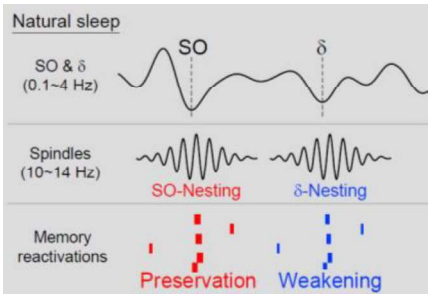
Abstract

- Slow oscillations (SO; 0.5-1 Hz), sleep spindles (12-15 Hz), and their temporal coupling, have been well characterized and associated with memory consolidation
- Delta waves (1-4 Hz) also play a critical role in memory processing *of rodents*, through a competitive interplay between SO-spindle and delta-spindle coupling
- Their functional role in humans is unclear

Study aims:

i) Delineate the coupling of delta waves to spindles
ii) Investigate interactions of delta- and SO related activity and
iii) Determine their role in human memory formation.



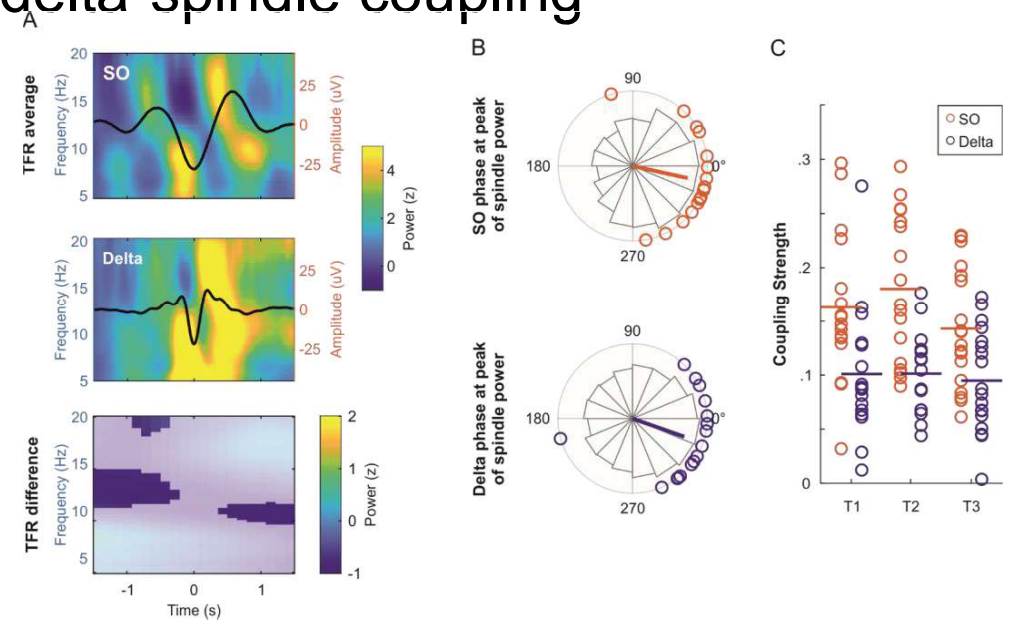
Modified from Kim et al.(2019)

Related publications:

–Kim et al., Cell (2019)
–Wüst et al., The Journal of Neuroscience (submitted)

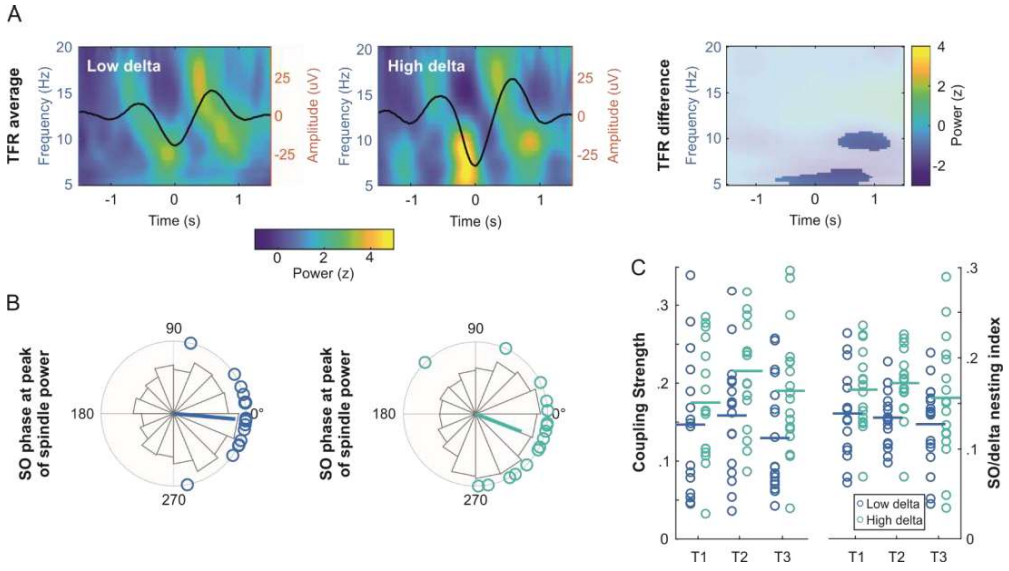
Characteristics of delta-spindle coupling

- n = 19 healthy older adults: 3 naps with EEG recording, Auditory Verbal Learning Test (AVLT)
- Spindle power **peak is around the up-state** for both SO and delta events
- **Coupling strengths of spindles to SOs significantly higher** as compared to delta waves

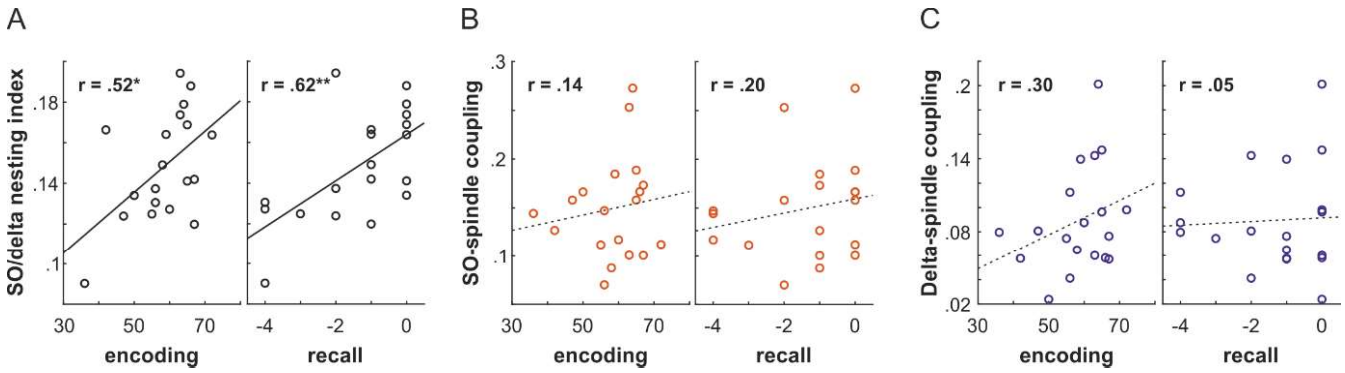


Dependency between SO- and delta-related activities

- No differences in TFR
- SO-spindle coupling **more synchronous in low delta power** intervals
- Coupling **strength higher in the high delta power** condition



Functional role of coupling parameter for memory



- **SO and delta coupling alone was not associated with memory performance** (encoding and retrieval)
- However, **SO/delta nesting index was associated with memory performance**