

## Effects of Movement-Based and Cognitive Priming on Brain Function

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**Introduction:** Priming involves exposure to a stimulus in order to elicit a behavior change related to motor learning. Priming may involve neurostimulation, pharmacology, exercise, and mental imagery. The purpose of priming is to potentiate the effects of a subsequent activity. Past work demonstrated enhanced motor learning with the addition of a bout of priming delivered prior to a motor-learning activity. Despite these encouraging findings, limited work has investigated the effects of priming on brain function.

**Purpose:** To determine the effects of priming on brain function. This study focused on two modes of priming: aerobic exercise (movement-based) and cognitive (action observation).

**Methods:** Healthy, right-handed individuals ( $\geq 18$  years) completed baseline testing consisting of a behavioral battery and a three-minute resting-state EEG recording. Participants were randomized to receive either a 5-minute movement- or cognitive-based priming intervention before crossing-over after 1 week to receive the remaining priming intervention. During these visits, participants completed a three-minute resting-state EEG recording before and immediately after priming. Movement-based priming consisted of walking on a treadmill while maintaining an established target heart rate range. Cognitive priming involved watching a video of individuals walking on a treadmill. Brain function was assessed by computing measures of [1] EEG power in leads overlying left (dominant) primary motor cortex (IM1), left dorsal premotor cortex (IPMd), and total power across the whole brain also by measuring [2] coherence (connectivity) between IM1 and rM1, IPMd, and the entire brain across alpha (8-12 Hz), low beta (13-19 Hz), and high beta (20-30 Hz) frequency bands. Effects of priming on brain function were determined with paired t-tests.

**Results:** Preliminary findings reported below were collected from a sample of four individuals (2 females) aged  $24.7 \pm 4.3$  years. A complete analysis involving # subjects will be presented in the near future. In the movement-based priming condition, we observed a trend of enhanced IM1 coherence with rM1 in all frequency bands and enhanced high beta IM1 coherence with the entire brain. We also observed trends of increased high beta total power and high beta power in leads overlying IM1 and IPMd. In the cognitive-based priming condition, we observed a reduction in low beta IM1 coherence with rM1 ( $p=0.04$ ) and reduced alpha ( $p=0.02$ ) and low beta ( $p=0.02$ ) IM1 coherence with IPMd.

**Conclusion:** Across a 8-30 Hz frequency spectrum, a brief bout of priming effects brain function in a mode-dependent manner.

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