

INTRODUCTION

Word learning from context (Wlfc)

- Using the surrounding language to determine a novel word's meaning¹
- Incremental process, with increased lexicalization occurring with multiple exposures to the word
- How children learn most of their new words starting in elementary school^{1,2}
- Typically assessed using behavioral measures, which assess the final stage of learning but not the *process* of word learning

Purpose

Examine the neural processes underlying Wlfc in typically developing school-age children by collecting EEG data as children complete a Wlfc task

METHODS

Participants

- 7 typically-developing children, $M_{AGE}=9;4$
- Inclusion criteria: right handed, monolingual English, no history of neurological disorders, significant neurological history, or language or learning disability
- Standardized assessments within normal limits, $M(SD)$: WISC nonverbal 101.6 (6.6); CELF 107.1 (9.4); PPVT 111.4 (10.9); EVT 107.6 (9.4)

EEG Analysis

- ERP
 - Data epoched -100-1000 msec around the target word
 - Voltage maps plotted to show change between sentences
- ERSP:
 - Data epoched -500-1000 msec around the target word
 - Data Fourier transformed, magnitude squared, and normalized
 - Power spectrum data averaged across trials and subjects and computed using the log power values minus the baseline
 - Statistical significance ($p < 0.05$) determined using random permutation statistical analysis
 - Only statistically significant clusters of 3 or more electrodes were considered in interpretations

Wlfc task

Stimuli

- Sentence triplets with target word in sentence-final position
- 2 conditions: Meaning, No Meaning

Procedure

- Auditory presentation
- Test question following each triplet: *Is there a meaning for the novel word? If so, what is it?*

Table 1. Wlfc task example stimuli

Conditions (50 triplets each)	Sent #	Example triplet (target in italics)
Meaning sentence triplet supports the target word's meaning	1	Her parents bought her a <i>chut</i> .
	2	The sick child spent the day in his <i>chut</i> .
	3	Mom piled the pillows on the <i>chut</i> .
No Meaning sentence triplet does not provide support for learning the target word's meaning	1	His favorite toy of all time is the <i>vik</i> .
	2	He had a lot of food on his <i>vik</i> .
	3	Before bed, I have to take a <i>vik</i> .

RESULTS

Behavioral: Meaning: 73.4% (SD=4.5%); **No Meaning:** 78% (SD=12.9%)

Figure 1. ERP (A) voltage maps and (B) waveforms representing N400 change in the Meaning condition

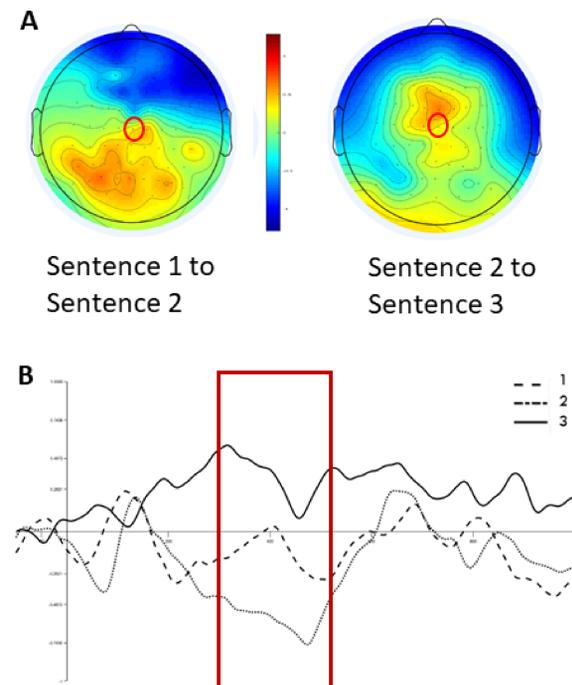
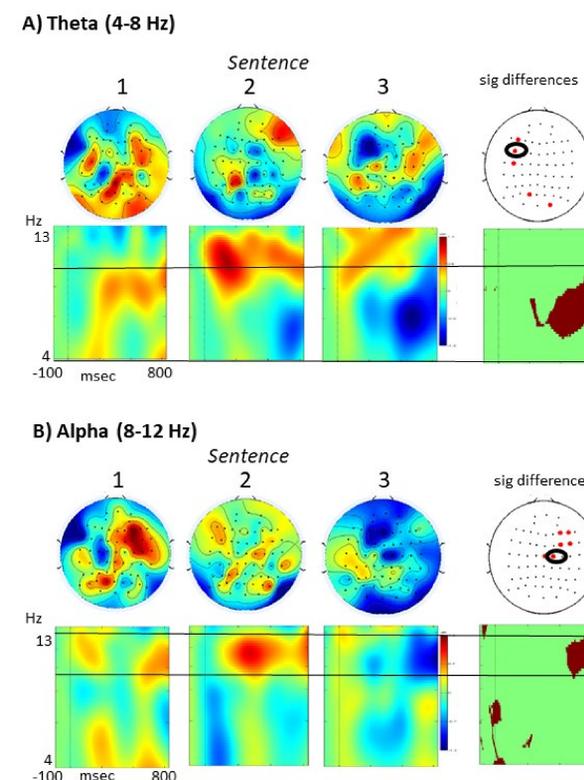


Figure 2. ERSF engagement of (A) theta and (B) alpha in the Meaning condition, **synchrony** and **desynchrony**



FINDINGS

Behavioral

- Participants were successfully able to learn words in our experimental Wlfc task

ERP

- The N400 amplitude to the novel word attenuated across exposures in the Meaning condition
 - Suggests engagement of semantic processing during word learning when contextual support for the word's meaning is available

ERSP

- Differences in patterns of oscillatory engagement across exposures to the novel word in the Meaning condition
 - Theta synchrony was followed by alpha synchrony then alpha and theta desynchrony
 - Suggests differential engagement of lexical retrieval³⁻⁵, inhibition⁶, and attention⁷ during the course of Wlfc.

CONCLUSIONS

School-age children appear to draw on multiple processes at different times during word learning. These findings have implications for our understanding of how children approach the task of word learning.

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