

**12/06 - "The impact of mindfulness meditation on visuomotor performance and awareness of action: an EEG study of short- and long-term meditators"**

*Instituição/Institution:* Institute of Environmental Medicine and Hospital Epidemiology, University Hospital Freiburg - Germany

*Duração/Duration:* 2007/05 - 2009/11

*Investigadores/Researchers:* Prof. Stefan Schmidt, Dr. Jose Raul Naranjo

**Objectives:** Awareness of action involves the ability to distinguish ones own actions and their sensory consequences from actions generated by external agents. It is still unclear if and how meditation enhances sensory-motor integration and awareness of action. The aim of this study was to investigate the motor error, the motor awareness and movement time (MT) in mindfulness meditators in a conflicting reaching task.

**Methods:** Participants were given a visual representation of their reaching movement by a video projector but they could not see their own movements directly. In the reaching task a gradually growing false feedback was introduced by an angular deviation between the actual movement trajectory and the trajectory fed back to the participants. This task was presented to 11 novices in meditation before and after intensive 8 weeks of MBSR training. This sample was compared with a group of 9 long-term meditators and a group of 11 non-meditators. Dependent variables were (i) deviations of the reaching trajectory from a straight line (motor errors). (ii) angle at which participants got aware of the introduced mismatch (threshold) (iii) movement time to reach the target.

**Results:** Long-term meditators had lower motor errors (group x angle interaction:  $p=.08$ ) than non-meditators. This was accompanied by larger movement time (side x group interaction:  $p=.056$ ). Compared to non-meditators, novices to meditation had lower motor errors after the MBSR intervention (time x group interaction:  $p=.068$ ), lower angular threshold ( $p=.06$ ) and larger movement time ( $p=.016$ ).

**Conclusions:** Mindfulness meditation is associated with decreased behavioral reactivity and slowing down. These changes lead to better motor performance and to detect lower levels of perceptual-motor conflict. We propose that mindfulness meditation entails a behavioral shift towards an 'expanded tempo', which facilitates a broader access to sensorimotor and proprioceptive signals. With this 'inner openness' to the movement experience, moment-by-moment monitoring of body states could be realized and online re-adjustment of movement trajectory is optimized. These considerations reinforce the positive impact that mindfulness meditation has on perceptual-motor control and awareness of action.

**Keywords:** motor awareness, self-agency, mindfulness meditation, MBSR