Temporal evolution of brain connectivity upon awakening from slow wave sleep varies by cognitive task

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Introduction

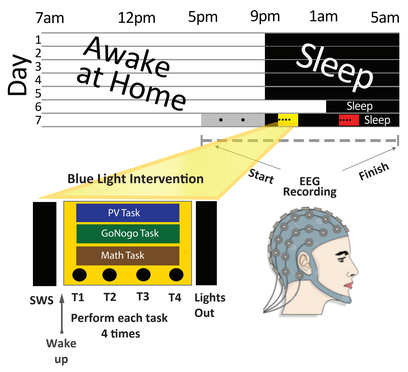
What is Sleep inertia?
- the state of transition between sleep and wake
-characterized by impaired alertness, confusion, and reduced cognitive and behavioral performance

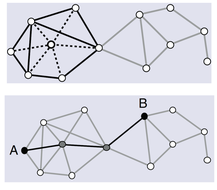
Open Questions:
- What is impact of blue-enriched light on sleep inertia?
- How does this depend on the cognitive task performed after waking?

Goals:
To understand how exposure to blue-enriched light during sleep inertia attenuates brain networks while engaging in different cognitive tasks.

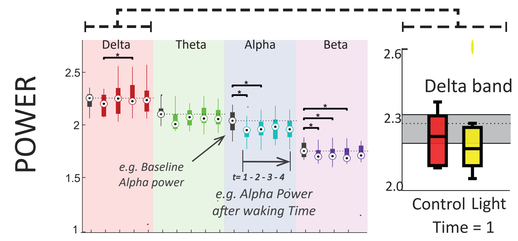
Methods

Explore the waking brain from a graph theoretical perspectve

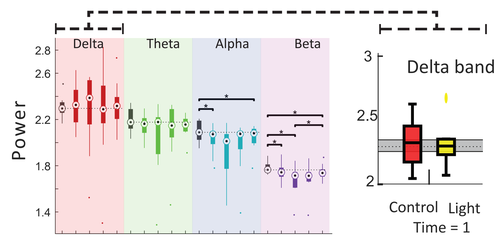




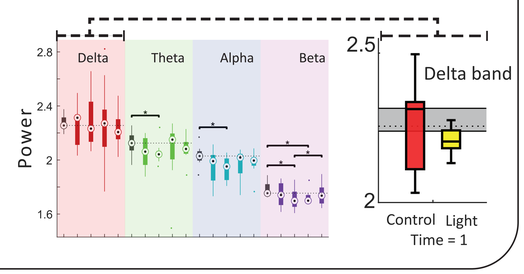
Power accross time during a PV task



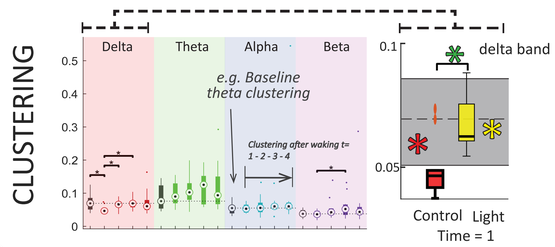
Power across time during a GoNogo Task



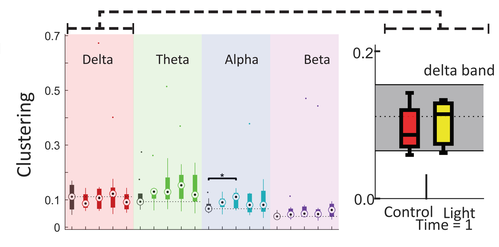
Power across time during a Math Task



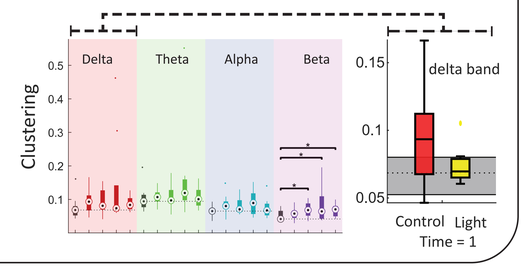
Clustering across time during a PV Task



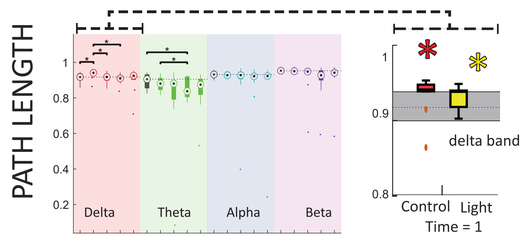
Clustering across time during a GoNogo Task



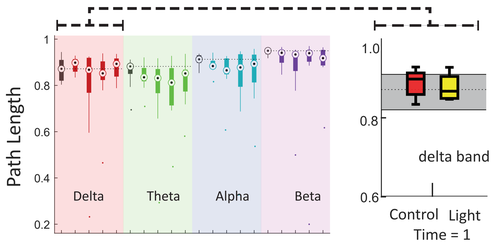
Clustering across time during a Math Task



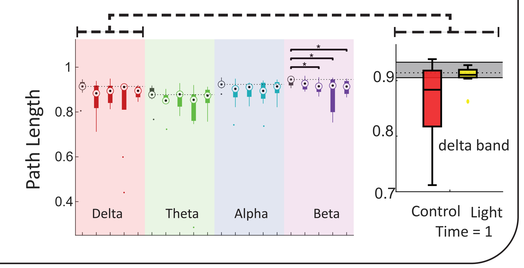
Path Length across time during a PV Task



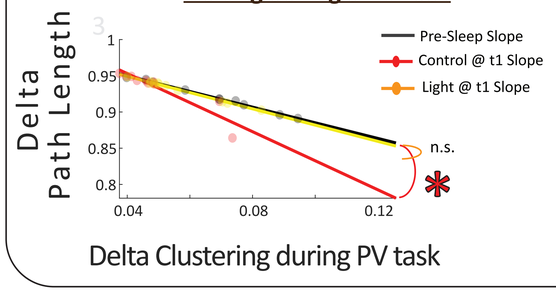
Path Length across time during GoNogo Task



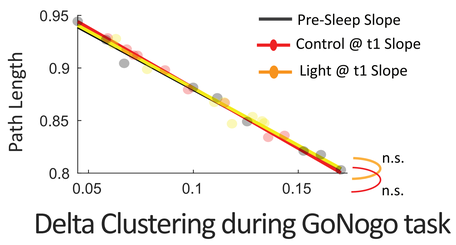
Path Length across time during a Math Task



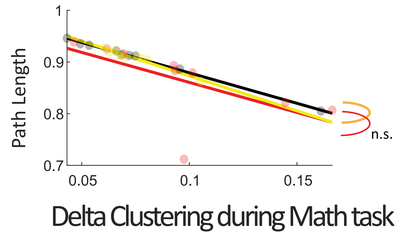
Delta Clustering Vs. Path Length after waking during a PV Task



Delta Clustering Vs. Path Length after waking during a GoNogo Task



Delta Clustering Vs. Path Length after waking during a Math Task



Discussion

Finding 1:
Power effects are stable across tasks during sleep inertia with and without blue light exposure

Finding 2:
Network metric effects during sleep inertia are task specific and may or may not be impacted by intervention with blue light.

Final Remarks:
Two different neural schemes may underly sleep inertia...

one that gradually recovers and impacts all that we do (i.e., power)

another that is sensitive to task and intervention, reconfiguring the brain as new task demands emerge

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