

Beyond "mindfulness" and toward a modern science of meditative mastery and spiritual transformation

ABSTRACT:

Background

Mindfulness meditation is a contemplative practice informed by Buddhism that targets the development of present-focused awareness and non-judgment of experience. Interest in mindfulness is burgeoning, and it has been shown to be effective in improving mental and physical health in clinical and non-clinical contexts.

Aims

In this report, for the first time, we used electroencephalography (EEG) combined with a neurophenomenological approach to examine the neural signature of “cessation” events, which are dramatic experiences of complete discontinuation in awareness similar to the loss of consciousness, which are reported to be experienced by very experienced meditators, and are proposed to be evidence of mastery of mindfulness meditation.

Method

We intensively sampled these cessations as experienced by a single advanced meditator (with over 23,000 hours of meditation training) and analyzed 37 cessation events collected in 29 EEG sessions.

Results

Spectral analyses of the EEG data surrounding cessations showed that these events were marked by a large-scale alpha-power decrease starting around 40 seconds before their onset, and that this alpha-power was lowest immediately following a cessation. Region-of-interest (ROI) based examination of this finding revealed that this alpha-suppression showed a linear decrease in the occipital and parietal regions of the brain during the pre-cessation time period. Additionally, there were modest increases in theta power for the central, parietal, and right temporal ROIs during the pre-cessation timeframe, whereas power in the Delta and Beta frequency bands were not significantly different surrounding cessations.

Conclusions

By relating cessations to objective and intrinsic measures of brain activity (i.e., EEG power) that are related to consciousness and high-level psychological functioning, these results provide evidence for the ability of experienced meditators to voluntarily modulate their state of consciousness and lay the foundation for studying these unique states using a neuroscientific approach.

Keywords

Meditation, Advanced meditation, Neuroimaging, Phenomenology, Neurophenomenology.

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