

Mindfulness meditation shapes synchronization of brain networks for effective perceptual decision making

ABSTRACT:

Background

Meditation is as an awareness training resulting in alterations in attention, perception and cognition. Theoretical and empirical papers show effects of meditation on focused and sustained attention. Conceivably, improved attention skills also impact on perceptual sensitivity and decision-making performance although scarce evidence exists.

Aims

We aim at understanding whether and how mindfulness meditation training affects attention, perception and decision making and the rhythmic interplay between brain networks involved in these processes.

Method

We designed a visual perceptual decision-making task (study1- S1) in meditators and non meditators. Subjects monitor incoherently moving dots for periods of coherent motion. Additionally, we used in-house multivariate connectivity to detect behaviorally relevant long-range synchronization in a cued visual attention paradigm [1] in non meditators (study2- S2). MEG data were acquired in both studies. In S1, modulations of power were analyzed in response to coherent motion. In S2, modulations of connectivity were analyzed in response to cue presentation.

Results

In S1, in non meditators a sustained decrease of alpha power is observed in occipital and parietal areas after coherent motion, the strength of which varies with the task difficulty. Such a decrease is not observed in meditators. In S2, an increase in alpha connectivity between occipital and parietal areas in response to the cue presentation is found.

Conclusions

In both studies a role for alpha in enhancing or reducing inhibition of parietal and occipital regions is observed. A Brain Theory of Meditation [2] has also been put forward providing theoretical support for the role of power and connectivity modulations.

Keywords

Mindfulness meditation, Phase synchrony, Magnetoencephalography, Brain Rhythms

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Published Work:

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