



Meditation in Motion

EEG state changes following Tai Chi practice using MUSE headband.

Background

- Freq estimates neural activity: beta (12+ Hz), alpha (8-12 Hz), theta (4-8 Hz), delta (1-4 Hz)
- Meditation - alpha and high theta with practice
- Frontal theta & ERP - attention/focus
- Meditation - positive psychological benefits: anxiety, calm, focus

(Herrmann, 1991; Cahn & Polich, 2006)

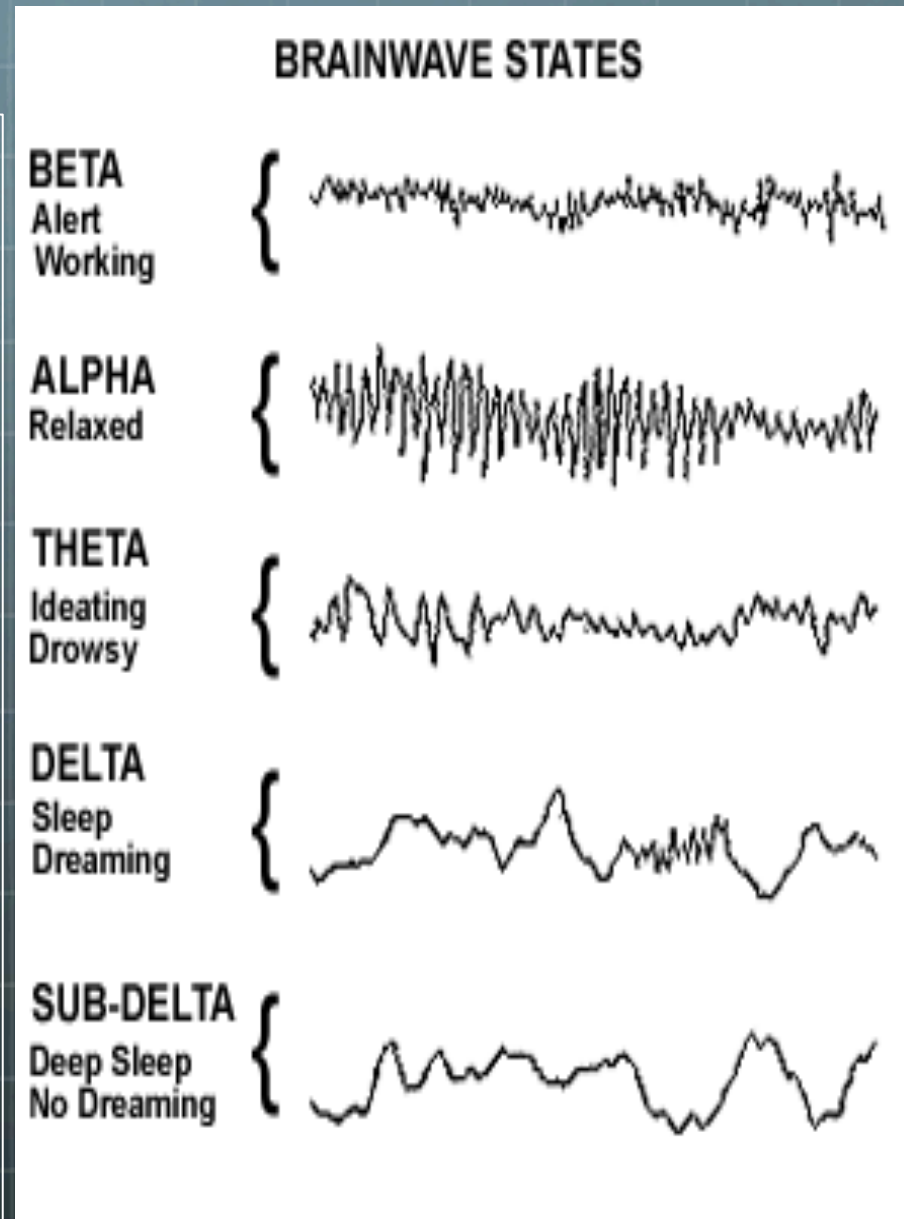


Figure 1. Brainwave frequencies. Adopted from Herrmann (1991).

- Participants = 5
- Mean age = 38.8 y
- Tai Chi class, 1-hr
- Raw EEG 5 min, pre- and post-class
- Data analyzed using PEER app and FFT (Matlab)



Results

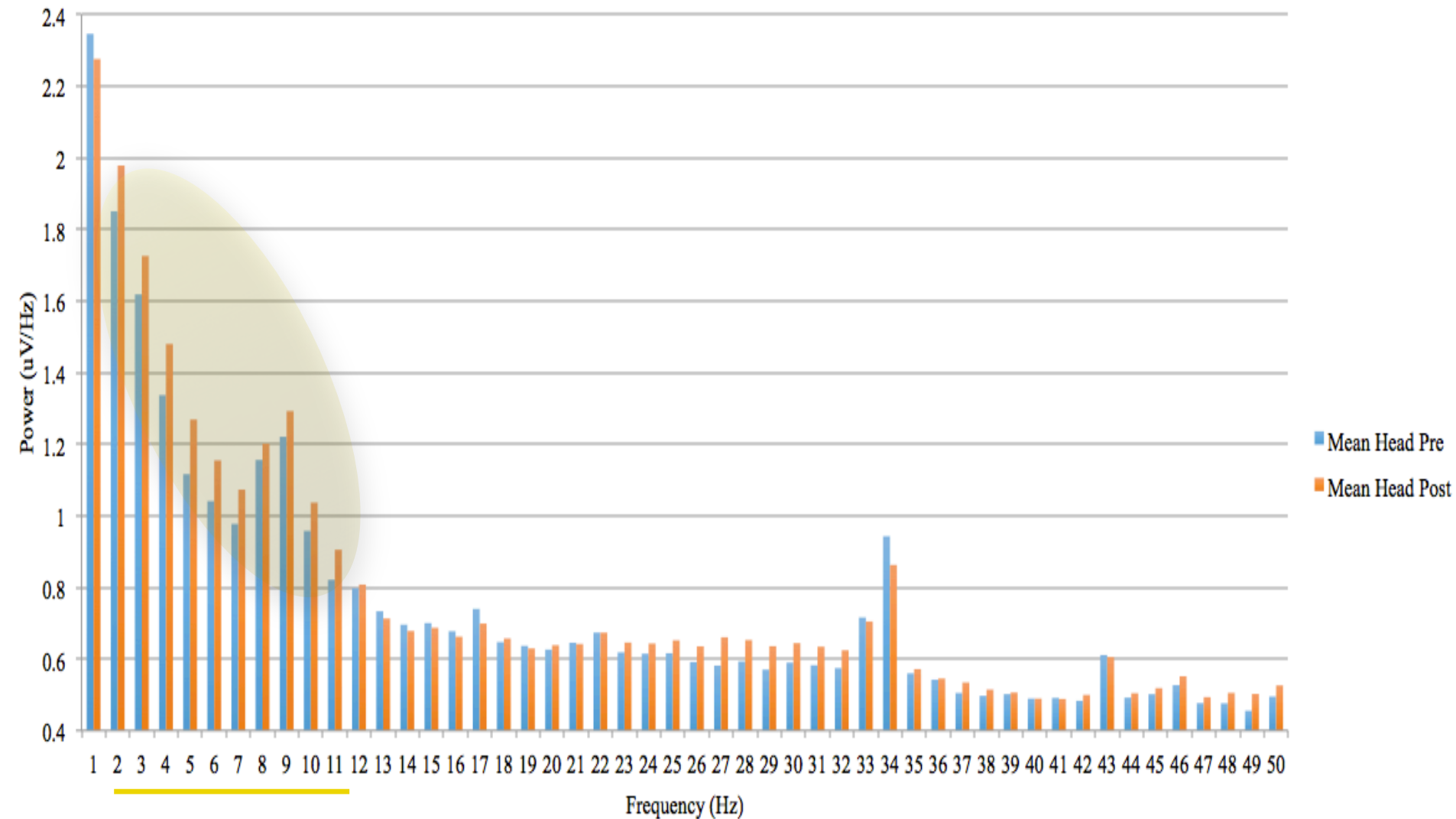


Figure 2. MUSE EEG mean frequency pre- and post-Tai Chi. Shows average activity including electrode locations TP9, AF7, AF8, TP10.

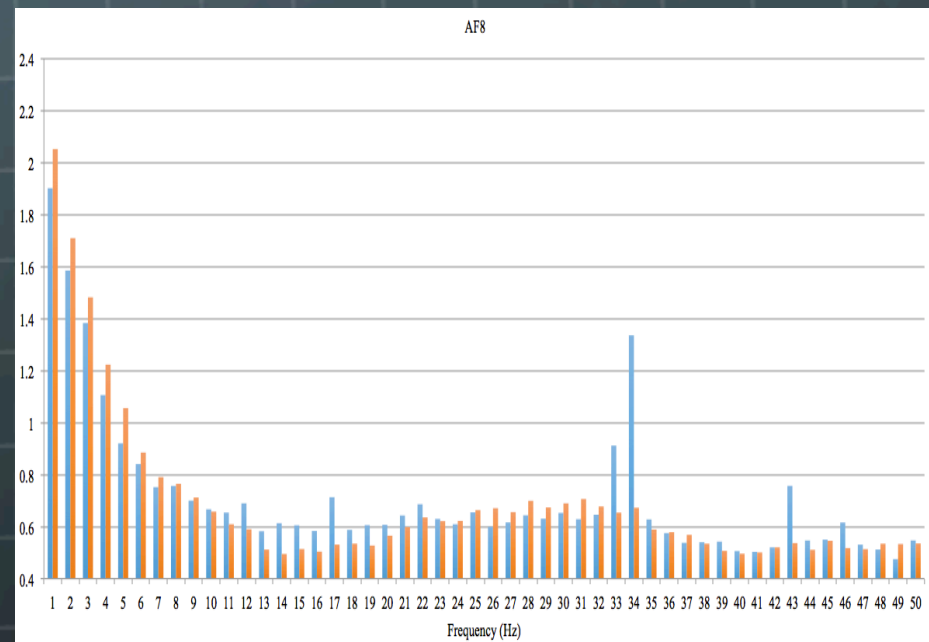
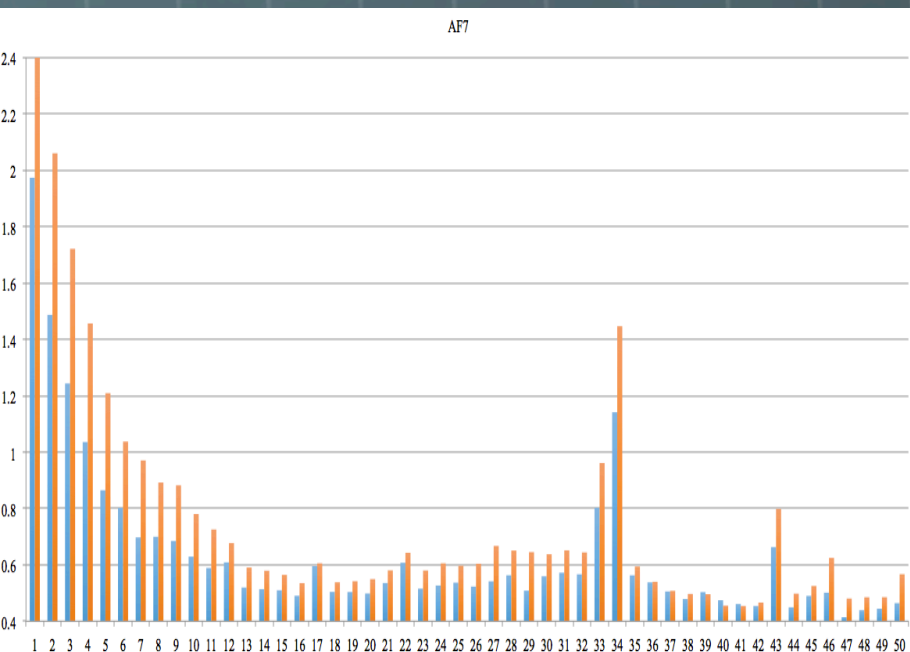
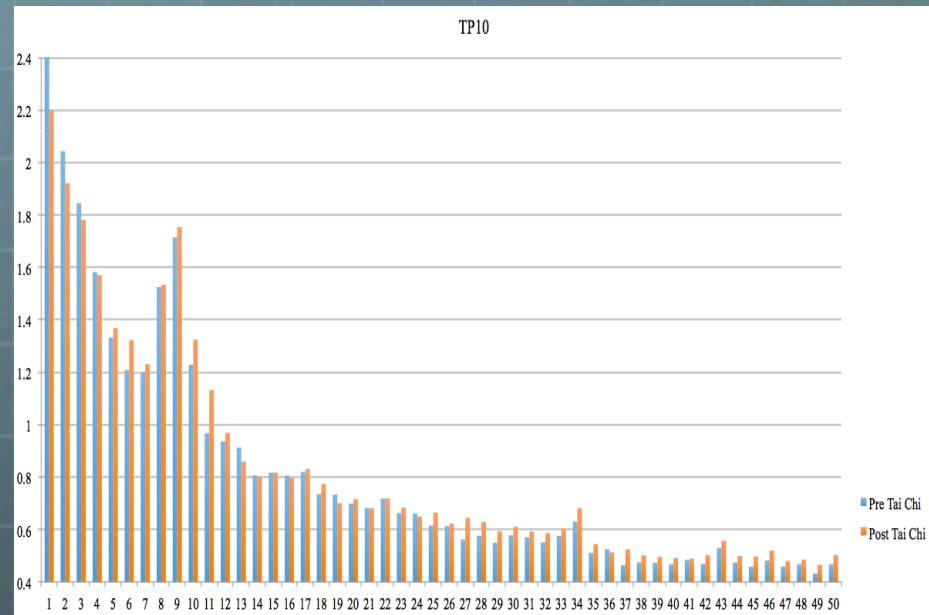
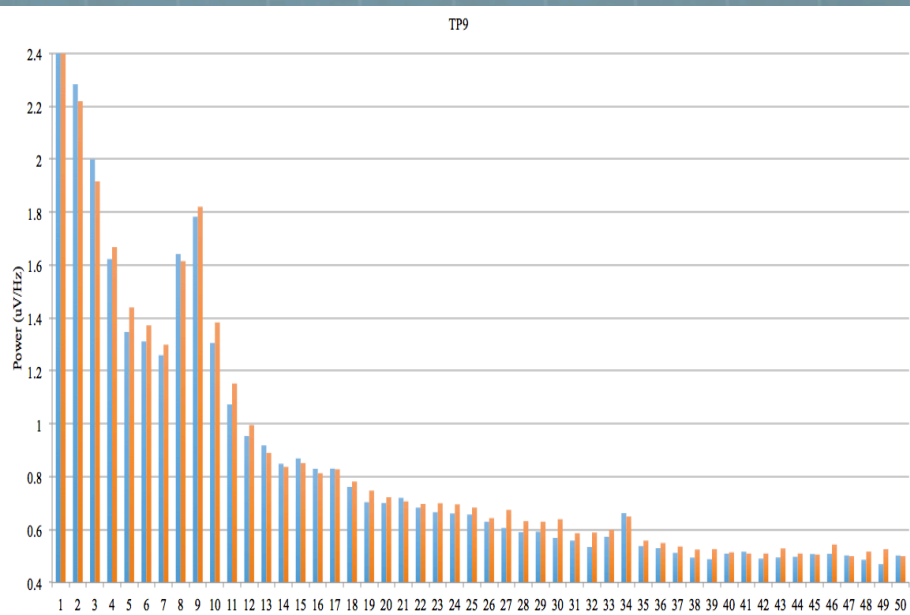


Figure 3. EEG frequencies average in four domains: TP9, TP10, AF7, AF8.

Lateralization: AF7

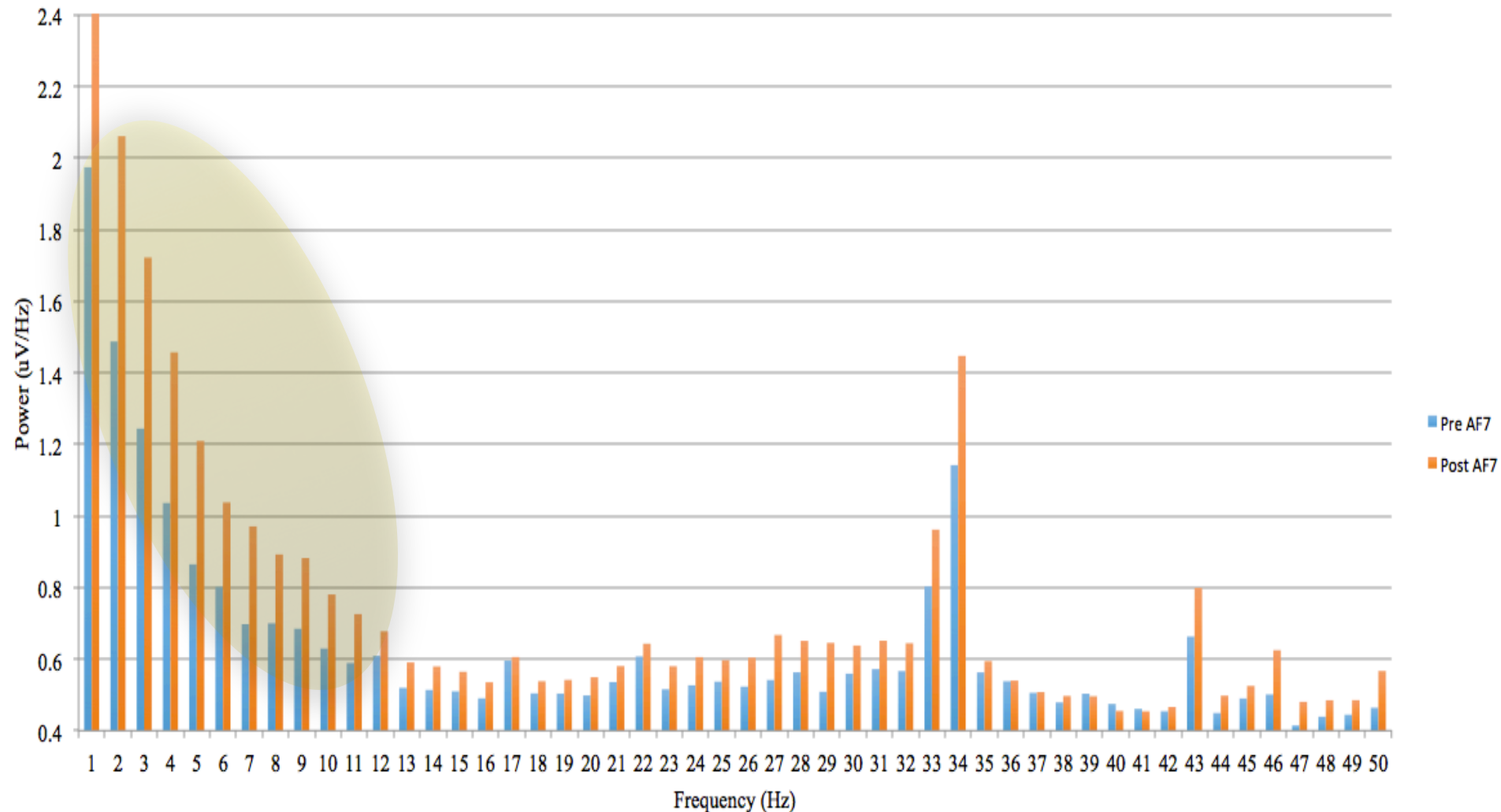


Figure 4. EEG frequencies on AF7 average over five participants.

Limitations

-  **Small sample**
-  **Environmental noise**
-  **Did not test statistical significance**
-  **Lacking control group**

Strengths

-  **In situ representation**
-  **Diverse demographics**
-  **Novel design**

Implications

- Tai Chi exhibits similar neural traits as meditation
- Supports Tai Chi for: depression, anxiety, relaxation, focus
- DLPFC & ACC implicated with theta (PET scans)

- Lateralization associated with external focus, visual imagery, positive emotions
- Comparison to aerobic physical exercise
- Comparison to concentrative exercise

References

-  Cahn, B. R., & Polich, J. (n.d.). Meditation States and Traits: EEG, ERP, and Neuroimaging Studies. <https://doi.org/10.1037/0033-2909.132.2.180>
-  Crosson, B., Sadek, J. R., Maron, L., Gökçay, D., Mohr, C. M., Auerbach, E. J., ... Briggs, R. W. (2001). Relative shift in activity from medial to lateral frontal cortex during internally versus externally guided word generation. *Journal of Cognitive Neuroscience*, 13(2), 272–83. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11244551>
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