

Implicit and explicit access to partial word knowledge in school-aged children

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INTRODUCTION

Word learning

- Children learn most of their vocabulary incidentally¹
- Word forms learned with meaning retained better than words learned without meaning in school-aged children²
- Explicit learning measures tend to only tap into the final stage of learning
- EEG offers a way to access implicit learning
 - ERP N400 component

N400

- Indexes lexico-semantic processing³
- Sensitive to:
 - Semantic learning in school-aged children⁴
 - Meaning attached to nonsense words in the absence of measures of explicit learning^{5,6}

PURPOSE

To examine explicit and implicit knowledge of words learned via an incidental word learning task in 8-11 year old children

METHODS

Participants

- 29 typically developing children ($M_{AGE}=9;9$)
 - 11 male 18 female
- Typically-developing, right-handed, monolingual English speakers with no significant neurological issues and no history of learning or reading difficulties
- Scored within or above normal limits on standardized measures of cognition and language

Standardized Assessment Battery

- Omnibus language- CELF-5
- Receptive vocabulary- PPVT-4
- Expressive vocabulary- EVT-2
- Nonverbal cognition- WISC-5

EEG

- NeuroScan 64-electrodecap EEG System
- EEG data segmented into epochs 500 msec before to 1000 msec after the nonsense word
- Data averaged across trials to create ERP
- N400 time window: 375-475 msec post-nonsense word onset

STIMULI AND PROCEDURE

<p>Semantic Learning Task</p> <ul style="list-style-type: none"> • Sets of three sentences, 6-9 words in length • Nonsense word in sentence-final position • Auditory presentation of stimuli • Meaning: contextual support for the nonsense word • No meaning: no contextual support for the nonsense word • Asked to identify the meaning of the nonsense word, if possible 	<p>Word Recognition Task</p> <ul style="list-style-type: none"> • 200 nonsense words <ul style="list-style-type: none"> • 100 previously heard in Semantic Learning Task <ul style="list-style-type: none"> • 50 from Meaning and 50 from No meaning • 100 New words • Auditory presentation of nonsense words • Indicate via button push if they had heard word in previous task
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BEHAVIORAL RESULTS

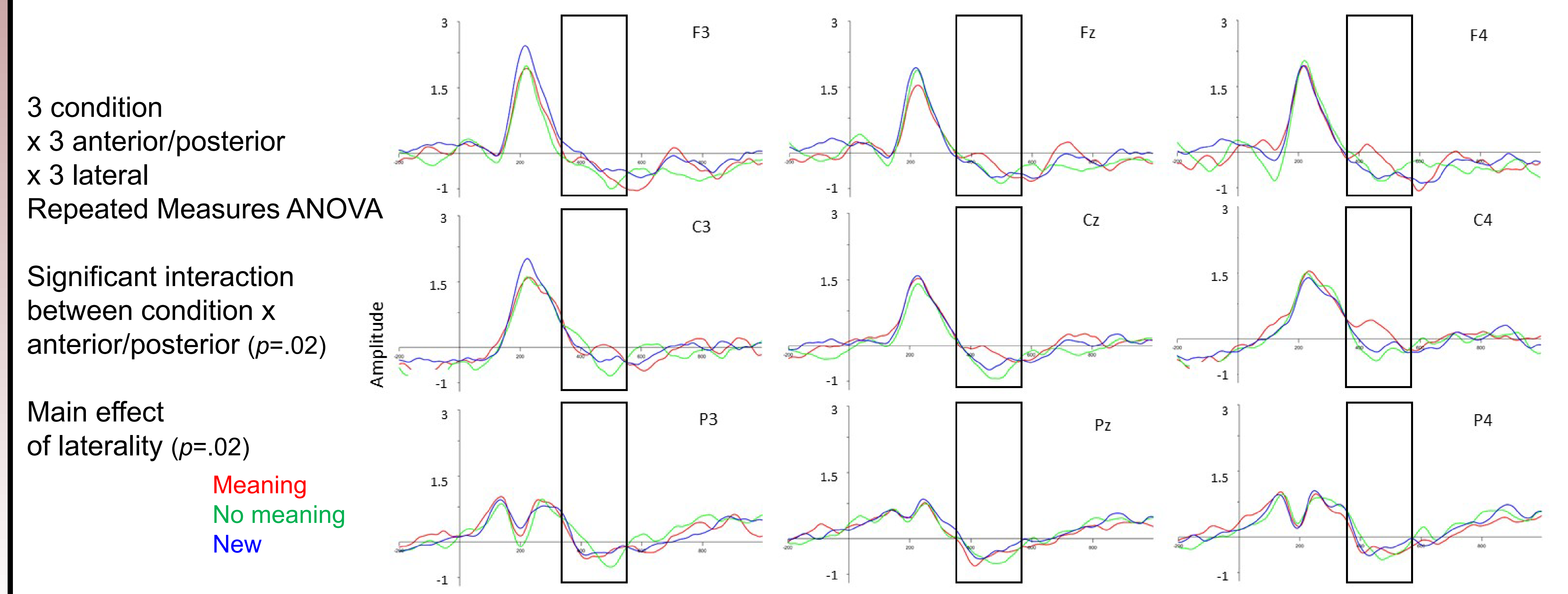
<p>Semantic Learning Task Accuracy*</p> <ul style="list-style-type: none"> • Meaning: $M=74.9\%$, $SD=8.7\%$ • No meaning: $M=82.8\%$, $SD=11.1\%$ 	<p>Word Recognition Task Accuracy**</p> <ul style="list-style-type: none"> • Meaning: $M=47.5\%$, $SD=13.3\%$ • No meaning: $M=47.2\%$, $SD=12.8\%$ • New: $M=58.9\%$, $SD=16.9\%$
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Pearson's Correlation

	PPVT-4	EVT-2	WISC-5	SL task Meaning	SL task No meaning	WR task Meaning	WR task No meaning	WR task New
CELF-5	0.68**	0.77**	0.71**	0.42*	0.45*	-0.19	-0.09	0.05
PPVT-4		0.81**	0.69**	0.48**	0.31	-0.20	-0.24	0.26
EVT-2			0.75**	0.61**	0.21	-0.26	-0.22	0.25
WISC-5				0.43*	0.36	-0.27	-0.20	0.33
SL task Meaning					0.13	-0.44*	-0.37*	0.31
SL task No meaning						-0.01	0.12	-0.01
WR task Meaning							0.76**	-0.71**
WR task No meaning								-0.77**

* $p < .05$ ** $p < .01$

ERP RESULTS: WORD RECOGNITION TASK



FINDINGS

- Behavioral:
 - Participants were below chance at recognition of all nonsense word forms
 - Moderate-strong *positive* correlations between accuracy on Semantic Learning task and performance on standardized assessments
 - Moderate *negative* correlation between Semantic Learning and Word Recognition performance
- ERP findings:
 - N400 amplitude for Meaning greater than No Meaning, which did not differ from New

DISCUSSION

- Task requirements may influence the acquisition of a new word
 - Introducing a nonsense word with semantic meaning results in poorer explicit word recognition but improved implicit access to semantic meaning
- Implicit and explicit access to word form and semantic meaning knowledge comes online at different times
 - N400 can access implicit semantic knowledge of newly-learned words that is not yet available explicitly
- It is important to examine all aspects of the lexical entry during the study of word learning
 - Successful word form learning does not guarantee meaning acquisition and vice versa

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ACKNOWLEDGEMENTS

This study was funded in part by the SDSU University Grants Program awarded to AA. Thank you to participants as well as members of the Language Learning Lab for their assistance with data collection and data analysis.