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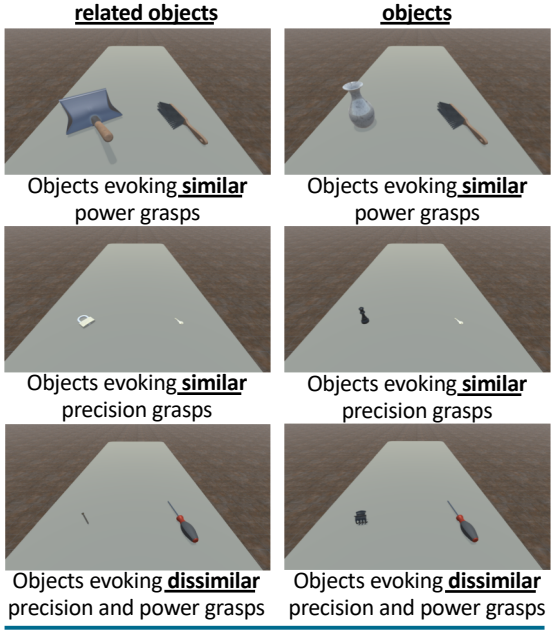
Introduction

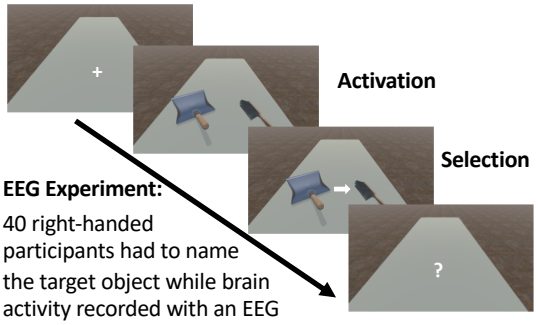
The perception of a manipulable object is known to evoke motor representations associated with potential interactions with the visual object (Ellis & Tucker, 2000). To date, much of the research on affordance evocation has used simple situations involving an object presented in isolation (Ellis et al., 2007). However, natural perceptual environments typically consist of multiple objects that evoke multiple affordances, which may be similar or dissimilar. Here, we investigated **the consequences of multiple affordance evocation on the processing of a target object among distractors and questioned the factors that influence affordance selection**. Two complementary experiments using behavioral and neurophysiological measures were designed to address these issues.

Method

Stimuli: 3D scenes of pairs of familiar graspable objects



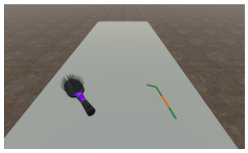
Procedure:

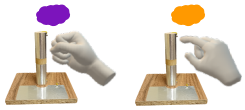


EEG Experiment:

40 right-handed participants had to name the target object while brain activity recorded with an EEG 128 electrodes

Behavioral Experiment: 60 right-handed participants. Is the stain on the target object orange or purple?



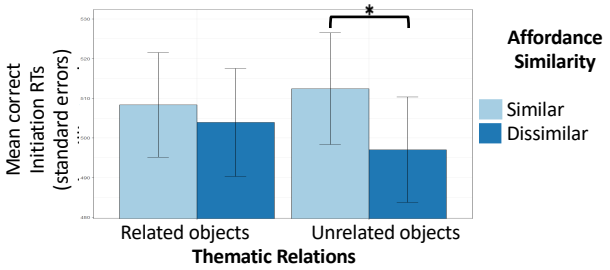


Response compatible/incompatible with grasp evoked by target.

Results

Behavioral experiment:

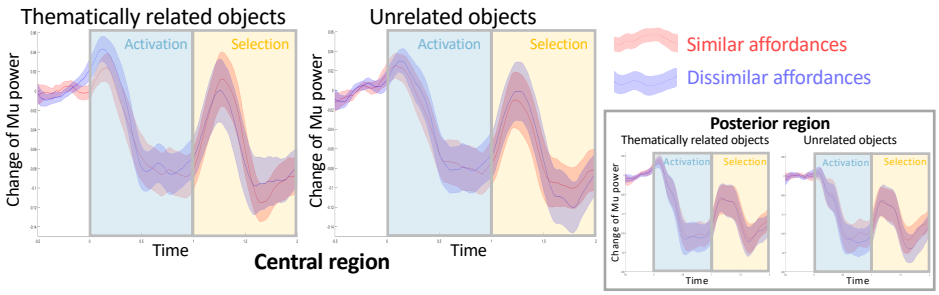
Correct initiation RTs on compatible trials as a function of Similarity and Relations:



Mixed-effect linear models on Correct initiation (estimate interaction= 8.167, t = 2.140, SE = 3.816, p = 0.032)

EEG experiment:

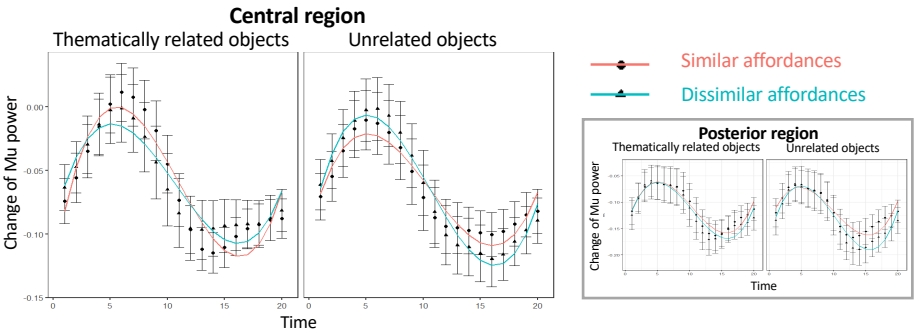
Evolution of μ desynchronization over time as a function of Similarity and Relations



Temporal analyses on central regions

Analysis of the modulation of the curve of μ desynchronization as a function of Similarity and Relations over time. **3 curve parameters: 1) the slope; 2) the flattening; 3) the inflexion.**

Model fit of μ desynchronization in the Selection phase as a function of Similarity of affordances and Relations considering slope, flattening and inflexion of the curves



The interaction between the Similarity of affordances and the Relations is significant for the curve slopes (estimate = 0.058 ; t = 2.323, SE = 0.025, p = 0.02) **and inflexions** (estimate = -0.056; t = -4.804, SE = 0.011, p < 0.001).

Discussion

When having to select a target object from an unrelated distractor, an interference of similar affordances on target selection was observed. This interference disappeared when objects are thematically related. At neurophysiological level, the interference was accompanied by a reduction of μ rhythm reactivity when affordances are similar. The reduction of μ rhythm reactivity for similar affordances disappears when objects are thematically related. Note that this effect occurred only during object selection phase (and not in the activation phase).

- Results support the inhibition hypothesis (Vainio & Ellis., 2020) and extend previous findings to realistic perceptual situations with familiar graspable objects by suggesting that thematic relationships could play a role in the regulation of the inhibition phenomenon.

References:

Ellis, R., & Tucker, M. (2000). Micro-affordance: The potentiation of components of action by seen objects. *British journal of psychology*, *91*(4), 451-471.

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