Are attention-related modulations of alpha-band dynamics local or global?

Pietrelli, Mattiaa, Samaha, Jasonb, & Postle, Bradley R.a
aUniversity of Wisconsin-Madison, Madison, bUniversity of California, Santa Cruz

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 synchronize with target presentation

Attended vs Unattended locations

Predictable vs Unpredictable target onsets

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**

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)

Method

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

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

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:

email: pietrelli@wisc.edu