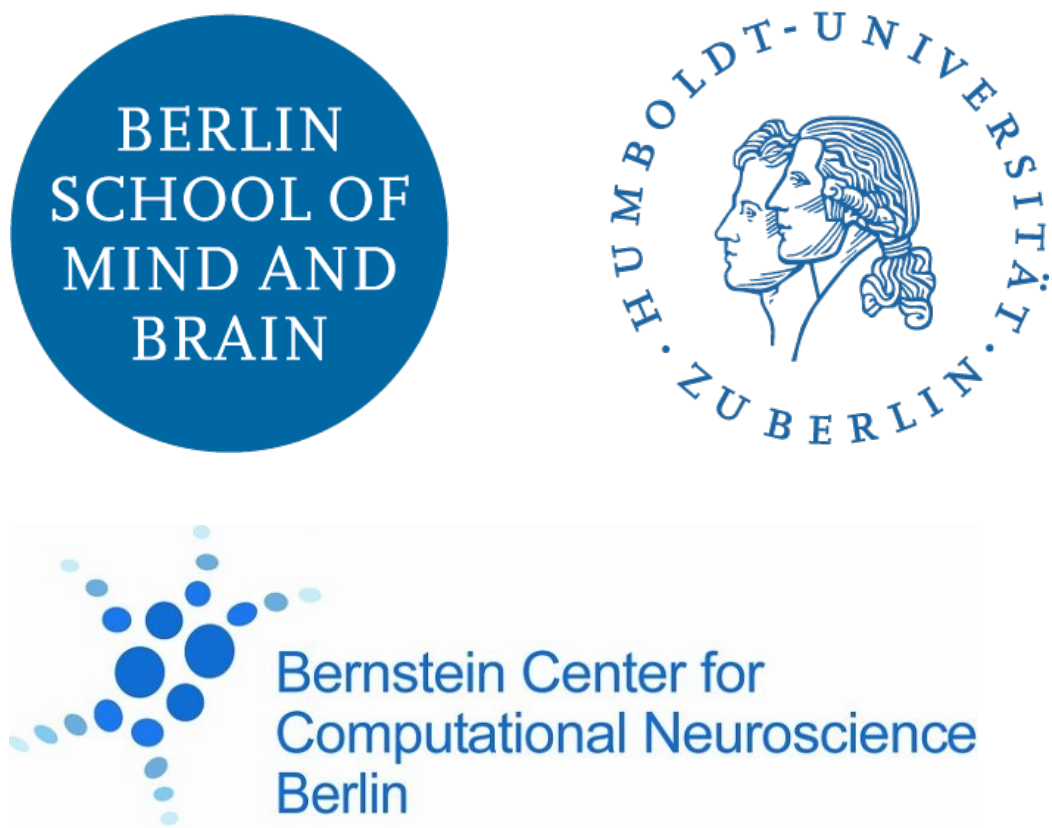


Metacognition of agency: an EEG study

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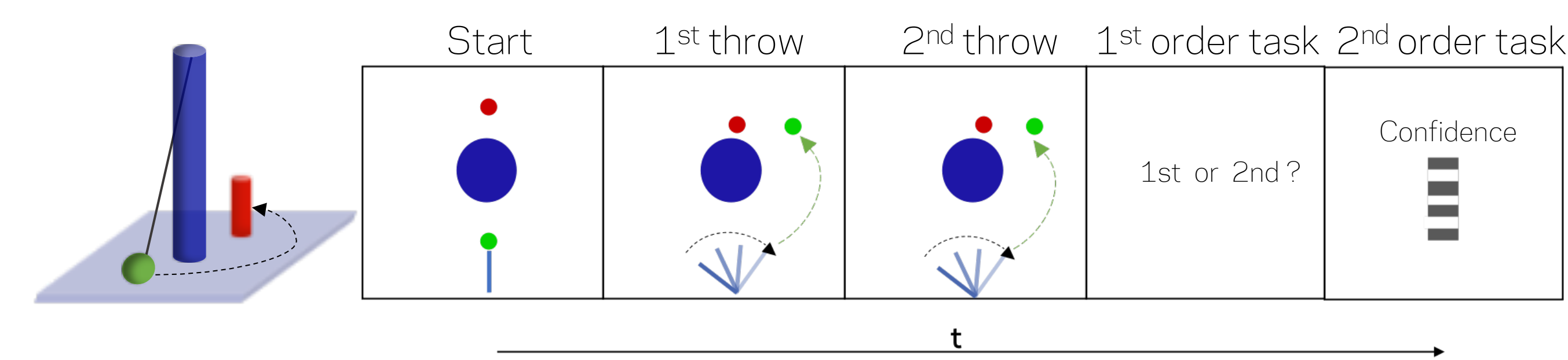
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Introduction

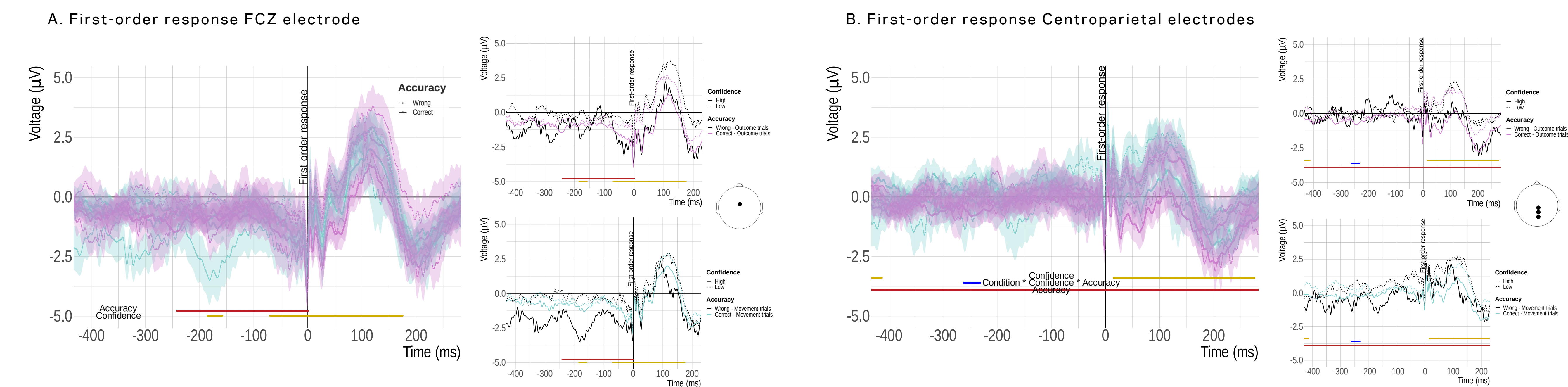
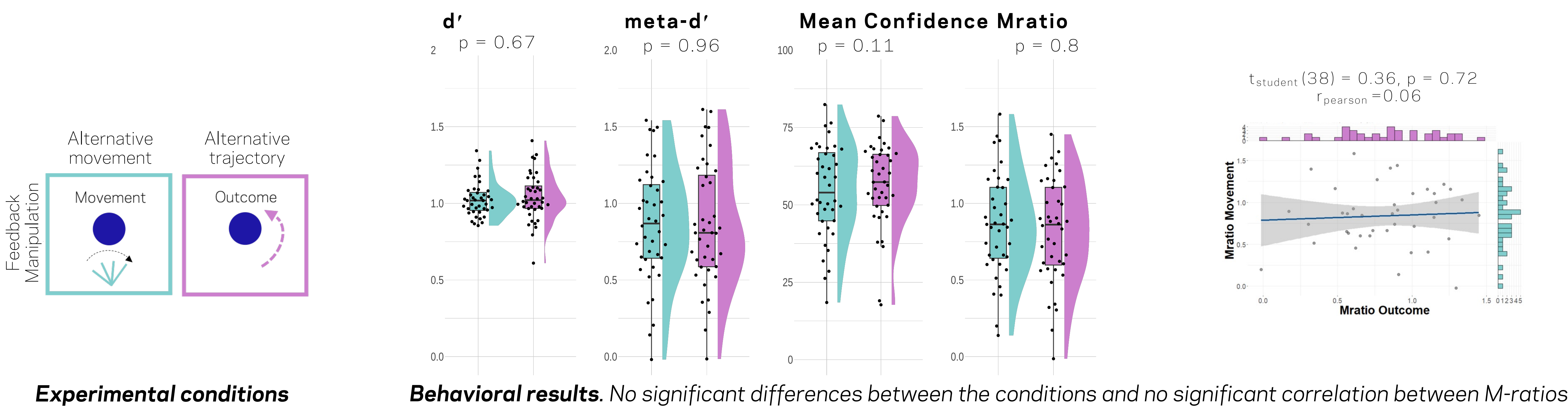
Empirical studies often probe the sense of agency (SoA) by manipulating visual representations of either a movement or its consequences on the environment. While these two may be valid means to manipulate the SoA, they may also do so in very different ways. They are, however, often implicitly assumed to be equivalent, but this has not been shown. To assess whether these manipulations are indeed equivalent, we used an experimental design that allows for comparisons of the precision of agency representations in different conditions, using behavioural and electrophysiological data (EEG).

Results

Methods



Experimental set up and task. In a virtual game, participants ($n = 40$) throw a ball to hit a target twice on each trial. The visual feedback is congruent with what participants did in only one of the two movements. Participants select in which they felt they more in control and rate their confidence in that decision. We used two conditions that resemble typical manipulations studied separately in the literature of SoA. They differ on whether the manipulation affected the movement or the ball trajectory.



ERP waveform time locked to first order decision (FCz and Centroparietal electrodes). Significant main effects and interactions (threshold free cluster enhancement correction for multiple comparisons using cluster permutation tests) are marked with horizontal lines ($n = 38$).

Discussion

Using a novel paradigm we found that metacognition of agency is similarly affected by visual manipulations of movement and outcome. The absence of main effect of condition on the EEG signal prior to the first- and second- order response, suggests that the monitoring of a movement or its consequences on the environment is governed by similar mechanisms. This project lays some theoretical grounds and a more precise methodological approach with which to move forwards in the field.