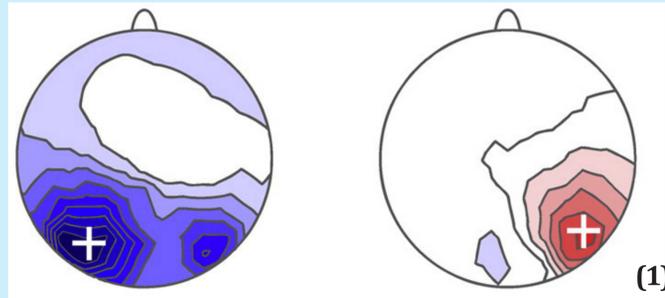


Spatial and Temporal expectations modulate alpha in brain areas tuned to task-related locations

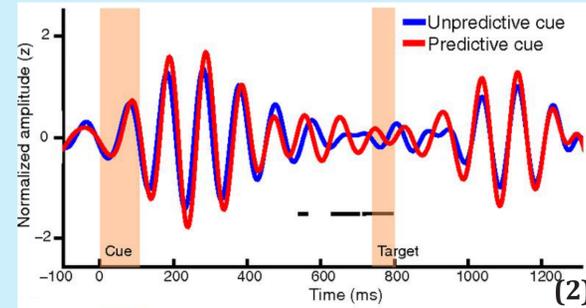
Spatial expectations modulate alpha:
 - a **decrease** in alpha power in brain areas tuned to the **Attended** location
 - an **increase** in alpha power in brain areas tuned to the **Unattended** location

Temporal expectations modulate alpha:
 - a change in alpha phase in brain areas tuned to the **Attended** location in order to synchronized with target presentation

Attended vs Unattended locations



Predictable vs Unpredictable target onsets

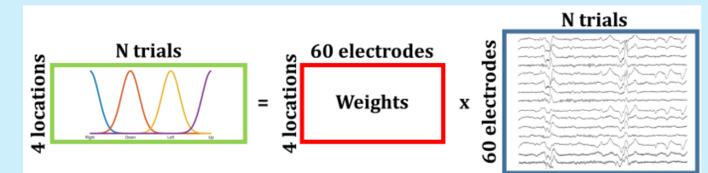


Method

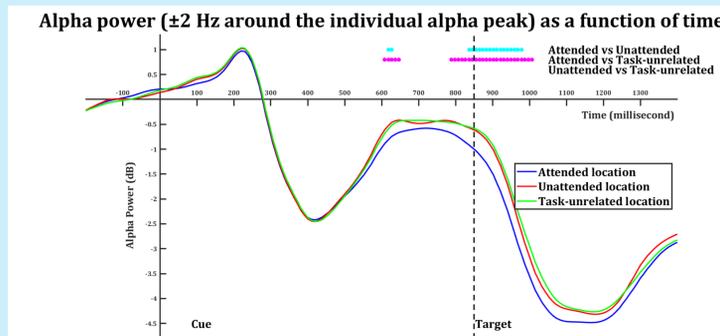
17 participants performed an orientation discrimination task:
 5 blocks with targets only left/right & 5 blocks with targets only up/down

A colored arrow as a spatio-temporal cue:
 - The arrow direction cues target **LOCATION** (75% validity)
 - The arrow color cues target **ONSET** (**Magenta** = 650 ms, **Green** = 650, 900, 1150 or 1400 ms)

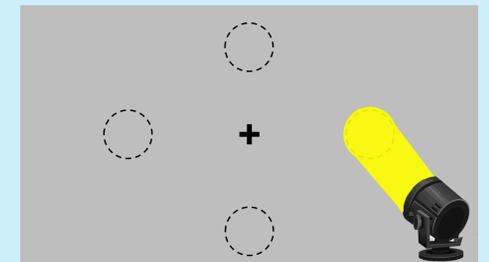
ROIs with electrodes that best fit the tuning function for each location activity



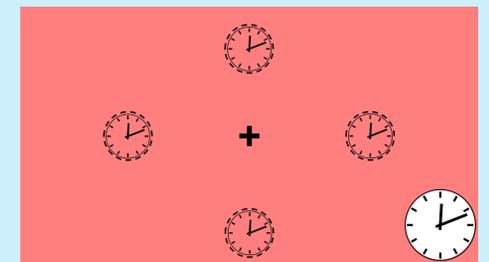
Results



Similar modulation between task-unrelated and unattended locations

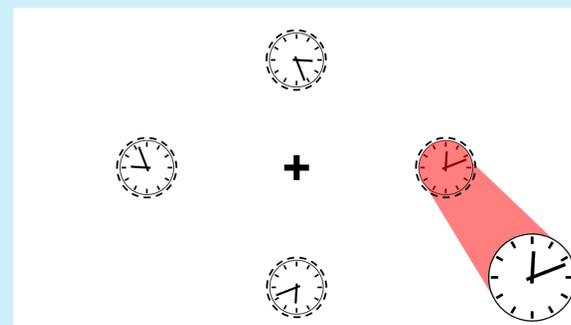
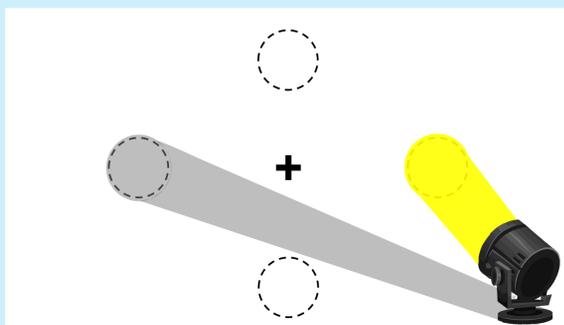


Similar modulation between task-unrelated and task-related locations

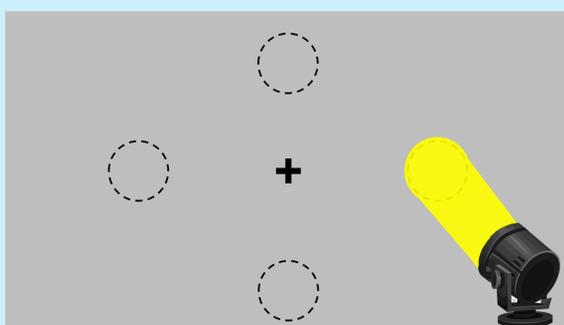


Are alpha modulations restricted to the task-related locations or extended also to task-unrelated locations?

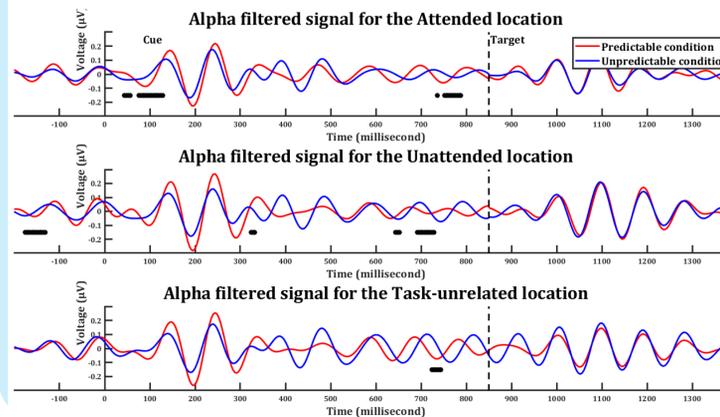
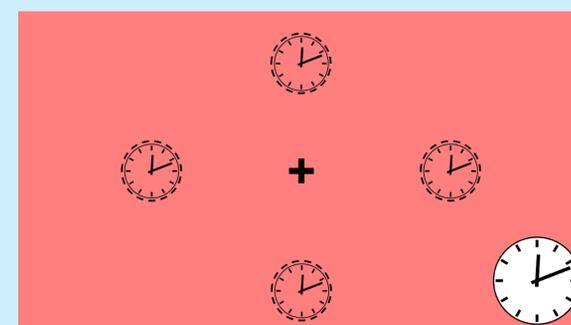
Spatial and temporal modulation could show a local or a global behavior:
Local spatial modulation **Local temporal modulation**



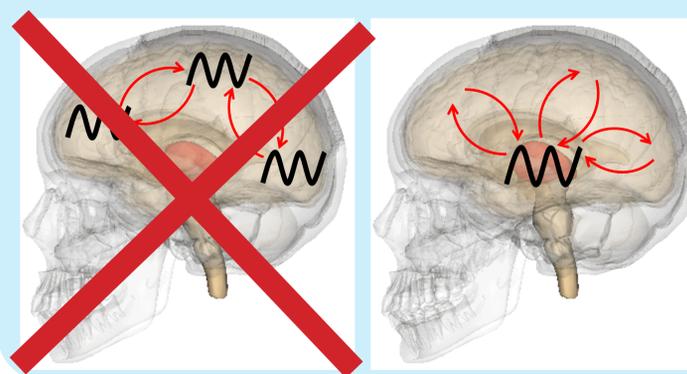
Global spatial modulation



Global temporal modulation



Conclusion



Attentional modulations in alpha frequency seem to be better understood as the global modulation of a single central oscillator, instead of local modulations of independent networks oscillating independently

Reference:
 (1) Rihs, T. A., Michel, C. M., & Thut, G. (2009). A bias for posterior α -band power suppression versus enhancement during shifting versus maintenance of spatial attention. *Neuroimage*, 44(1), 190-199.
 (2) Samaha, J., Bauer, P., Cimaroli, S., & Postle, B. R. (2015). Top-down control of the phase of alpha-band oscillations as a mechanism for temporal prediction. *Proceedings of the National Academy of Sciences*, 112(27), 8439-8444.