EEG Biomarkers of Immediate and Delayed Verbal Recall

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INTRODUCTION

• Prior research using intracranial EEG recordings revealed increased high frequency power and decreases in lower frequency power in the moments leading up to spontaneous verbal recall (Burke et al. 2014)

• Existing methods use contrast between power during deliberation periods or leading up to intrusions

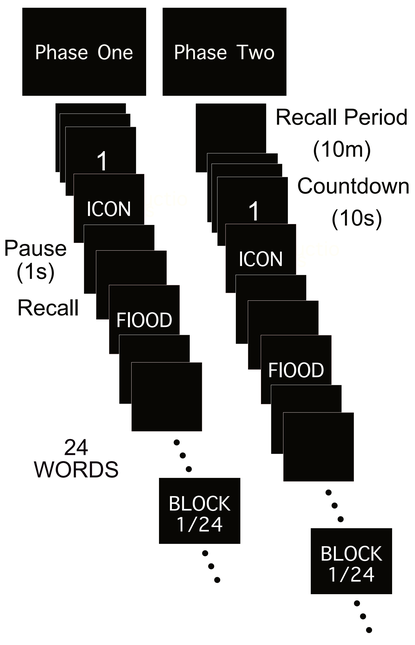
• We aim to better isolate spectral features of successful recall using extreme manipulation of retrieval demands

TASK

• Phase 1: Five sessions of immediate recall of 576 just presented words.

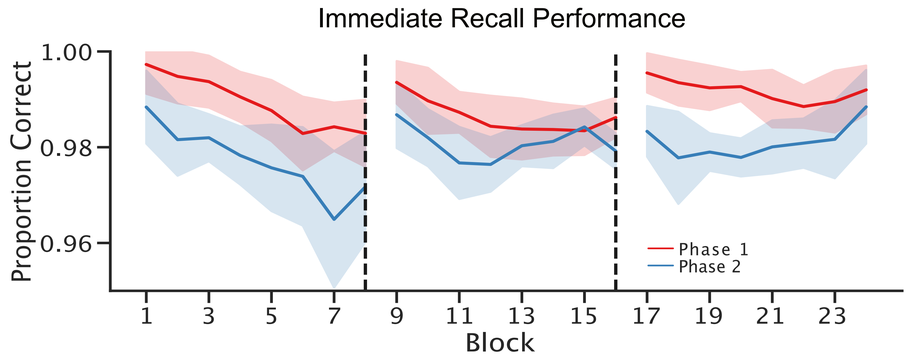
• Phase 2: Five sessions of immediate recall of 576 just presented words preceded by a ten minute recall interval.

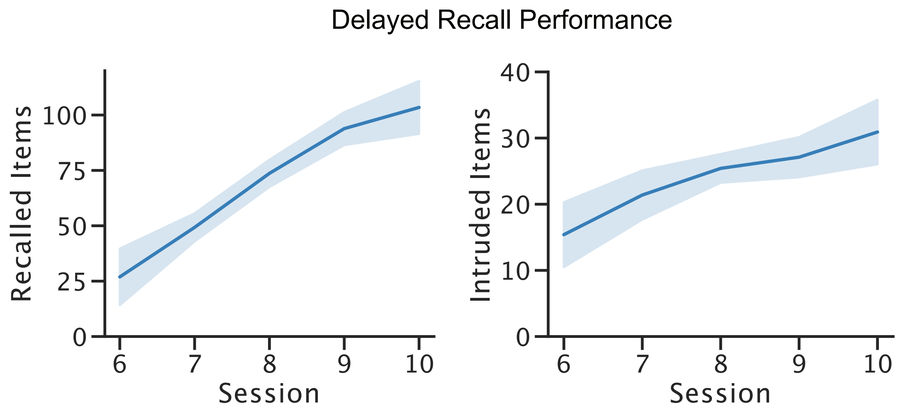
• Participants are ignorant of delayed recall test until beginning session 6

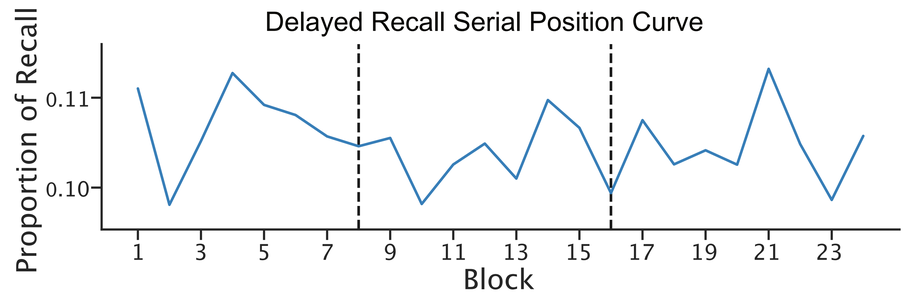


BEHAVIORAL DATA

immediate recall performance is high across all task phases and produces modest performance on surprise delayed test

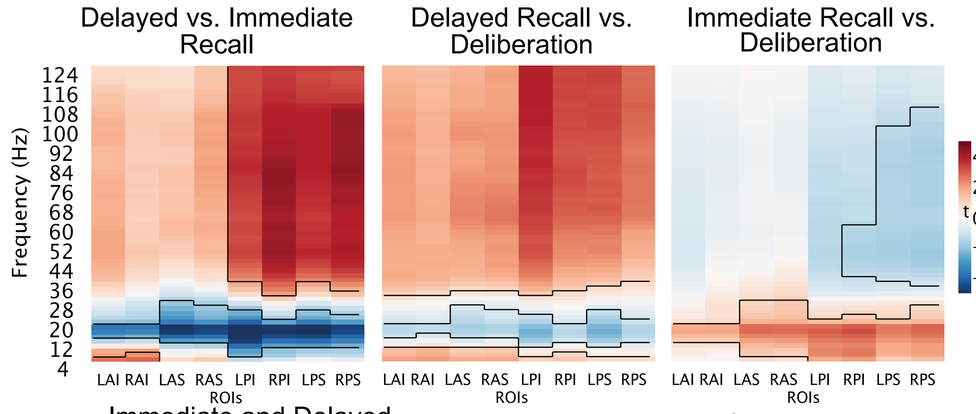


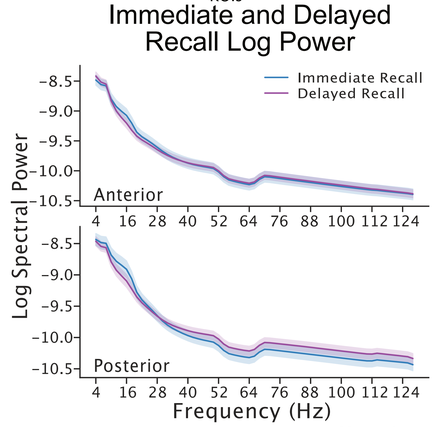


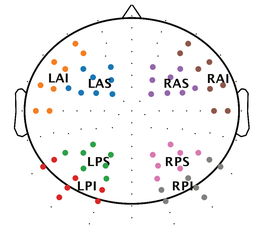


BIOMARKERS

spectral contrast difference scores show distinct patterns of high and low frequency activity associated with successful recall



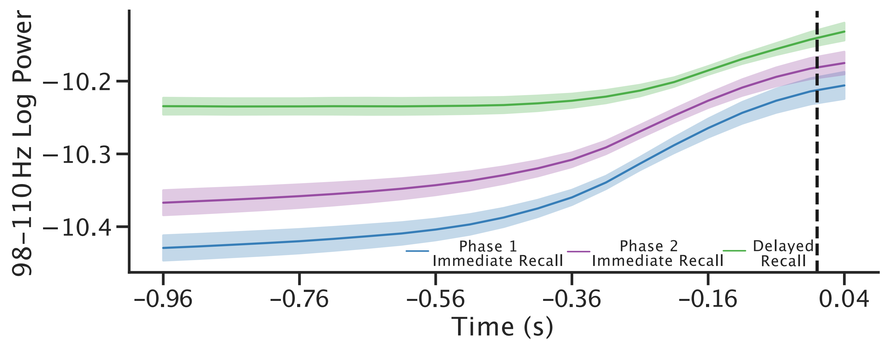




• Differing recall demands create opposite spectral signals of verbal recall when compared to deliberation

• Confounding effects of vocalization apparent with deliberation control compared to vocalization control

pre-vocalization at posterior electrodes shows persistent increase in power leading up to recall



SUMMARY & CONCLUSIONS

• Contrasts of delayed recall with immediate recall and deliberation replicate the finding of spectral tilt in the moments leading up to successful recall reported in Burke el al. 2014. To our knowledge, this is the first replication of these findings using scalp EEG in non-epileptic participants.

• Observation of spectral tilt is not due to motor artifact, as contrast between delayed and immediate recall shows a stronger spectral tilt than contrast between delayed recall and deliberation. Further, contrast between immediate recall and deliberation shows inverse signal compared to other contrasts.

REFERENCES

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