

# What am I grasping? Deepening cortical and corticospinal spatiotemporal dynamics underlying grasping observation

*Saturday, September 13, 2025 2:10 PM (20 minutes)*

**Introduction.** Observing people perform actions activates a network of fronto-temporo-parietal brain regions known as the Action Observation Network (AON). Prior research suggests this network can engage specialized pathways depending on action features, though their temporal dynamics remain unclear.

**Methods.** We conducted two experiments with 50 healthy participants using an action observation paradigm involving intransitive (i.e., a grasping movement presented in isolation), object-directed (i.e., a hand grasping a bottle), and social-directed (i.e., a hand grasping another hand) grasping movements. Experiment 1 used electroencephalography (EEG) and microstate analysis to examine AON activation and its temporal evolution while observing the abovementioned stimuli. Experiment 2 assessed motor resonance –i.e., corticospinal facilitation during action observation –via TMS at various time points from different muscles involved in the depicted grasps to relate better the cortical and corticospinal dynamics of action mirroring.

**Results.** In Experiment 1, intransitive and social-directed grasps elicited similar fronto-parietal activity patterns up to 250 ms from action onset, while object-directed actions showed greater posterior activation. From 250 to 450 ms, all stimuli evoked distinct temporo-parietal activity profiles. Experiment 2 revealed stimulus- and muscle-specific MEP enhancements (i.e., motor resonance) only at 200 ms for intransitive and object-directed grasping movements. No facilitation occurred at later timings; instead, results suggested motor cortex inhibition.

**Conclusion.** Passive observation of grasping movements with varying targets engages the AON with distinct temporal and spatial dynamics. Cortical and corticospinal responses reflect complementary mechanisms of action mirroring, especially for simple actions like those used in the present study.

**If you're submitting a symposium talk, what's the symposium title?**

**If you're submitting a symposium, or a talk that is part of a symposium, is this a junior symposium?**

**Primary author:** GUIDALI, Giacomo (Department of Psychology, University of Milano-Bicocca)

**Co-authors:** Dr ARRIGONI, Eleonora (Department of Psychology, University of Milano-Bicocca); Prof. PISONI, Alberto (Department of Psychology, University of Milano-Bicocca); Prof. BOLOGNINI, Nadia (Department of Psychology, University of Milano-Bicocca)

**Presenter:** GUIDALI, Giacomo (Department of Psychology, University of Milano-Bicocca)

**Session Classification:** Lunch and poster 3

**Track Classification:** Action and movement