

Neural correlates of motor performance in target sports: The model of movement-related alpha gating

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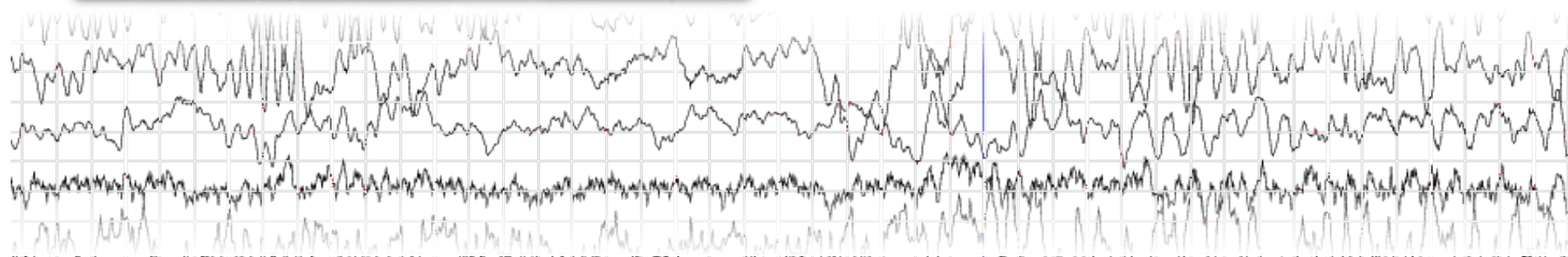
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What determines superior performance?



Electroencephalography (EEG)

Post-synaptic potentials that are synchronous within **regional** neuronal populations of the **cerebral cortex**



What determines superior performance?

2



Alpha

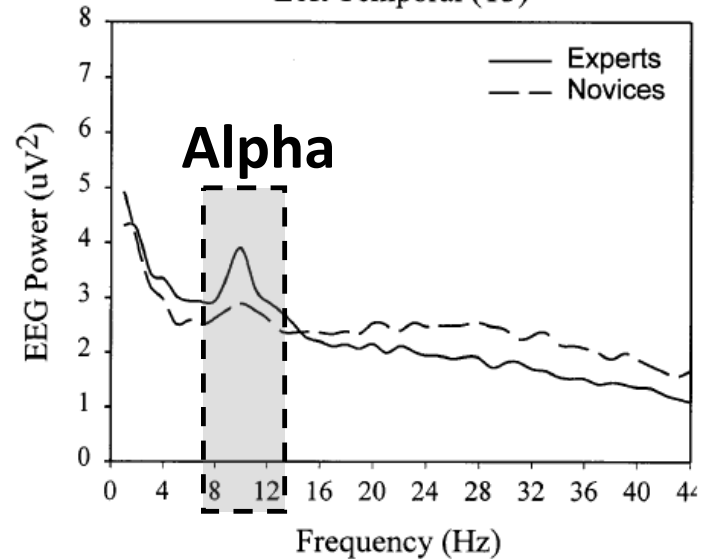
- Dominant rhythm
 - * In the awake adults
- Inhibitory function

Hatfield, 2018, *King, 2001, HSP*

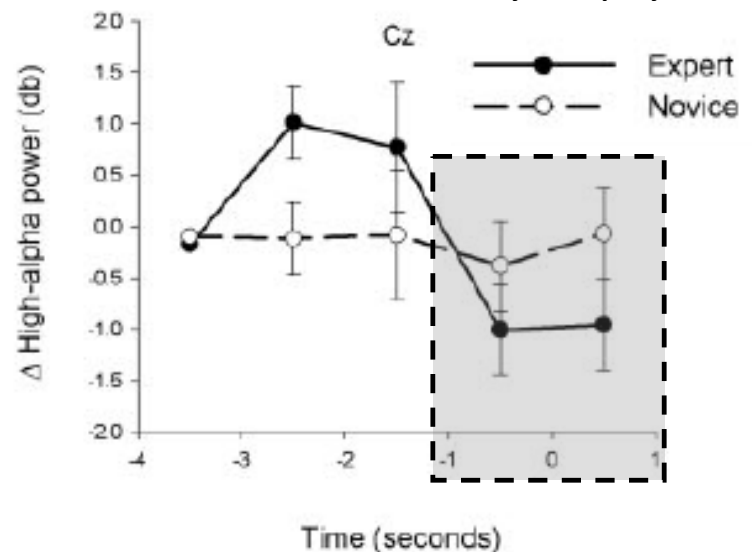
Neural efficiency

1. Pruning of unnecessary activity.
 - Superior performance associated with **decreased distractibility**
2. Enhancement of processes functional for task performance

Haufler et al., 2000, *Bio Psy*
Left Temporal (T3)

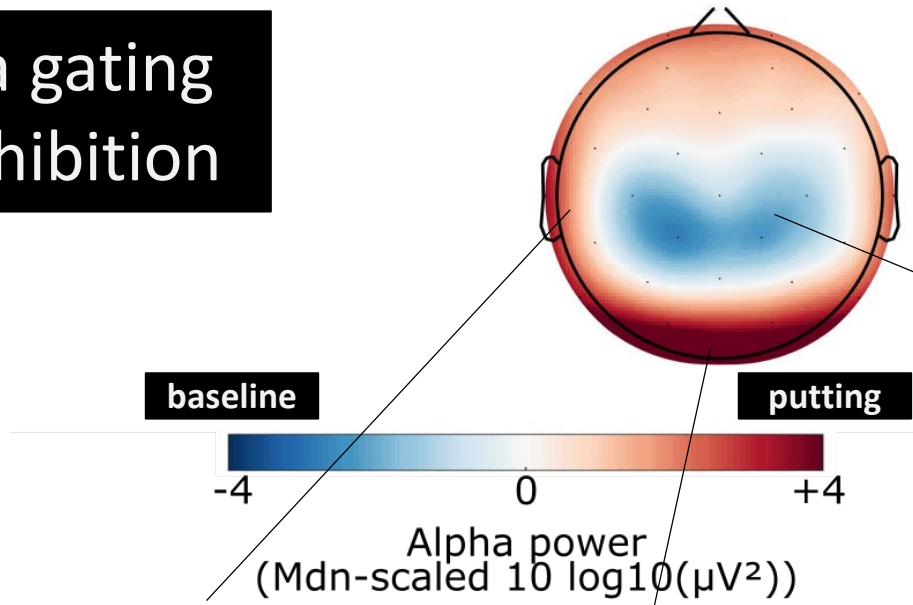


Cooke et al., 2014, *Psychophys*



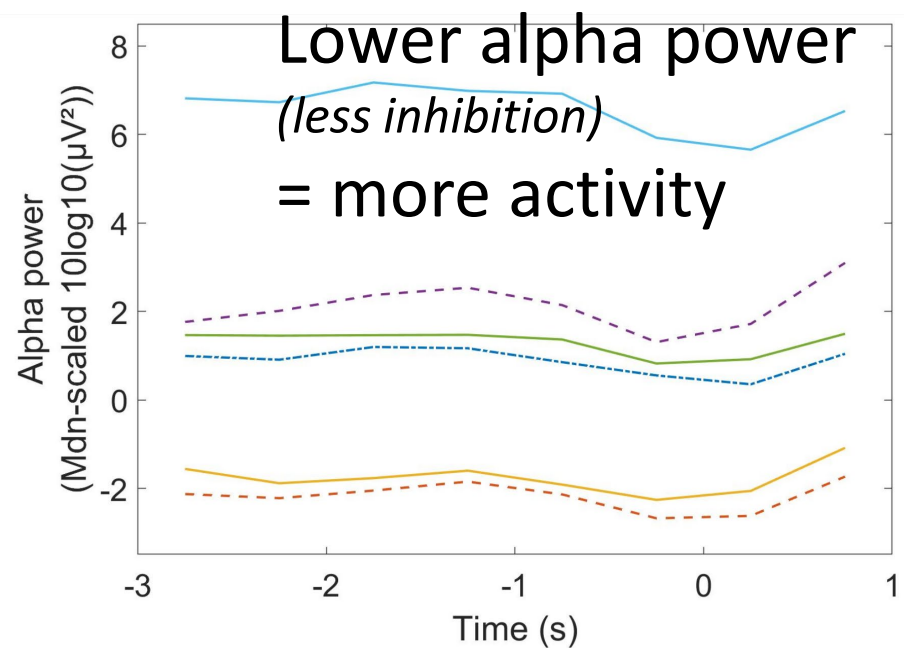
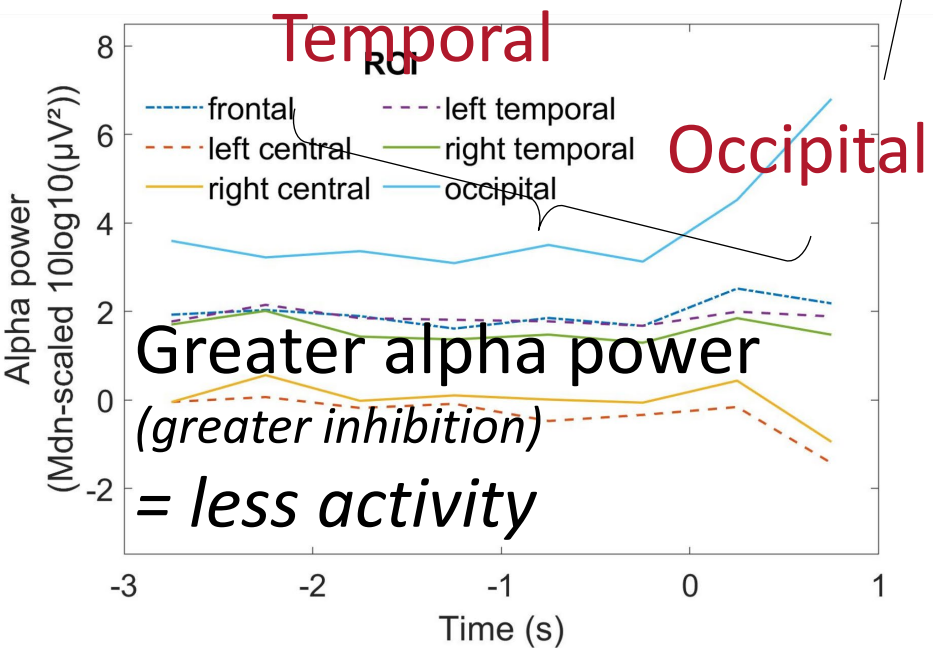


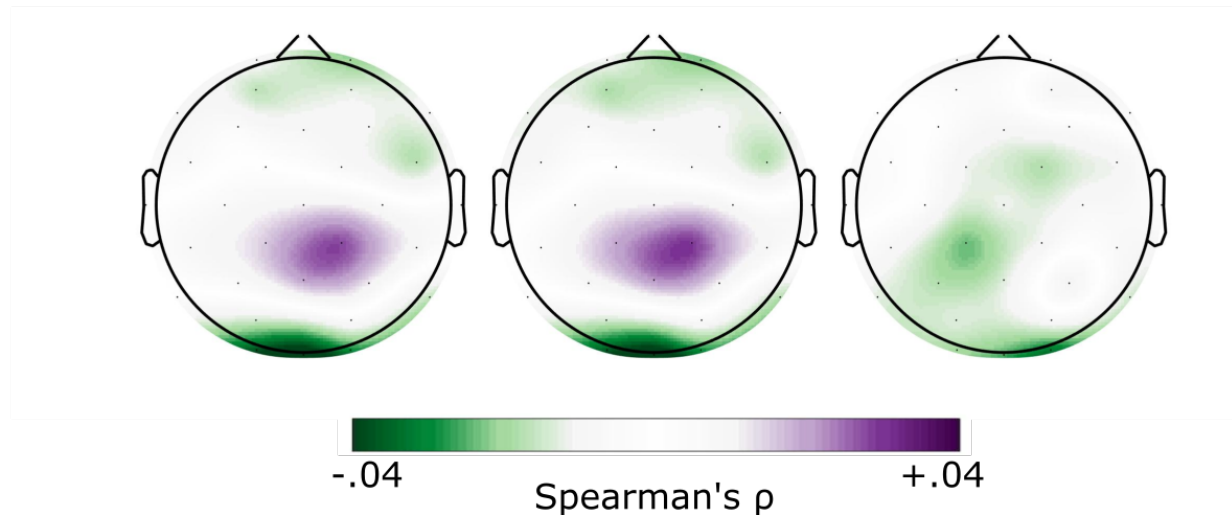
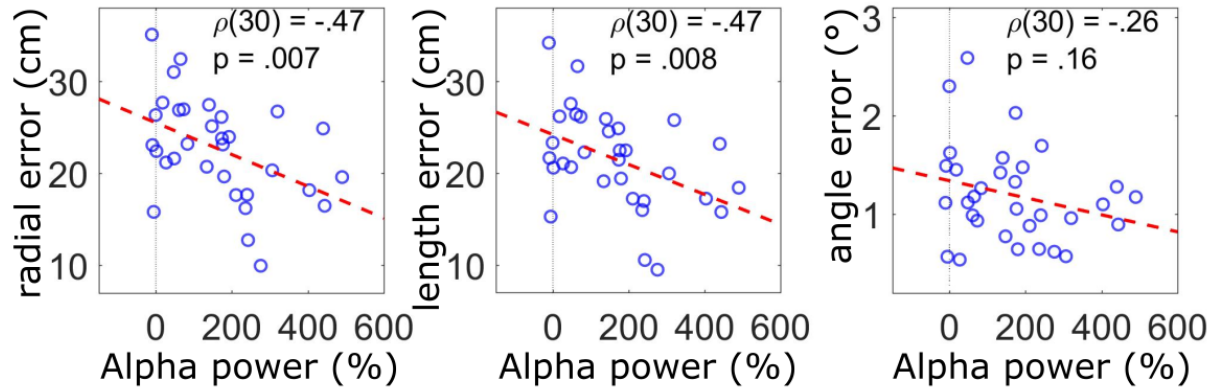
Alpha gating via inhibition



putting vs baseline

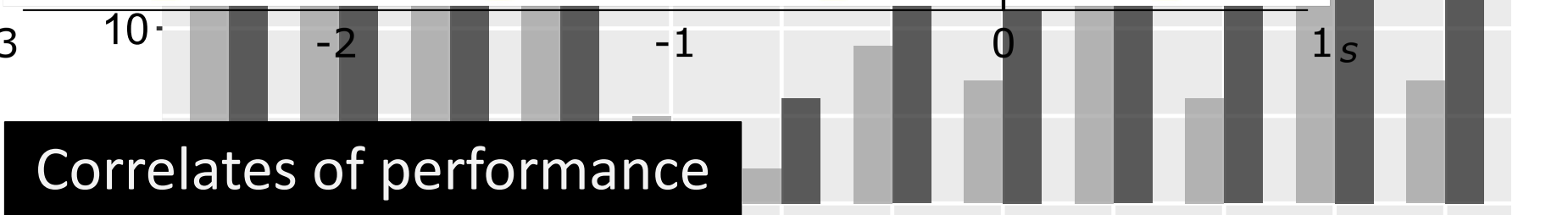
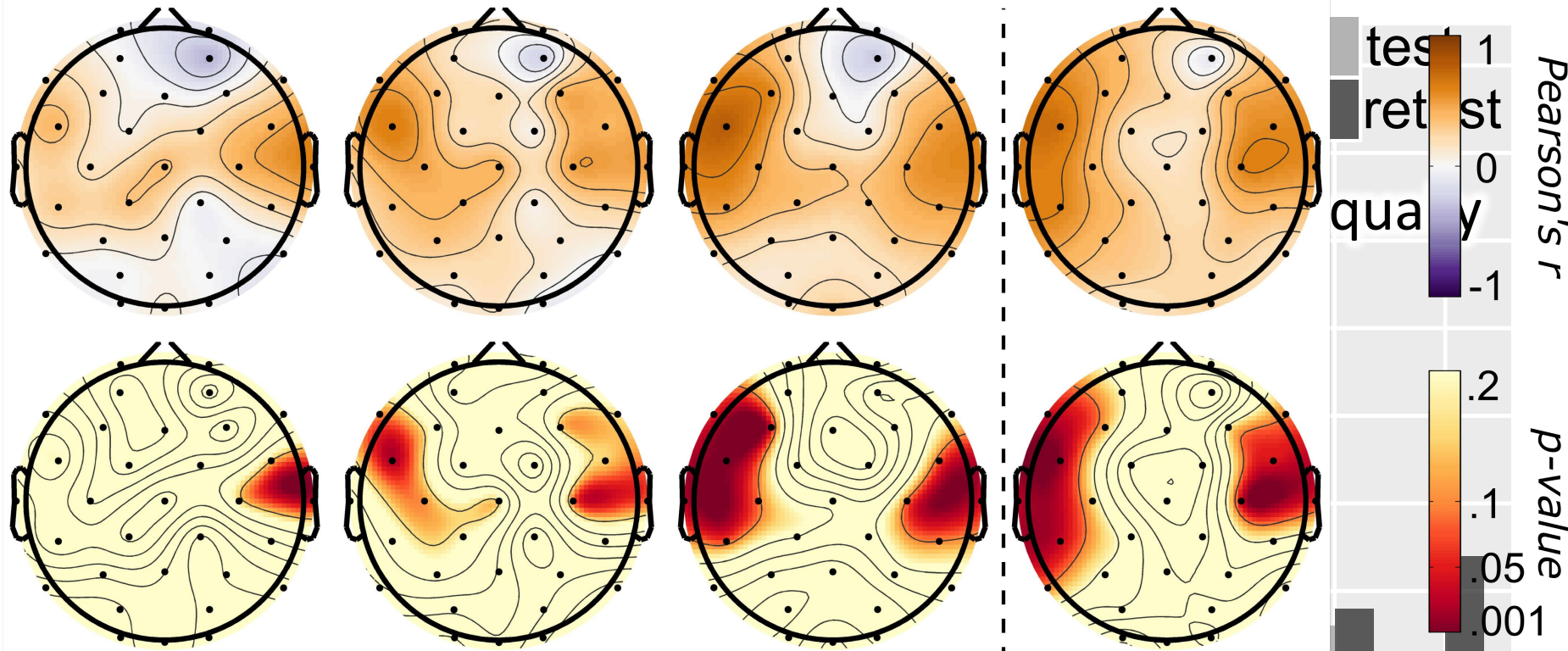
Central





Correlates of performance

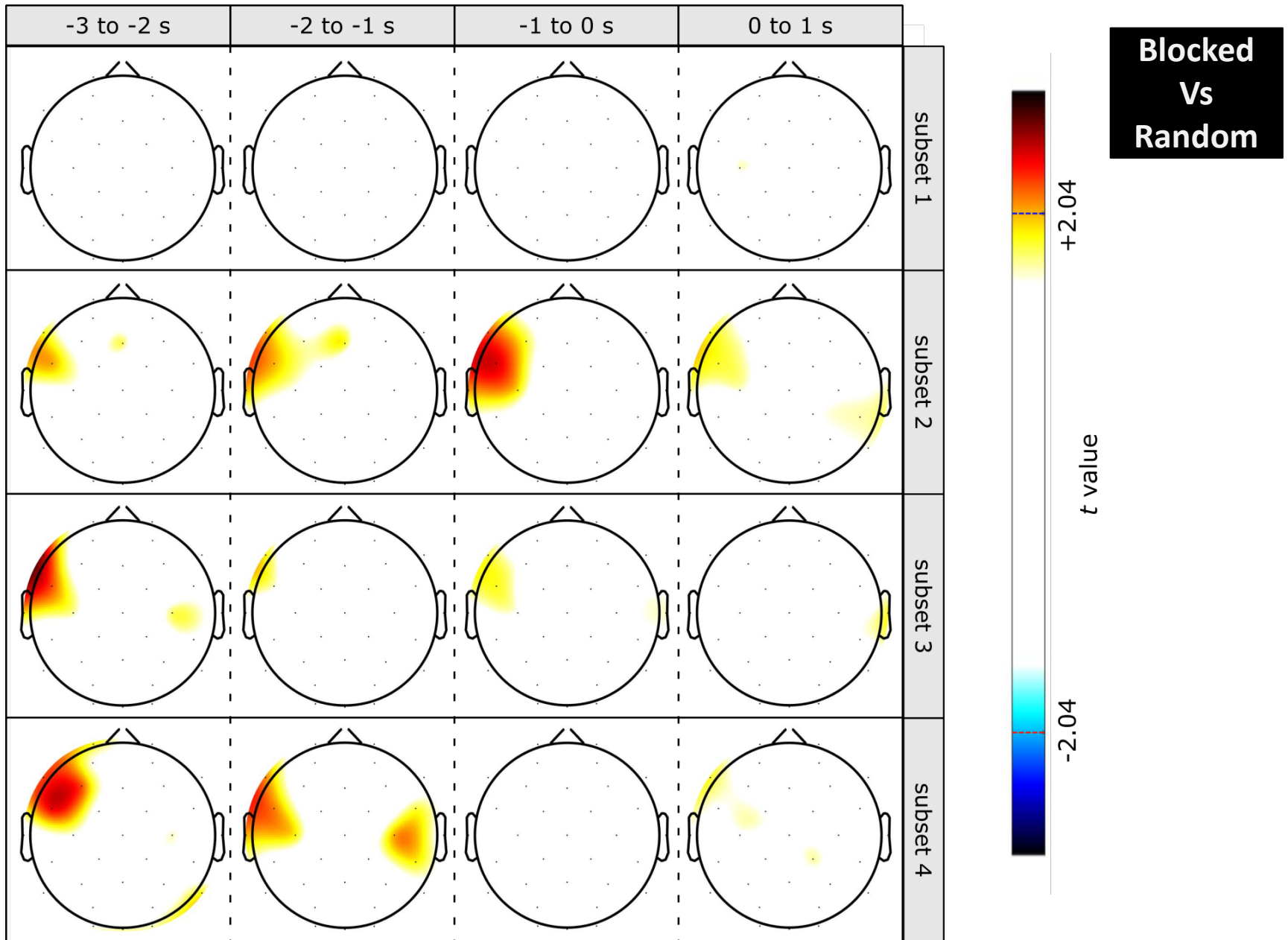
- Greater alpha power (less activity) in the occipital area
- Lower alpha power (more activity) in the central area



Correlates of performance

- Larger increases / smaller increases of temporal alpha power participants
- Mediated (partly) the performance change

Gallicchio & Ring (2019, *Psychophys*)





1. The movement-related alpha gating pattern is **task specific**



3. The development of a stronger gate mediates (partly) performance improvement due to **practice**

2. A stronger gating correlates with **performance**

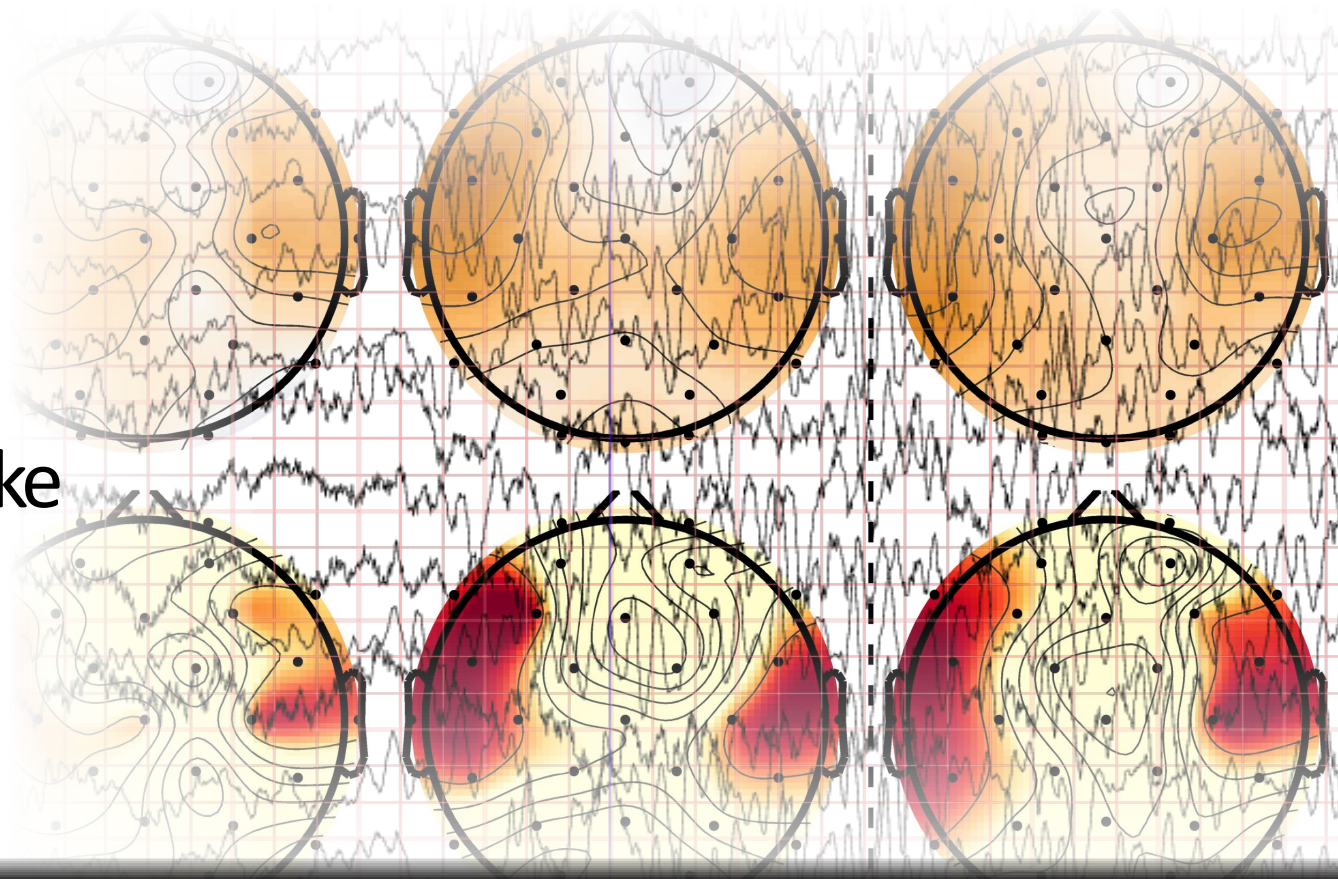
4. **Interfering** with the gating pattern may impair performance

Thank you!!

Chris Ring



Andrew Cooke



Additional reading

- Gallicchio, G., Cooke, A., & Ring, C. (2017). Practice makes efficient: Cortical alpha oscillations are associated with improved golf putting performance. *Sport, Exercise & Performance Psychology*, 6(1), 89-102.

<https://dx.doi.org/10.1037%2Fspy0000077>

- Gallicchio, G., & Ring, C. (2019). Don't look, don't think, just do it! Towards an understanding of alpha gating in a discrete aiming task. *Psychophysiology*, 56(3), e13298. <https://doi.org/10.1111/psyp.13298>

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