



Bringing the Mind Back: Neural Oscillations Associated with Refocusing Attention after a Mind Wandering Episode



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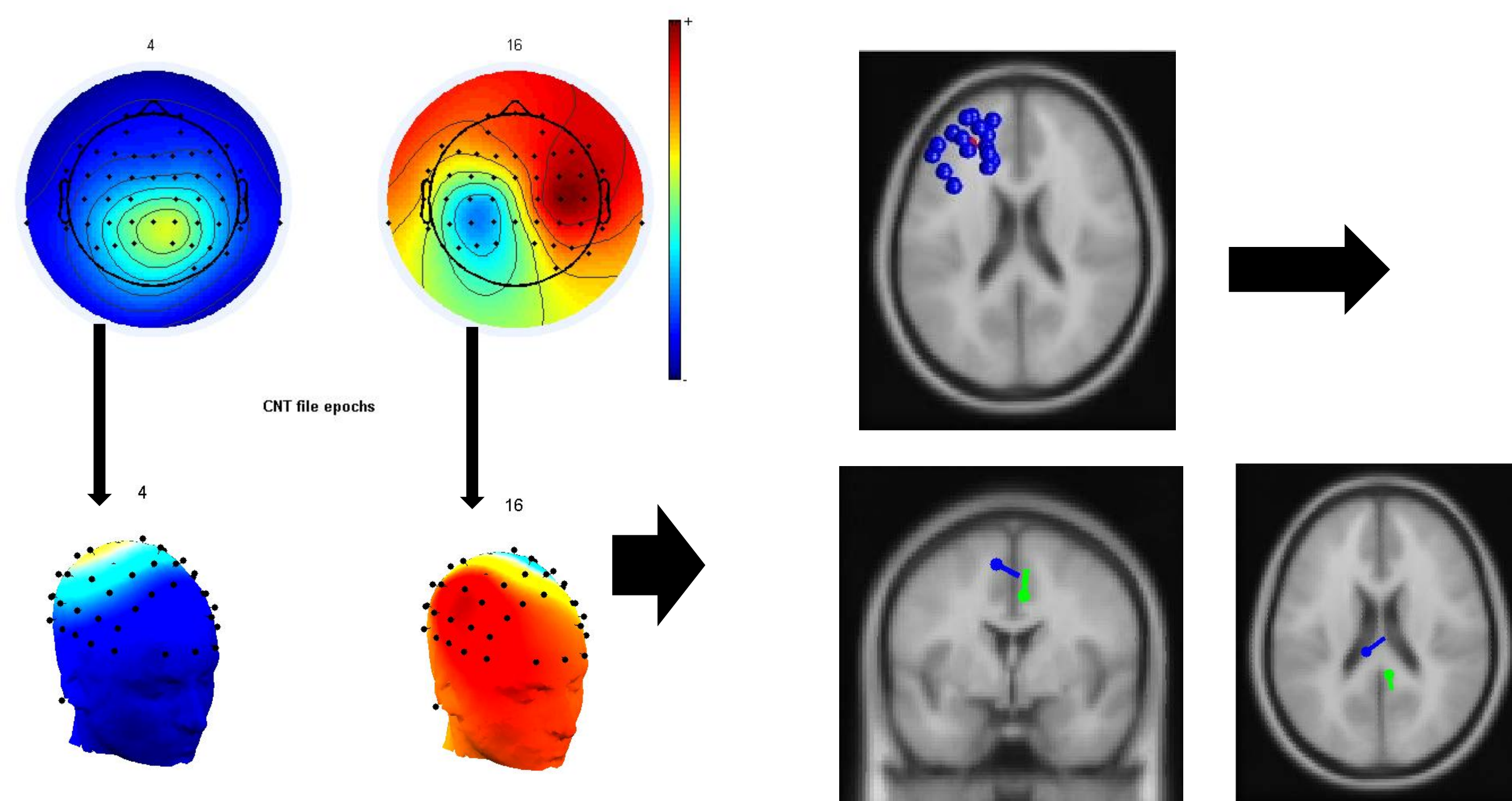
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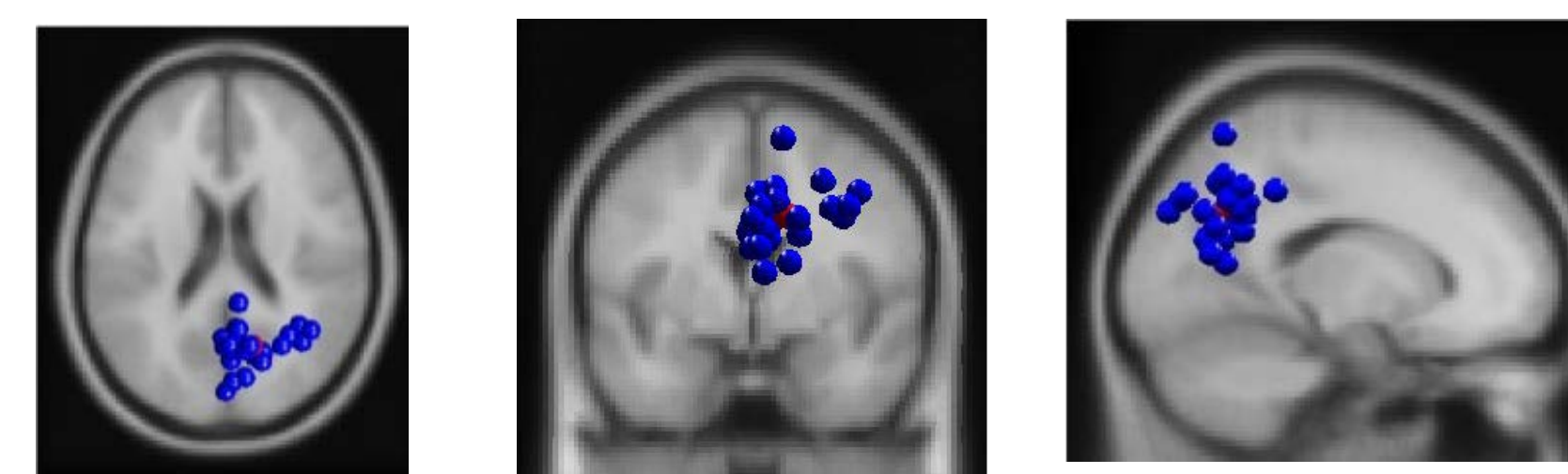
INTRODUCTION

- Mind wandering (MW) episodes occur when individuals lose focus and drift into thinking about past or future events (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009).
- The states of MW and focused attention have been shown to activate different neural networks, including (Hasenkamp, Wilson-Mendenhall, Duncan, & Barsalou, 2012):
- The Default Mode Network (DMN) is associated with MW episodes.
- The Frontoparietal Control Network (FPCN) is implicated in cognitive control, decision-making, and goal-oriented behavior.
- Though neural networks have been identified with fMRI, more work is needed to elucidate how networks interact during MW and focused attention (Vincent, Kahn, Snyder, Raichle, & Buckner, 2008).
- Event-related spectral perturbation (ERSP) analyses have been used to directly measure the neural communication in some tasks, but few studies have examined MW (Braboszcz & Delorme, 2011).
- Independent component analysis (ICA) and dipole modeling can be used to measure EEG activity from separate brain sources.

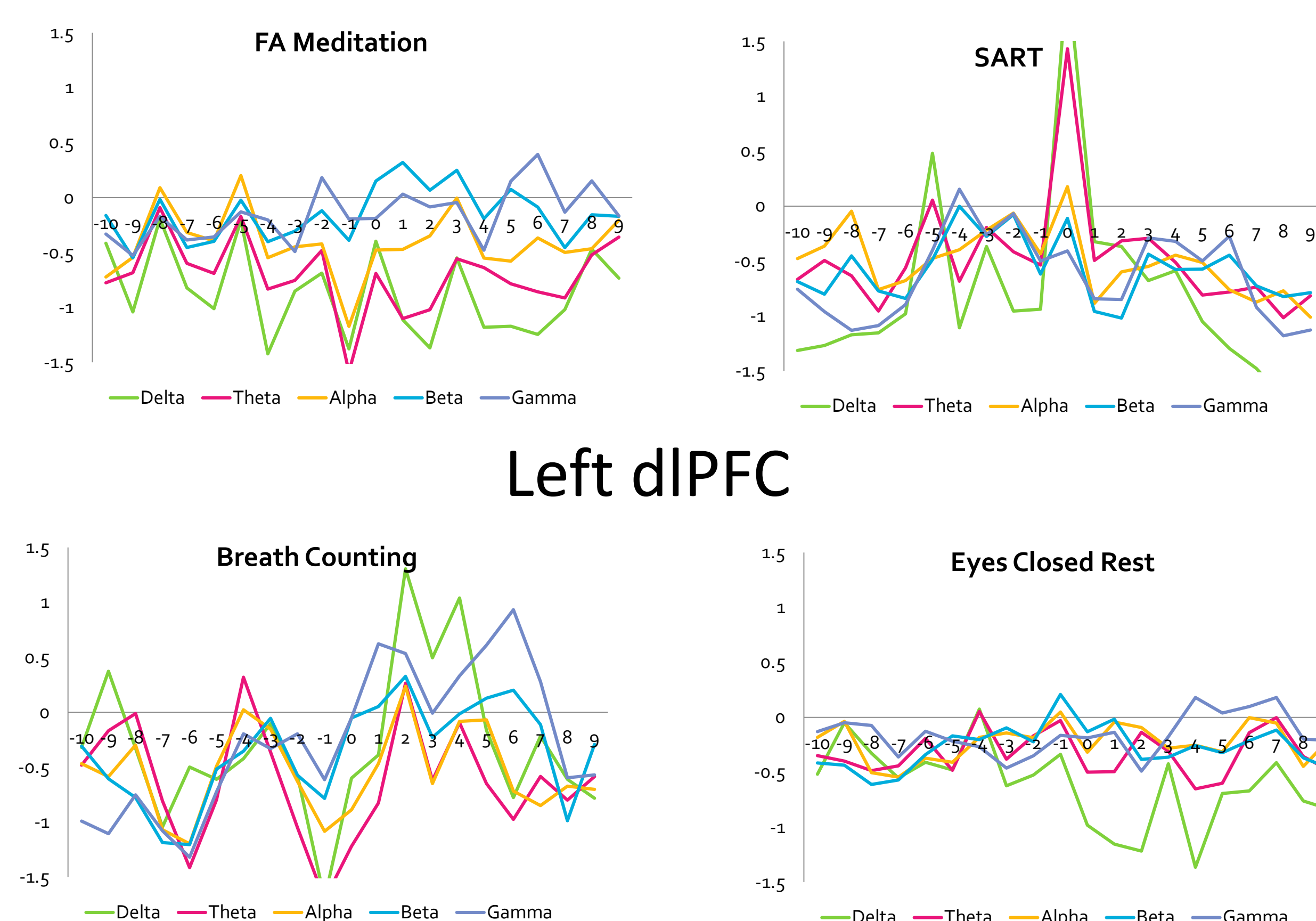
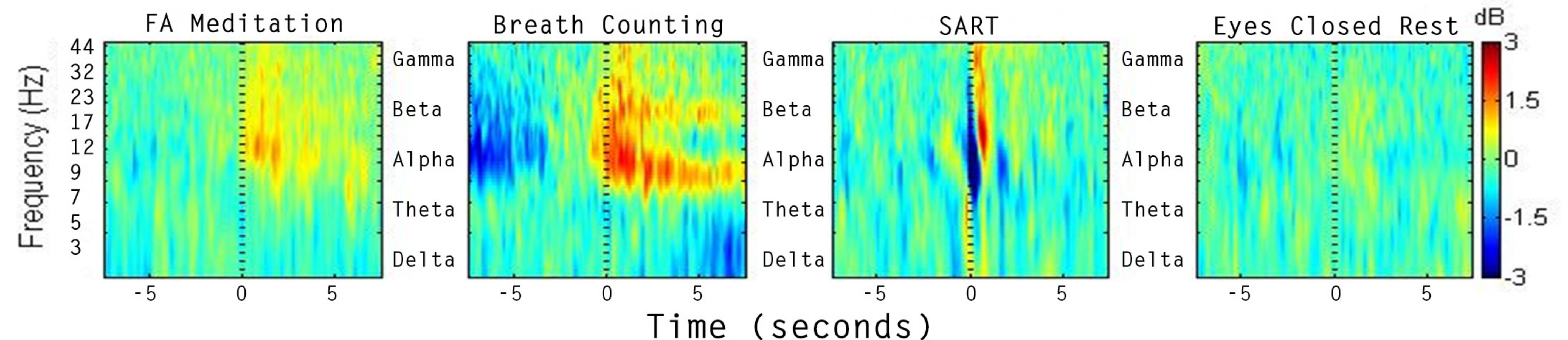


METHODS

- EEG data was recorded during:
 - focused attention (FA) meditation
 - breath counting
 - eyes closed rest
 - Sustained Attention to Response Task (SART)
- Infomax (ICA) and dipole source modeling were performed to estimate the brain sources of ERSPs within the EEG data.
- Example: rPCC



RESULTS



RESULTS CONT'D

- Components of the DMN (right/left PCC, IPL, and mPFC) were found to have higher alpha and beta activity, and lower delta and theta activity, after participants became aware of their MW, which may be indicative of an inhibition in self-related cognitions.
- The OFC, insula, and left dlPFC (all components of the FPCN) increased delta, theta, beta, and gamma activity immediately following awareness of MW, indicating the cognitive control network was recruited to refocus attention.
- Different frequency band patterns emerged from each condition.

CONCLUSIONS

- Increased alpha and beta activity in the DMN occurs as attention is focused.
- Novice meditators appear to have a limited ability to inhibit DMN activity.
- EEG, ICA, and ERSP analyses can be used to explore network dynamics with high temporal resolution.

REFERENCES

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