

## **The impact of mindfulness meditation on visuomotor performance and awareness of action: an EEG study on short- and long-term meditators**

### **Results:**

Background: Attribution of agency involves the ability to distinguish our own actions and their sensory consequences which are self-generated from those generated by external agents. There are several pathological cases in which motor awareness is dramatically impaired. On the other hand, awareness-enhancement practices like tai-chi and yoga are shown to improve perceptual-motor awareness. Meditation is known to have positive impacts on perception, attention and consciousness itself, but it is still unclear how meditation changes sensorimotor integration processes and awareness of action. The aim of this study was to investigate how visuomotor performance and self-agency is modulated by mindfulness meditation. This was done by studying meditators' performance during a conflicting reaching task, where the congruency between actions and their consequences is gradually altered. This task was presented to novices in meditation before and after an intensive 8 weeks mindfulness meditation training (MBSR). The data of this sample was compared to a group of long-term meditators and a group of healthy non-meditators.

Results: Mindfulness resulted in a significant shift in attribution of self-agency towards the self in both groups. Novices in mindfulness demonstrated a strongly increased sensitivity to detect external influences in the task after the MBSR intervention. Both mindfulness groups demonstrated a speed-accuracy trade-off in comparison to their respective controls. This resulted in slower and more accurate movements.

Conclusions: Our results suggest that mindfulness meditation practice is associated with slower body movements which in turn may lead to an increase in monitoring of body states and optimized re-adjustment of movement trajectory, and consequently to better motor performance. This extended conscious monitoring of perceptual and motor cues may explain the reported shift in the attribution of self-agency by an availability of more self-related cues in the memory upon evaluation of the trial. The reduction of detection threshold in the MBSR group is also likely due to the monitoring of these processes. Our findings confirmed our assumptions about the positive effect of mindfulness on perceptual-motor integration processes.

### **Published works:**

Naranjo, J. R., & Schmidt, S. (2012). Is it me or not me? Modulation of perceptual-motor awareness and visuomotor performance by mindfulness meditation. *BMC Neuroscience*, 13, 88. doi:10.1186/1471-2202-13-88

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