

# Episodic Memory and Sleep Contribute to the Processing and Retention of Context-specific Lexical Information

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## Introduction

- When a homonym (e.g., *bark*) is encountered in a context that biases its interpretation towards a less frequent meaning, subsequent interpretations of the word are more likely to favour that subordinate meaning (Rodd et al. 2013).
- The longer-term maintenance of such context-specific **word-meaning priming** effects appear to be reliant on a period of sleep-associated consolidation (Gaskell et al. 2019).
- Gaskell et al. proposed that such results were explicable via an **episodic context account** in which an encounter with any utterance results in a temporary, contextually bound episodic representation that has the potential to bias lexical processing and is subsequently integrated into long-term knowledge during periods of offline consolidation.
- Here, we tested the generalisability of this account by investigating the influence of sleep on the priming of context-specific interpretations of non-homonymic and morphosyntactically versatile words.
- Specifically, we asked (a) **whether word-meaning priming effects could be observed more generally** and (b) **whether this effect is preserved more over sleep than over wake**.

## Methods

- Participants were exposed to non-homonymic target words (e.g., *bathtub*, Exp 1) or morphosyntactically versatile words (e.g., *loan*, Exp 2) in a sentence exposure task. These sentences biased interpretation of the words toward a specific aspect of the word's meaning (e.g., *bathtub-slip*, Exp1) or toward a specific word class (i.e., noun vs. verb, Exp2). For example:
- In **Experiment 1** the sentence for the target-probe pair "bathtub-slip" would be:  
*"The old man fell while getting out of the bathtub"*
- In **Experiment 2** the sentence for the word "loan" when priming toward a verb interpretation would be:  
*"Brentwood Borough Council said it would loan individual projects £1m to £20m to transform the borough"*
- Both experiments tested the effect of sentence exposure on subsequent interpretations after a delay of 20-30 mins and after a 12-hour delay including either daytime wakefulness or an overnight sleep.

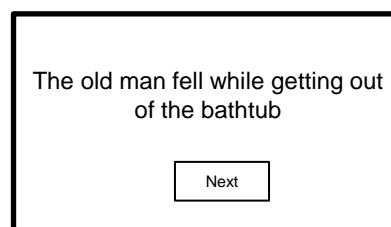
## Citations

Gaskell, M.G., Cairney, S.A., & Rodd, J.M. (2019). Contextual priming of word meanings is stabilized over sleep. *Cognition*, 182, 109-126.

Rodd, J.M, Curtin, B.L., Kirsch, H., Millar, A., & Davis, M.H. (2013) Long-term priming of the meanings of ambiguous words. *Journal of Memory and Language*, 68, 180-198.

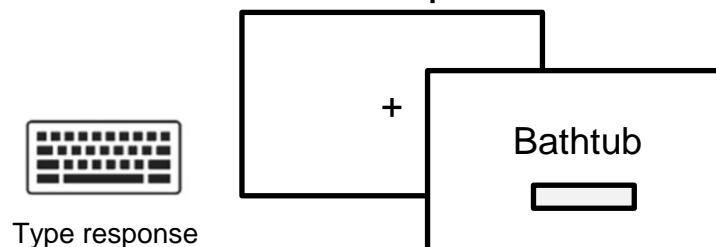
## Experiment 1

### 1. Sentence exposure



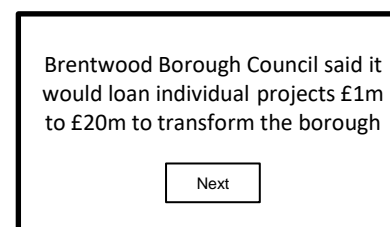
Respond with cursor

### 2. Associate production



## Experiment 2

### 1. Sentence exposure



Respond with cursor

### 2. Sentence generation

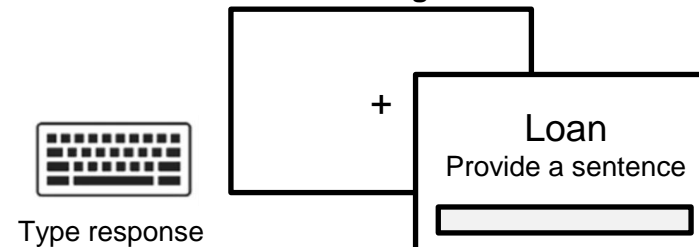
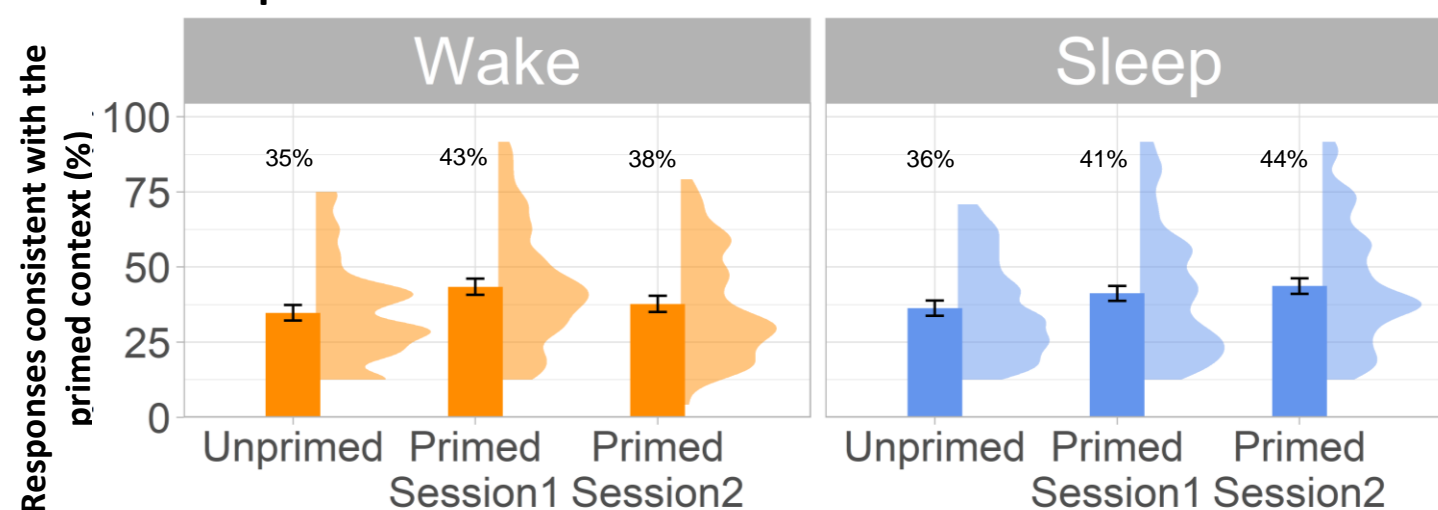


Figure 1. Schematics of trial progression for Experiments 1 and 2.

## Results

- Significant priming effects** were seen between the primed and unprimed items in both experiments.
- This suggests that the context-specific representation generated at sentence exposure biased lexical processing towards the representation.
- 12 hours later, magnitude of priming was stronger in the participants with a sleep opportunity
- This indicates that sleep facilitated the maintenance of the context-specific representation that underlies the priming effects.

## Experiment 1



## Experiment 2

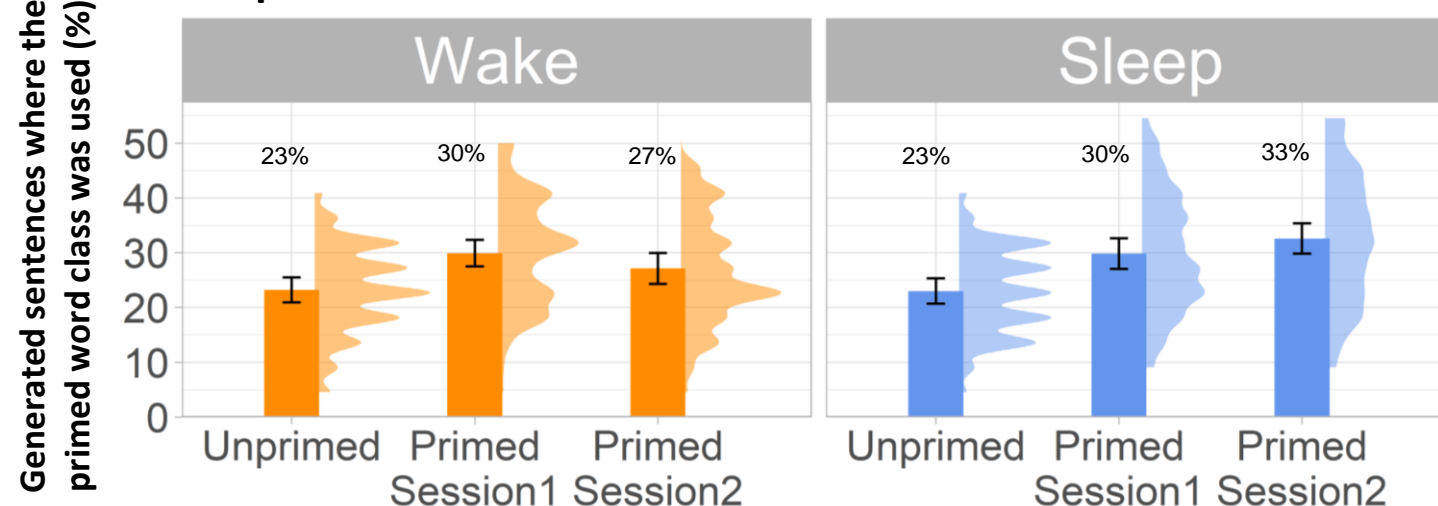


Figure 2. Plots showing mean percentage of responses that were consistent with the primed context in Experiment 1 and the mean percentage of sentences where the primed word class was used in Experiment 2. Error bars represent 95% within-subject confidence intervals.

## Conclusion

- As predicted by an **episodic context account**, we observed priming effects for both non-homonymic and morphosyntactically versatile words. These effects were more resistant to decay after sleep (vs. wakefulness).
- By this account, episodic memory contributes to the rapid generation of a context-specific representation during language comprehension, and this representation is prone to sleep-related consolidation effects.