Examining the Effects of Children's Word Specific Phonological Awareness on Word Reading Accuracy Within a Lexical Quality Theoretical Framework

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INTRODUCTION

The purpose of this project is to understand on a deeper level the relationship between phonemic awareness and word reading over time. While data that explains relationships between these factors does exist, there are gaps in considering how these relationships develop and change over time.

Learning is characterized by the interactions between the skills of individuals (children in this project) that enable them to complete the task and/or item, which produces continued changes in the children's lexical representations pertaining to unique words. (McClelland & Rumelhart, 1986; Nation & Castles, 2017; Rumelhart & Norman, 1978; Seidenberg & McClelland, 1989; Perfetti, 1991).

Previous data has been collected that demonstrates the effects of children's word-reading abilities. This data has reflected predictors of word recognition and decoding accuracy in child levels (e.g., Gilbert et al., 2011; Goodwin et al., 2014; Kearns et al., 2016; Steacy et al., 2022). This research, however, does not investigate the phonological awareness of the child or word readings when determining predictions of word recognition accuracy.

In this project, a sample of second-grade students was utilized to better understand the relationship between word recognition and reading accuracy, and phonological awareness based on Rasch-based Explanatory Item Response Models. These students have basic reading skills and developing phonological systems. This study aims to understand to what extent phonological awareness affects word reading and recognition, and the predictors of phonological, orthographic, and semantic knowledge in word reading accuracy.

RESEARCH QUESTIONS & MODELS

Research Question	Model Number	Covariates
Does child-by-word phonological awareness predict the probability of a child reading a given word accurately when controlling for child-by-word GPC knowledge and familiarity?	1	Level 1 (child-by-word): PASTPA, GPCK, Familiarity (Fam.)
After controlling for the effect of all other general child level predictors, how does a child's general phonological awareness affect the probability of correct word reading?	2	Level 1 (child-by-word): PASTPA, GPCK, Fam Level 2 (child): Voc., MatR., RLN, PDE, PA
Are the important word predictors (frequency, concreteness, number of phonemes, transparency and Levenshtein distance) related to word reading accuracy?	3	Level 1 (child-by-word): PASTPA, GPCK, Fam Level 2 (child): Voc, MatR, RLN, PDE, PA Level 2 (word): NPhon, OLD, PLD, Frequency, CRate, SPTR
Is there an interaction between child decoding skill and word transparency?	4	Level 1 (child-by-word): PASTPA, GPCK, Fam Level 1 (interaction): PDE*SPTR Level 2 (child): Voc, MatR, RLN, PDE, PA Level 2 (word): NPhon, OLD, PLD, Frequency, CRate, SPTR

METHODS

- Both second-grade (n=80) and first-grade students (data collection currently being conducted) from southeast United States Title-I schools were administered the Phonological Awareness Screening Test (PAST; Kilpatrick, 2021), which contains 52 constant words.
- Additionally, children's reading and word recognition skills were measured by other child-level and word-level tests tailored to their age group.

Sample: This study employed a short-term cross-sectional approach in children whose word reading was representative of a continuum of abilities. A total of 82 second grade students attending one of seven classrooms across two Title-1 schools in North Florida participated in the study. Two students were excluded from analyses due to obtaining a standard score ≤ 70 on the 2-subtest WASI-2. Table 1 presents demographic statistics for the resulting sample of 80 children. Table 2 presents student special education and related service information (N=80).

Table 1. Demographic Statistics (N = 80)

Variable	n	%	Mean	SD
Age in Years			8.21	0.47
Race				
African American	6	7.5		
Hispanic	14	17.5		
White	56	70		
Asian	2	2.5		
Multiracial	2	2.5		
Native Hawaiian/Pacific Islander	1	1.2		
Gender				
Male	41	51.2		
Female	39	48.8		

Table 2. Special education and related service information (N=80).

Disability Classification	n	%
No Disability Classification	60	75
Learning Disability	5	6.2
Speech and/or Language Impairment	8	10
ADD/ADHD	11	13.8
Autism	1	1.2
Other Health Impairment	2	2.5
Other	13	16.2
Anxiety	1	7.7
Gifted	9	69.2
ODD	1	7.7
OT	1	7.7
Speech Consultation	1	7.7
IEP Goals		
Reading IEP Goal	1	1.3
Reading & Math IEP Goal	5	6.3
Speech Production IEP Goal	4	5
Receptive and/or Expressive Language IEP Goal	1	1.3
Speech and Language IEP Goal	3	3.8
Related Services		
Speech/Language Related Services	8	10
Occupational Therapy Related Services	5	6.2
Other Related Services	10	12.5
Gifted	9	
Retained	9	11.2
Number of Years Retained	1	
ELL Status	5	6.2

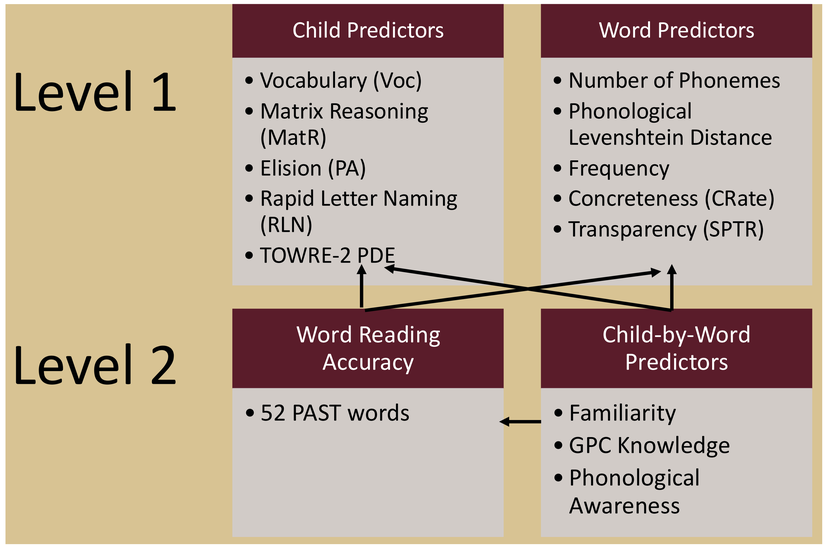
PROCEDURES & PLANNED ANALYSES

General Procedures:

- Children were assessed individually across two days, controlling for order effects of tasks using the same target words.
- Assessment sessions were audio recorded for students with parental permission.
- REDCap was utilized for data entry.

Analyses:

- A logistic (logit reference) cross classified random-effects model will be utilized to estimate the probability of an individual correctly reading a specific word on the PAST.
- The lme4 package in the R system for statistical computing will be used to perform analyses (Bates et al., 2015).



PRELIMINARY DESCRIPTIVE RESULTS

Table 3. Means, standard deviations, and correlations for child-level predictors

Variable	M	SD	1	2	3	4	5
PDE	22.08	9.83					
Vocab	21.15	4.95	0.48**				
MR	12.44	4.05	-0.01	0.24*			
PA	22.08	6.20	0.58**	0.46**	0.33**		
RLN	23.11	6.41	-0.38**	-0.29**	0.14	-0.28*	
PAST WR	44.70	9.29	0.66*	0.40**	-0.05	0.49**	0.65**

M and SD represent mean and standard deviation, respectively.
PDE = Pseudoword Decoding Efficiency; Vocab = WASI Vocabulary;
MR = WASI Matrix Reasoning, PA = phonological awareness; RLN = Rapid Letter Naming; PAST WR = Phonological Awareness Screening Test Word Reading.
*p<.05 **p<.01

Table 4. Means, Standard deviations, and correlations for word-level predictors

Variable	M	SD	1	2	3	4
Frequency	9.86	2.13				
PLD	1.61	0.78	-0.37**			
Number of Phonemes	4.15	1.63	-0.35*	0.90**		
Concreteness	3.69	1.03	-0.54**	0.09	0.07	
SPTRate	2.26	2.60	-0.31*	0.07	0.07	-0.16

M and SD represent mean and standard deviation, respectively. PLD = Phonological Levenshtein Distance; SPTRate = Spelling to Pronunciation Transparency Rating.
*p<.05 **p<.01

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