

## **From Trance to Transcendence during Meditation**

### **Results:**

A total of 16 mindfulness meditators (MM) underwent both MEG measurement and structural MRI. Of these, a total of 12 had previously served in an EEG study with us, and their EEG data are reported (as part of a larger set) in a forthcoming publication (Berkovich-Ohana, Glicksohn, & Goldstein, under review).

We report: (1) that default mode network (DMN) activity is identified as reduced gamma mean phase coherence (MPC) during the transition from resting state to a time-production task; (2) a state increase in alpha MPC; (3) MM-induced trait reduction in right theta and left alpha and gamma MPC.

In our MEG study, we devised a novel protocol for assessing a change in time perception, space perception and perception of self, and focus on three specific experiences: a sense of timelessness, a sense of spacelessness and a sense of selflessness. Common brain regions underlying the spacelessness and timelessness conditions were found only for theta activity, including the bilateral parietal and medial frontal cortex, the right temporo-parietal cortex and left precuneus, as well as the cerebellum.

We found that shifting from a 'narrative' self-awareness to a 'minimal' self-awareness (MS) involves extensive medial prefrontal gamma band (60-80 Hz) decrease; (2) shifting to a selfless mode of processing is related to beta-band (13-25 Hz) decreases in a network that includes medial prefrontal, medial posterior and lateral parietal regions. These data are reported in two forthcoming publications (Berkovich-Ohana et al., under review; Dor-Ziderman et al., under review).

### **Published Work:**

#### Papers

Berkovich-Ohana, A., Dor-Ziderman, Y., Glicksohn, J., & Goldstein, A. (2013). Alterations in the sense of time, space, and body in the mindfulness-trained brain: a neurophenomenologically-guided MEG study. *Frontiers in Psychology*, 4:912. doi: 10.3389/fpsyg.2013.00912

Berkovich-Ohana, A., Glicksohn, J., & Goldstein, A. (2013). Studying the default mode and its mindfulness-induced changes using EEG functional connectivity. *Social Cognitive and Affective Neuroscience*. doi: 10.1093/scan/nst153

Dor-Ziderman, Y., Berkovich-Ohana, A., Glicksohn, J., & Goldstein A (2013). Mindfulness-induced selflessness: a MEG neurophenomenological study. *Frontiers in Human Neuroscience*, 7: 582. doi: 10.3389/fnhum.2013.00582

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Berkovich-Ohana, A., Glicksohn, J., & Goldstein, A. (2012). Mindfulness-induced changes in resting state activity - implications for the default mode network, self-reference and attention. *Clinical Neurophysiology*, 123(4), 700-710. doi: 10.1016/j.clinph.2011.07.048

Glicksohn, J., & Berkovich-Ohana, A. (2011). From trance to transcendence: A neurocognitive approach. *The Journal of Mind and Behavior*, 32, 49-62.

#### Chapters

Glicksohn, J., & Berkovich-Ohana, A., (2012). Absorption, immersion, and consciousness. In J. Gackenbach (Ed.), *Video game play and consciousness* (pp. 83-99). New York: Nova Science Publishers, Inc.

### **Areas of interest:**

Time Perception; Consciousness; EEG/MEG

### **Researcher's contacts:**

Joseph Glicksohn, Ph.D. Department of Criminology, and The Leslie and Susan Gonda (Goldschmied) Multidisciplinary Brain Research Center, Bar-Ilan University, Ramat Gan, 52100, Israel.

E-mail: [jglick@post.bgu.ac.il](mailto:jglick@post.bgu.ac.il).

Tel: 972-3-5318221

Fax: 972-3-7384038