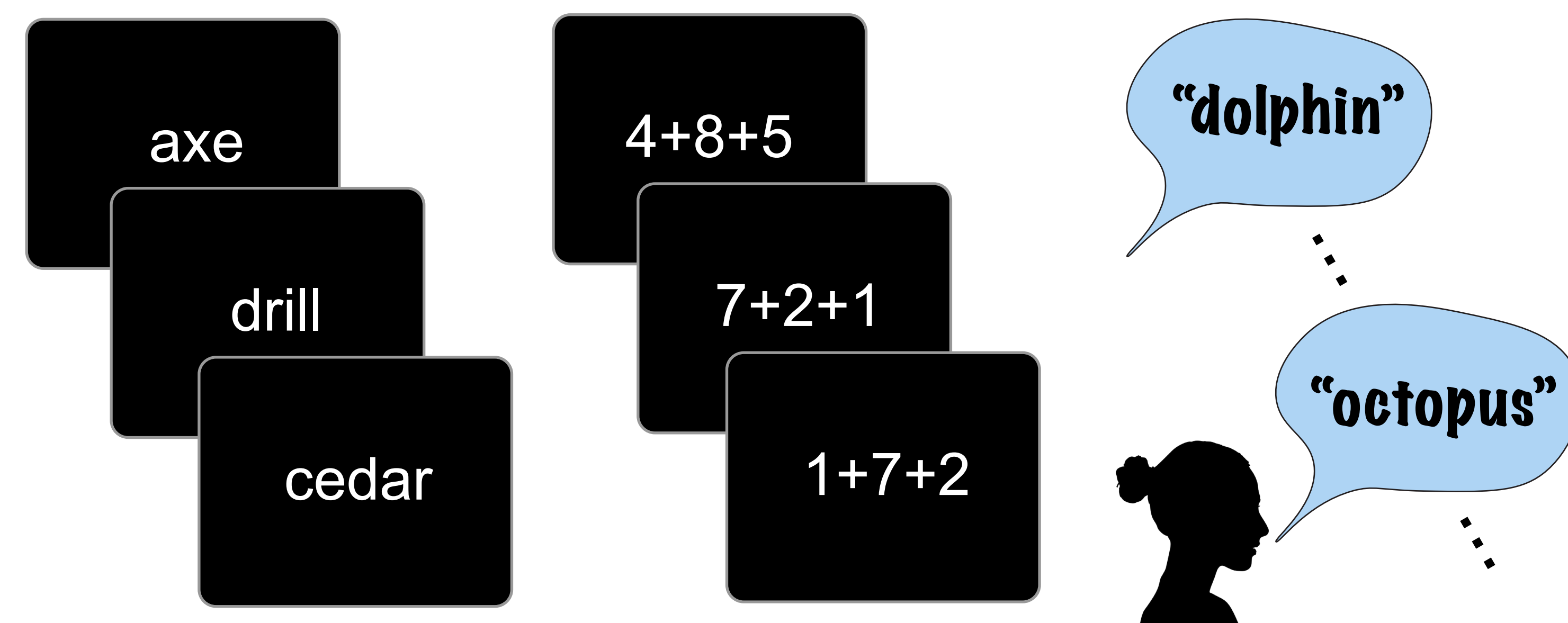


Introduction

- High frequency neural oscillations termed ripples (80-178 Hz.) have been shown to signal reinstatement of context in hippocampus during memory recall (Sakon & Kahana, 2021, bioRxiv*)
- Measuring ripples in patients (N=44; 97 sessions) with intracranial electrodes in medial temporal lobe (MTL) performing a free recall task, we determine if ripples signal successful memory encoding
- Isolating words which lead to temporal and semantic clustering between subsequent recalls, we hypothesize ripples signal reinstatement of context during encoding

Free recall task

Encoding (30 s) Math distractor (20 s) Retrieval (30 s)



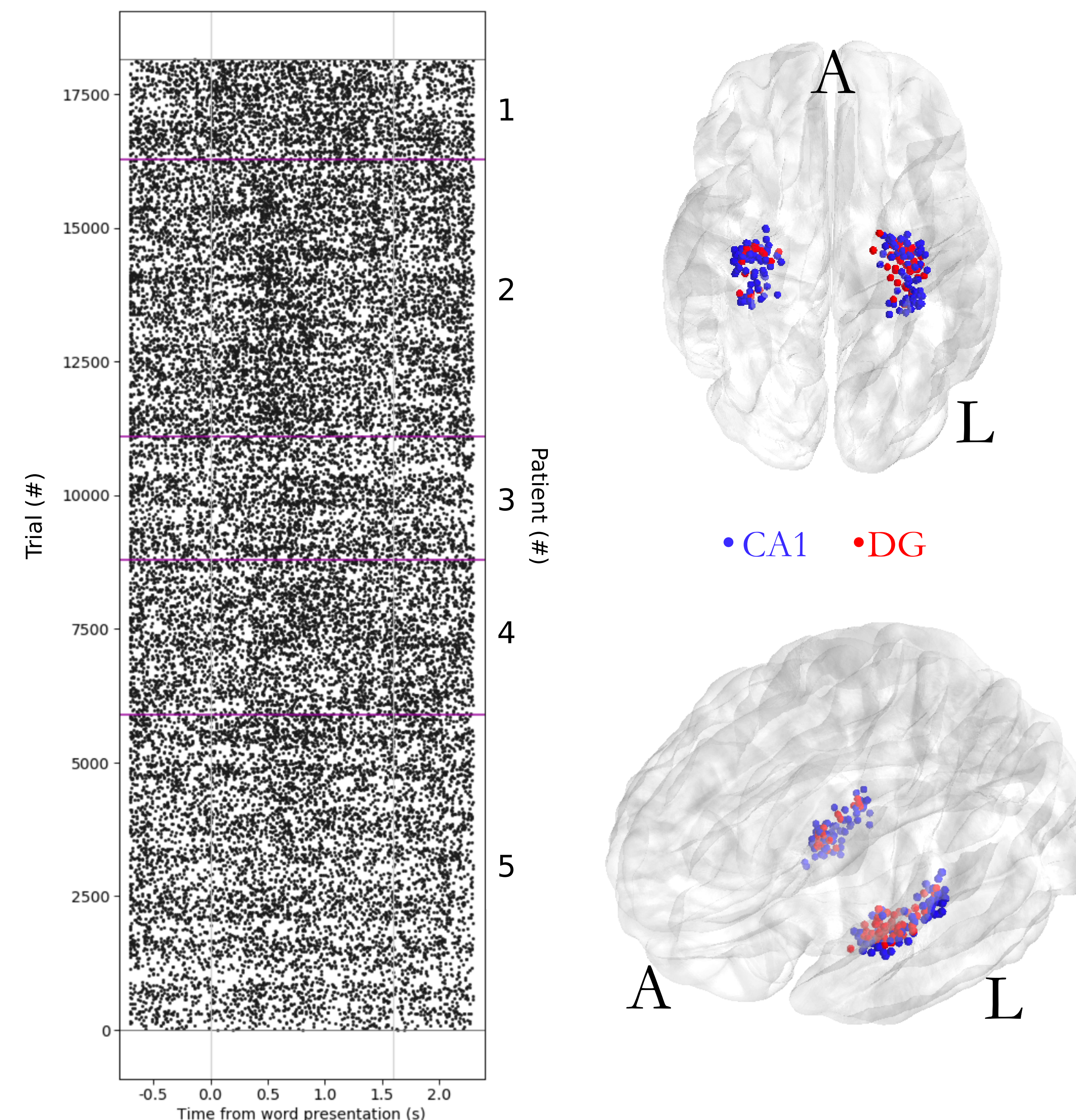
Example word list

axe	drill	cedar	hickory	dolphin	octopus	wrench	pliers	fish	whale	birch	cypress
A ₁	A ₂	B ₁	B ₂	C ₁	C ₂	A ₃	A ₄	C ₃	C ₄	B ₃	B ₄

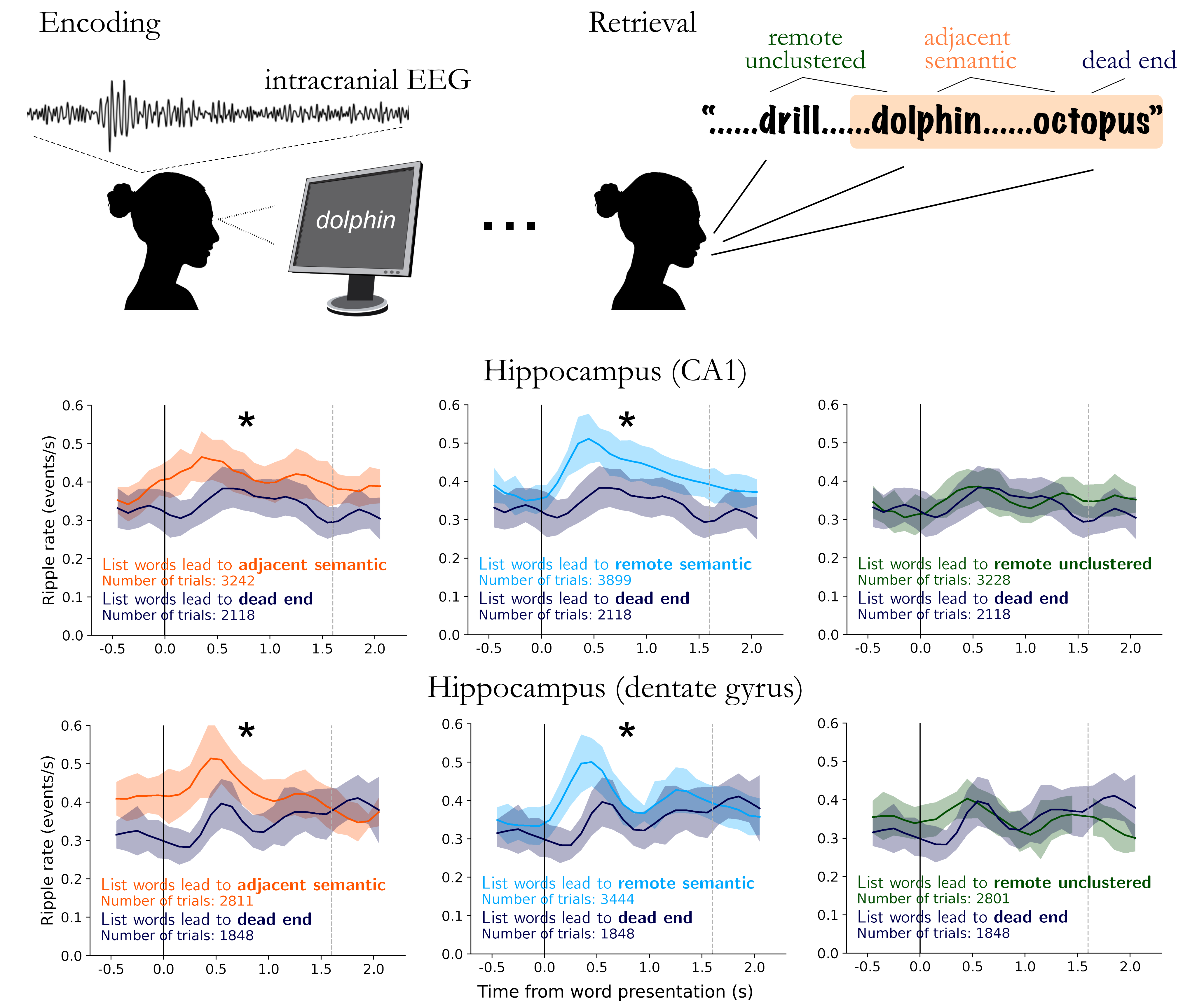
Types of recall transitions

- Adjacent semantic** (temporal & semantic reinstatement)
e.g. “dolphin...octopus”: 22% of recalls
- Remote semantic** (semantic reinstatement only)
e.g. dolphin...whale”: 27% of recalls
- Remote unclustered**
e.g. “dolphin...pliers” 22% of recalls
- Dead end**
e.g. “dolphin...” 15% of recalls

Ripples during encoding



Subsequent clustering effect



Conclusions

- Ripple rates in hippocampus, but not other MTL regions, are higher during words that are subsequently recalled compared to those not recalled
- The increase in hippocampal ripples is specific for words that subsequently lead to temporal and semantic clustering between recalls, indicative of contextual reinstatement during memory encoding
- Hippocampal ripples--but not high frequency activity (HFA)--signal encoding of episodic memories

Future direction: unlock held out 2/3 of dataset to confirm these conclusions!

*Please see preprint of our work on hippocampal ripples and recall: tinyurl.com/SakoKaha21