Novel Word Learning in Second Grade Predicts Later Vocabulary and Comprehension

Supraja Srikumar, MS[1]; Anna M. Ehrhorn, PhD, CCC-SLP[2]; Taylor Bryant, MS, CCC-SLP[1]; Dawna Duff, PhD, Reg. CASLPO, CCC-SLP[3]; and Suzanne M. Adlof, PhD[1]

[1] Department of Communication Sciences and Disorders, Arnold School of Public Health, University of South Carolina, Columbia, SC

[2] Department of Speech, Language, and Hearing Sciences, Auburn University, Auburn, AL

[3] Department of Speech and Language Pathology, Decker College of Nursing and Health Sciences, Binghamton University, Johnson City, NY

Introduction

- A child's vocabulary knowledge is one of the most robust predictors of their future reading comprehension (Language and Reading Research Consortium & Logan, 2017; Perfetti & Stafura, 2014).
- Static tests provide a snapshot of children's accumulated knowledge. These scores are shaped by factors like prior language exposure, cognitive abilities, and socioeconomic background, which all influence vocabulary growth and reading development.
- However, static measures do not tell us how easily a child can learn new words. Dynamic assessments provide an opportunity to evaluate children's learning potential (Lidz & Elliot, 2000).
- Few studies have examined whether dynamic measures of word learning can uniquely predict later language and reading comprehension beyond what is explained by children's existing vocabulary, cognitive abilities, and socioeconomic background (Nash et al., 2024; Gellert & Elbro, 2013).
- We used a novel word learning paradigm to determine whether children's ability to learn novel words word-learning skills in second grade uniquely predicted later receptive vocabulary size and reading comprehension.

Research Questions

To what extent does 2nd-grade novel word learning predict 4th-grade language and reading comprehension, after controlling for baseline vocabulary, nonverbal intelligence, and socioeconomic status?

- Does novel word learning uniquely predict 4th-grade receptive vocabulary (PPVT-5)?
- Does novel word learning uniquely predict 4th-grade reading comprehension (WRMT-3 & GORT-5)?

Participants

351 monolingual English-speaking participants completed tests of vocabulary, nonverbal intelligence and novel word learning experiments in 2nd grade.

Race: American Indian/ Alaska Native (1.1%); Asian (4%); Black/ African American (12%); White (85%); Other (2.8%)

Ethnicity: Hispanic or Latino (7%); Not Hispanic or Latino (91%); Unknown (2%)

- **SES:** 32% of participants were eligible for free or reduced-price school lunch.

Methodology

Participants completed standardized assessments in 2nd and 4th grade (Table 1).
In 2nd grade, children completed measures of receptive vocabulary (PPVT-5) and nonverbal reasoning (TONI-4) to establish baseline language and cognitive abilities.
In 4th grade, children completed receptive vocabulary (PPVT-5) and reading comprehension assessments (WRMT-3 Passage Comprehension, GORT-5 Oral Reading Index) to evaluate later language and literacy outcomes.

Word Learning Experiment: Children helped an astronaut learn new words for her "astronaut test."

- Taught 8 novel words paired with unique objects and short definitions.
- Received 18–35 exposures per word through spaced retrieval and recognition with feedback.
- Training was followed by a post-test including five word-learning tasks (see Table 2).

Table 1: Measures in 2nd and 4th grade

Measure	N	Mean (M)	SD
2nd Grade (Baseline Measures)			
PPVT - 5	351	107.13	17.13
TONI- 4	351	104.84	10.2
4th Grade (Outcome Measures)			
PPVT-5	169	114.94	18.69
GORT-5 ORI	110	92.02	15.18
WRMT-3 PC	168	110.47	18.89

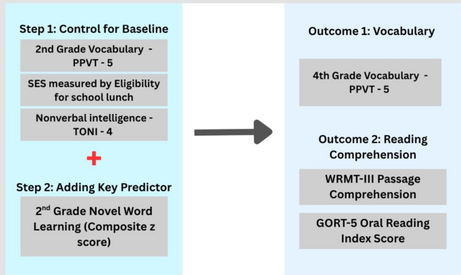
Table 2: Post-test tasks

Naming (phonological recall)	Listening (phonological recognition)	Listening (semantic recognition)	Describing (verbal sematic recall)	Drawing (non-verbal semantic recall)
What is this called?	I will show you a picture, and you will hear four words. Tell me which one is the right name of the picture.	You will hear a word. Then find the picture that goes with it.	You will hear a word. Then tell me everything you know about it.	You will hear a word. Then draw a picture of it on your paper.

Analysis

We conducted a principal components analysis on these five measures and used the first component (67% of variance) as the indicator of students' word-learning ability.

We conducted three separate hierarchical multiple regression analyses to predict each 4th-grade outcome. The structure of these models is depicted in the flowchart.



Results

Second-grade low-context novel word learning significantly predicted 4th-grade receptive vocabulary and reading comprehension, even after controlling for baseline vocabulary, nonverbal IQ, and SES.

Table 3: Pearson correlations among the predictors and outcomes

Pearson Correlations	1	2	3	4	5	6	7
1. Vocabulary in 2nd grade (PPVT-5)	-						
2. SES (School Lunch)	.37***	-					
3. Nonverbal IQ (TONI-4)	.40***	.20**	-				
4. Novel Word Learning (Composite)	.46***	.22**	.43***	-			
5. Vocabulary in 4th grade (PPVT-5)	.60***	.11	.38***	.44***	-		
6. Reading Comprehension measured by WRMT-3 PC	.45***	.08	.39***	.47***	.53***	-	
7. Reading Comprehension measured by GORT-5 ORI	.55***	.04	.25**	.45***	.66***	.53***	-

Table 4: Hierarchical regression models predicting 4th grade outcomes

Predictor (from 2nd Grade)	PPVT-5	WRMT-3 PC	GORT-5 ORI
	\beta	\beta	\beta
Vocabulary (PPVT-5)	.47***	.30***	.43***
SES (School Lunch)	-0.01	-0.01	0.01
Nonverbal IQ (TONI-4)	.17**	.22**	0.09
Novel Word Learning (Composite)	.22**	.24**	.27**
Model Statistics			
ΔR2 (Step 2)	.038**	.047**	.062**
R2 (Final Model)	0.446	0.328	0.38

*$p < .05$, **$p < .01$, ***$p < .001$*

Results

Novel word learning was a significant, unique predictor for 3 of the 4 outcomes. It explained an additional 3.8% of the variance in receptive vocabulary (PPVT-5), 4.7% in passage comprehension (WRMT-3), and a substantial 6.2% in reading comprehension (GORT-5).

Discussion

- Word-learning ability served as a distinct predictor of later vocabulary and reading skills, above and beyond baseline vocabulary, nonverbal reasoning, and SES, suggesting that it may tap children's efficiency to learn and integrate new word meanings beyond what is captured by existing knowledge or general reasoning ability.
- In our sample, nonverbal IQ was a significant predictor of later vocabulary and reading comprehension, while SES did not seem to contribute to variance after accounting for cognitive and language skills. Our finding for nonverbal IQ aligns with prior work (Nash et al., 2024).
- Our findings extend prior work showing that experimental measures of word learning can predict later language outcomes (Gellert & Elbro, 2013) and align with recent evidence that dynamic word-learning tasks relate to comprehension growth (Nash et al., 2024).
- While the composite word learning score offered strong predictive power for research purposes, individual task scores may better inform clinical decision-making and help tailor intervention strategies.

Future Directions

- Examine how different types of structured learning experiences (e.g., words taught in isolation vs. embedded within stories) influence dynamic assessment outcomes.
- Although SES was not a significant unique predictor after controlling for other skills, its influence is likely indirect. We found significant correlations between SES and both baseline vocabulary and novel word learning. Future work should therefore use more nuanced SES measures and apply mediation or SEM approaches to formally model these indirect pathways.
- Extend to bilingual and DLD populations to assess generalizability and developmental differences in learning potential.

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