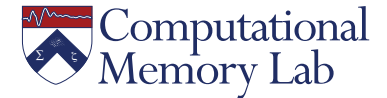


# Spectral correlates of contextual processing during memory encoding

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## Introduction

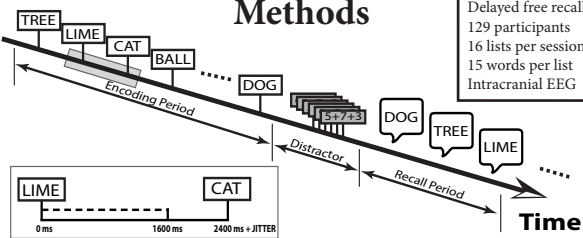
- Do activation increases during successful memory formation reflect memory specific processing or a mnemonic attentional signal?
- Associative encoding is a memory specific process whereby study items are encoded along with their spatiotemporal context, leading to consecutive recall or *clustering* of study neighbors at test

Is there a subsequent clustering effect (SCE) which directly relates to the subsequent memory effect (SME) or is the SME purely attention?

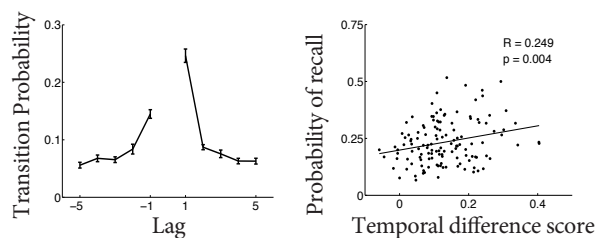
Kahana, 1996; Kim, 2011; Long et al., 2014

## Methods

Delayed free recall  
129 participants  
16 lists per session  
15 words per list  
Intracranial EEG



## Behavioral evidence of clustering

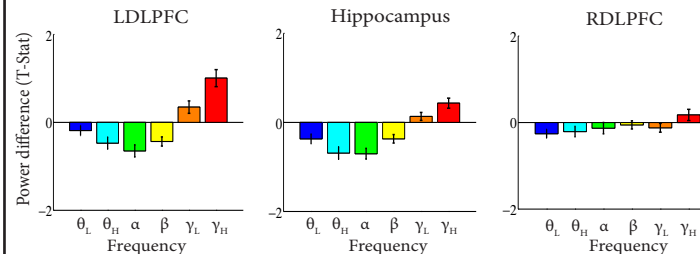


- Participants reliably cluster
- Clustering is positively related to recall performance

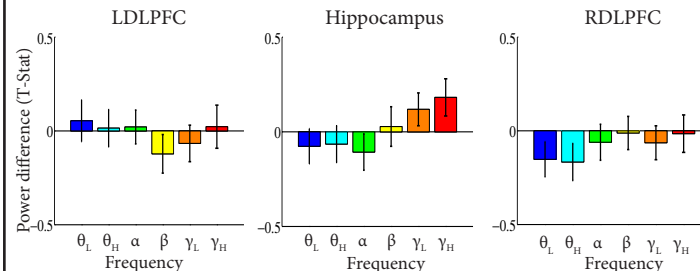
Contact: niclong@sas.upenn.edu

## Subsequent memory and clustering effects

### Subsequent memory effect (SME) Recalled > Not recalled



### Subsequent clustering effect (SCE) Recalled > Not recalled

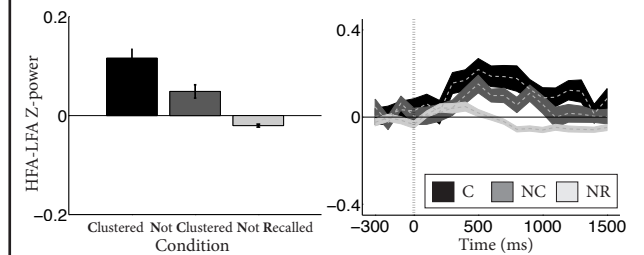


Average t-statistic of z-scored power across frequency

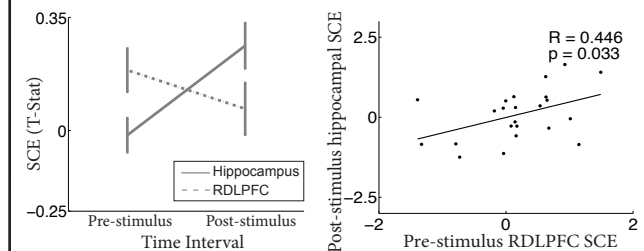


## Clustering Dynamics

Hippocampal activation tracks goodness of encoding throughout the post-stimulus period



Hippocampal SCE is specific to the post-stimulus interval and is positively coupled with RDLPFC pre-stimulus SCE



## Summary

- Subsequent clustering effect (SCE) is supported by increased activation in hippocampus
- Hippocampal activation tracks goodness of encoding
- SCE is specific to the post-stimulus interval
- Pre-stimulus RDLPFC SCE positively correlates with post-stimulus hippocampal SCE
- Successful encoding and the SME are driven by contextual mechanisms

## References

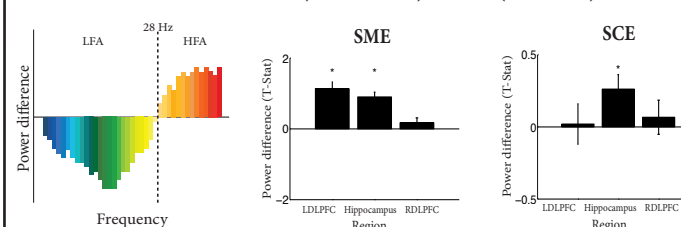
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## HFA-LFA Activation Signal

HFA increases and LFA decreases correlate with motor movement, memory formation and BOLD fMRI signals

Mukamel et al., 2005; Miller et al., 2007

Activation: HFA (28-100 Hz) - LFA (2-28 Hz)



Reprints: <http://memory.psych.upenn.edu/files/pubs/LongKaha14.poster.pdf>