Relations between Phonological Awareness and Vocabulary in Preschoolers

Kimberly McDowell, PhD, CCC-SLP
Department of Curriculum & Instruction Wichita State University
1845 Fairmount, Box 28
Wichita, KS 67260-0028

Jeri Carroll, PhD
Department of Curriculum & Instruction
Wichita State University
1845 Fairmount, Box 28
Wichita, KS 67260-0028

&

Robyn Ziolkowski, PhD, CCC-SLP
University of Hawaii at Manoa
Gold Bond Building,
Ewa Tower 677
Ala Moana Blvd. Suite 625
Honolulu, HI, 96813

ABSTRACT
The primary focus of the study was to determine the relations among vocabulary and phonological awareness skills in two groups of preschool-aged children (n=118): those with typical vocabulary skills and those with deficits in expressive and receptive vocabulary. Additionally, we sought to determine if the patterns of relations among the variables differed by vocabulary status. Finally, given the different levels of linguistic complexity of the tasks (i.e., word level, syllable level, phoneme level, contextualized, decontextualized), we were interested in exploring whether the eight phonological awareness tasks were tapping a single underlying construct or distinct constructs. Results indicated that there were no group differences in performance on phonological awareness tasks. Vocabulary predicted unique variance in phonological awareness in both groups of participants. Finally, the eight phonological awareness tasks loaded on three components, not a single underlying construct.

Keywords: phonological awareness, vocabulary, preschool

1. Relations between Phonological Awareness and Vocabulary in Preschoolers

Reading skills provide a vital foundation for children's academic success. Children who read well, read more and as a result, acquire more knowledge in content domains (Cunningham & Stanovich, 1998). Although many children learn to read without significant problems, more than one in three experience considerable difficulty (Adams, 1990). Research shows a strong relationship between the skills at school entry and later academic achievement (Baydar, Brooks- Gunn, & Furstenberg, 1993; Stevenson & Newman, 1986). Children who experience early reading difficulties receive less practice than other children (Allington, 1984), miss opportunities to develop reading comprehension strategies (Brown, Palinscar, & Purcell, 1986), often encounter reading material that is too advanced for their skills (Allington, 1984), and may acquire negative attitudes toward reading (Oka & Paris, 1986).

2. Phonological Awareness

Whitehurst and Lonigan (1998) stated that phonological awareness is decoding letters into corresponding sounds. Ziolkowski and Goldstein (2008) defined phonological awareness as the "sensitivity to the sound unit of oral language, including the awareness of words in sentences, of syllables in words, of the beginning and end parts of words, and of phonemes" (p. 7). The National Reading Panel (NICHD, 2000) describes phonemes as the smallest units composing spoken language and they identified phonological awareness and letter knowledge as the two best predictors of good performance in the first two years at school.

There is correlation between reading and phonological awareness. Phillips, Clancy- Menchetti, and Lonigan (2008) explained that phonological awareness is important for later reading because a child can sound out words and read them only if he/she understands that a word can be broken down to smaller components. They also discussed that phonological awareness, letter name knowledge, and letter sound knowledge are all interrelated.

3. Vocabulary

Vocabulary can be thought of as the words a child understands (i.e., receptive) and the words a child uses in communication (i.e., expressive). According to the National Reading Panel Report (NICHD, 2000), the importance of vocabulary instruction in students' reading achievement has been acknowledged for over 50 years. Recently, concern about literacy has focused on the large individual discrepancies of vocabulary abilities of young children starting school (Beck & McKeown, 2001). Numerous research studies have demonstrated the relationship of reading skill and vocabulary size (IRA, 2002). Biemiller (2003) described significant differences in vocabulary size among children already by the end of second grade. In his study, second graders in the highest quartile of vocabulary size demonstrated the knowledge of approximately 7,100 root words. By contrast, second graders in the lowest quartile had a vocabulary size of only 3,000 root words. When these second graders reached fifth grade, the students in the lowest quartile still had not learned even 7,100 root words.

Therefore, since most vocabulary distinctions develop among individuals before third grade, at

which point a significant disparity exists in the pace of word acquisition (Biemiller & Slonim, 2001), it is essential to begin building vocabulary knowledge when children are young. Estimates of the number of words that elementary students learn each school year vary from approximately 2,000 words (Biemiller, 2003) to 4,000 words (Johns & Lenski, 2005). Teachers would need to teach 22 new vocabulary terms every day of the school year in order for their students to learn 4,000 words during the year (Johns & Lenski, 2005). As a result, it is apparent that children learn vocabulary both incidentally and intentionally.

4. Relations between Phonological Awareness and Vocabulary

Storch and Whitehurst (2002) examined the relations among phonological awareness, decoding, and oral language skills in a group of 626 children, following them from preschool through fourth grade. They found that the relation between oral language and code-related skills (e.g.. phonological awareness, letter knowledge) was strongest in the preschool years, with oral language predicting 48% of the variance in code-related skills. This relation declined with age, as oral language predicted only 10% of the variance in code-related skills in kindergarten. In first and second grade students, the relation between the two skills became nonsignificant. They also found that oral language had a significant indirect effect on kindergarten through fourth grade reading accuracy (i.e., decoding skills) as well as on third and fourth grade reading comprehension. They concluded that code-related skills mediated the relationship between preschool and kindergarten oral language skills and elementary school reading accuracy.

Likewise, Roth, Speece, and Cooper (2002) investigated the relation between oral language and early reading development in a group of 39 children followed from kindergarten through second grade. They found that phonological awareness skills, but not oral language
skills, measured in kindergarten predicted single-word reading in first and second grade students. Oral language skills played a predictive role in second grade reading comprehension.

5. Purpose of the Study

Extant literature indicates that vocabulary, or the process of restructuring one's lexicon (lexical restructuring model, Metsala & Walley, 1998) may facilitate the emergence of phonemic awareness (e.g., McDowell, Lefever-Davis, Kear, & Hamm, 2006). Given this hypothesis, one could predict that children with impaired vocabulary might have difficulties with phonological awareness tasks.

Studies examining the relation between vocabulary and phonological awareness skills have indicated that, in typically-developing children, the two skills are related (e.g., McDowell, Lonigan, & Goldstein, 2007; Whitehurst & Lonigan, 2001). However, literature is scant in the area of children with deficits in vocabulary and the available research focuses on school-aged children (e.g., Catts, 1993).

This study sought to address the following research questions: (1) What is the relation among vocabulary and phonological awareness skills in the two groups of participants?, (2) Are there group-based differences in performance on the phonological awareness measures?, and (3) Do the eight phonological sensitivity tasks tap a single underlying construct or distinct constructs?

6. Methodology

6.1 Participants. Preschool children (ages ranged from 2 years, 8 months to 5 years, 7 months) were recruited to participate. A total of 118 children were identified and recruited. Inclusionary criteria for participants were: (a) between the ages of 2 and 5:11 years, (b) pass an audiological screening bilaterally at

25 dB across 500, 1000, 2000, and 4000 Hz, and (c) speak English as a primary language.

Eligibility assessments were conducted over a four-week period. Assessments were conducted in the school, and consisted of a standardized receptive vocabulary measure (*Peabody Picture Vocabulary Test-III*) and a standardized expressive vocabulary measure (*Expressive One Word Picture Vocabulary Test-III*). These tests are both standardized measures of vocabulary and report adequate reliability (internal consistency values of .95 and .96, respectively for this age group).

Of the 118 students recruited, 47 were identified by receptive or expressive vocabulary skills that fell below one standard deviation from the mean and were grouped in the "vocabulary deficit" group. The remaining 71 students demonstrated vocabulary skills that fell within normal limits (scores between 85 and 115) and were grouped in the "typical vocabulary" group.

*6.2 Measures***.** Following return of informed consent and eligibility assessment, all participants participated in assessment of phonological awareness skills. Eight tasks (precursors to the *Test of Preschool Early Literacy*, Lonigan, Wagner, Torgesen, & Rashotte, 2002) were administered to all participants in individual assessment sessions, with the order counterbalanced to control for order effects. The eight tasks were elision word (i.e., deleting parts of words), elision nonpicture, multiple choice elision, rhyme matching, rhyme detection, blending word, blending nonpicture, and multiple choice blending.

7. Results

In order to determine if there were significant differences in the phonological awareness skills of children based on vocabulary status, a one way analysis of variance (ANOVA) was computed. Results indicated that there were no significant differences in performance on the eight phonological awareness tasks based on vocabulary status (*F*s ranging from 1.05 to .02, *ns;* see Table 1). To determine if the pattern of relations among the phonological awareness tasks differed based on vocabulary status the data were further analyzed. Bivariate correlations were computed by group (see Table 2). Examination for any differences in the strength of correlations for each group was conducted through the Independent Correlation *z* test. This tests the hypothesis that two correlation coefficients obtained from independent samples are equal. The correlation coefficients were converted into z-scores using Fishers *r*-to-*z* transformation (Cohen& Cohen, 1983). No significant differences were found among the patterns of relations among the tasks assessing phonological awareness.

To determine if vocabulary status predicted unique variance in phonological awareness, simultaneous multiple regression was computed (see Table 3). Results indicated that receptive vocabulary in both groups, predicted unique variance in phonological awareness and that expressive vocabulary in the vocabulary impaired group also predicted unique variance in phonological awareness.

Finally, to determine if the phonological awareness tasks were tapping a single underlying construct or distinct constructs (given the different linguistic levels they appeared to
be tapping such as word level, syllable level, etc.), a principal component analysis was conducted with aggregated data (given that the pattern of relations among the tasks did not differ significantly between the groups). When examining the relations between the variables
measuring phonological awareness, several intercorrelations among the variables were evident. This may indicate that some of these variables relate to phonological processing at a more fundamental level; therefore, a principal component analysis was conducted to determine if the larger set of variables could be accounted for by a smaller set of components. The eight phonological awareness tasks were submitted to a principal component analysis with direct Oblimin rotation and Kaiser normalization. A three-component solution emerged for both groups. For the group of children with typical vocabulary skills, the three

components together
accounted for 55.37% of the total variance (see Table 4). For the group of children with impaired vocabulary, the three components together accounted for 54.57% of the total variance. Variables were chosen for inclusion within a component on the basis of having the fewest cross-loadings and conceptual appropriateness. Additionally, a cutoff point of .40 was employed and loadings with values of less than .40 were replaced with zeros (Tabachnick & Fidell, 1983). All communalities for the three-component solution were at or above .40, indicating that the variables were well accounted for by the three-component model (Tabachnick & Fidell, 1983).

8. Discussion

Findings from this study did not support the notion that children with deficits in vocabulary would have difficulties with phonological awareness tasks. There are a few possible explanations for this finding. It could be that, given the wide range of ages represented in this sample, many of the younger children were not at a point in development where they are transitioning from being a "whole word" learner to a learner who is representing lexical items at a smaller unit (e.g., syllable or phoneme). It could also be that the vocabulary measures were not sensitive enough to detect lexical restructuring.

This study indicates that children with deficits in expressive and/or receptive vocabulary may not necessarily be at-risk for decoding difficulties. However, given that vocabulary is directly related to comprehension, it can be inferred that their vocabulary deficits might place them at-risk for comprehension difficulties.

9. Limitations and Future Research

This study is one of the few studies that have examined the differences in performance on code-based skills between typically developing children and those with vocabulary deficits. Greater generalizations could be made with larger sample sizes within each group (i.e., typical and impaired). Future research could include longitudinal analysis to determine if those who
have impaired vocabulary in the early school years continue to demonstrate impaired vocabulary and reading skills in subsequent school years.

References

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, Mass.: MIT Press.

Allington, R. (1984). Content, coverage, and contextual reading in reading groups. *Journal of Reading Behavior, 16*, 85-96.

Baydar, N., Brooks-Gunn, J., & Furstenberg, F. (1993). Early warning signs of functional illiteracy: Predictors in childhood and adolescence. *Child Development, 64*, 815- 829.

Beck, I., & McKeown, M. (2001). Inviting students into the pursuit of meaning. *Educational Psychology Review, 13*(3), 225=241.

Biemiller, A., (2003). Vocabulary: Needed if more children are to read well. *Reading Psychology, 24*, 323-335.

Biemiller, A., & Slonim, N. (2001). Estimating root word vocabulary growth in normative and advantaged populations: Evidence for a common sequence of vocabulary acquisition. *Journal of Educational Psychology, 93*(3), 498-520.

Brown, A., Palincsar, A., & Purcell, L. (1986). Poor teachers: Teach, don't label. In U. Neisser (Ed.), *The school achievement of minority children: New perspectives* (pp. 105-143). Hillsdale, NJ: Erlbaum.

Catts, H. (1993). The relationship between speech-language impairments and reading disabilities. *Journal of Speech and Hearing Research, 36,* 948-958.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences.* Hillsdale, NJ: Erlbaum.

Cunningham, A., & Stanovich, K. (1998). What reading does for the mind. *American Educator, 22*, 8-15.

Johns, J., & Lenski, S., (2005). *Improving reading: interventions, strategies, and resources*. Duguque, IA: Kendall Hunt Publishing.

Lonigan, C.J., Wagner, R., Torgesen, J., & Rashotte, C. (2007). Test of Preschool Early Literacy skills. Austin, TX: PROED.

McDowell, K., Lefever-Davis, S., Kear, D., & Hamm, D. (2006, November). *Interactions between vocabulary and phonological distinctness: Impact on phonological awareness.* Annual meeting of the National Reading Conference. Los Angeles, CA.

McDowell, K., Lonigan, C.J., & Goldstein, H. (2007). Relations among SES, age, and predictors of phonological awareness. *Journal of Speech, Language, Hearing Research, 50,* 1079-1092.

McDowell, K., & Swartzendruber, K. (2008). Vocabulary intervention. *Kansas Journal of Reading, 24,* 34-41.

Metsala, J., & Walley, A. (1998). Spoken vocabulary growth and segmental restructuring of lexical representations: Precursors to phonemic awareness and early reading ability. In J. Metsala & L. Ehri (Eds.), *Word recognition in beginning reading*. Mahwah, NJ: Lawrence Erlbaum.

National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Phillips, B., Clancy-Menchetti, J., & Lonigan, C., (2008). Successful phonological awareness instruction with preschool children: Lessons from the classroom. *Topics in Early Childhood Special Education, 28*(1), 3-17.

Roth, F. P., Speece, D. L., & Cooper, D. H. (2002). A longitudinal analysis of the connection between oral language and early reading. *Journal of Educational Research, 95,* 259-272.

Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology,38*, 934-947.

Tabachnick, B. G., & Fidell, L. S. (1983). *Using multivariate statistics*. New York, NY: Harper and Row.
Whitehurst, G. J. & Lonigan, C., (1998). Child development and emergent literacy. *Child Development, 69*, 848-872.

Ziolkowski, R., & Goldstein, H., (2008). Embedded phonological awareness intervention during repeated book reading on preschool children with language delays. *Journal of Early Intervention, 31*(1), 67-90.

Table 1
Descriptive Statistics

Variable	Mean	SD	Range	F
ENP				
TV	.18	.52	0 - 3	.020
VI	.17	.43	0 -2	
BNP				
TV	.94	1.36	0 - 5	1.050
VI	.70	1.06	0 - 3	
MCE				
TV	4.65	1.91	0 – 9	.022
VI	4.60	1.81	0 – 8	
EW				
TV	.35	1.21	0 – 9	.246
VI	.26	.71	0 - 3	
RM				
TV	5.85	1.98	2 - 11	.329
VI	5.64	1.81	2 - 10	
MCB				
TV	7.09	2.35	2 - 10	.037
VI	7.17	2.39	2 - 10	
BW				
TV	2.31	2.84	0 – 11	.034
VI	2.21	2.69	0 - 11	
RD				
TV	4.56	2.58	0 - 11	.347
VI	4.85	2.63	0 - 11	

Note. TV=Typical Vocabulary group (n=71), VI=Vocabulary Impaired group (n=47)
PPVT and EOW standard scores, ENP=Elision nonpicture (7 points possible), BNP=blending nonpicture (5 points possible), MCE=multiple choice elision (10 points possible), EW=elision word (10 points possible), RM=rhyme matching (12 points possible), MCB=multiple choice blending (12 points possible), BW=blending word (12 points possible), RD=rhyme detection (12 points possible).

Table 2
Correlation Coefficients

Variable	1	2	3	4	5	6	7	8	9	10
1. PPVT	--	.50***	.14	.23	.12	.07	.10	.14	.08	-.01
2. EOW	.39**	--	.02	.20	-.09	.06	.04	-.05	.07	-.22
3. ENP	.19	-.07	--	.28*	.15	.08	.15	.16	.25*	.07
4. BNP	.29	.26	.16	--	.16	.07	.28*	.10	.09	-.09
5. MCE	.18	-.09	.01	.20	--	.22	.40***	.37**	.29*	-.04
6. EW	-.09	.00	.07	-.10	.07	--	.27*	.03	.07	-.08
7. RM	-.03	.11	.11	.41**	.22	-.01	--	.16	.23	.02
8. MCB	.23	-.11	.14	.24	.47***	.05	.19	--	.22	.10
9. BW	.03	-.01	.12	.15	.15	-.08	.17	.21	--	.00
10.RD	.17	-.20	.16	.17	.17	-.07	-.03	.19	.21	--

Note. Typical vocabulary group represented across top, vocabulary impaired group represented below. EOW=Expressive One Word, ENP=Elision nonpicture, BNP=blending nonpicture, MCE=multiple choice elision, EW=elision word, RM=rhyme matching, MCB=multiple choice blending, BW=blending word, RD=rhyme detection

Table 3
Predicting Phonological Awareness from Vocabulary

Predictor Variable	*R*	ΔR2	ß	*F* ratio
Typical Vocabulary	.432	.163		7.82***a
PPVT		.072	.314	2.29*a
EOW		.020	.163	1.19
Impaired Vocabulary	.393	.155		4.029*b
PPVT		.107	.421	2.295*b
EOW		.001	-.050	-.248

Note. EOW=Expressive One Word, ***=p<.001, **=p<.01, *=p<.05, a=df (2,68), b=df (2, 44).

Table 4
Component Analysis

Group	Component 1	Component 2	Component 3
Typical Vocabulary			ENP .58
			BNP .64
	MCE .72		
	EW .40		
	RM .68		
	MCB .53		
	BW .56		
		RD .69	
Variance	27.53%	14.69%	13.15%
Impaired Vocabulary			ENP .44
	BP .66		
	MCE .61		
			EW .66
	RM .61		
	MCB .70		
	BW .46		
		RD .67	
Variance	25.73%	15.10%	13.74%

Note. ENP=Elision nonpicture, BNP=blending nonpicture, MCE=multiple choice elision, EW=elision word, RM=rhyme matching, MCB=multiple choice blending, BW=blending word, RD=rhyme detection

Author Notes

Kimberly D. McDowell, Department of Curriculum and Instruction, Wichita State University. Preparation of this work was supported, in part, by grants to the first author from the Office of Research Administration at Wichita State University and the American Speech Language Hearing Foundation. Views expressed herein are the authors' and have not been cleared by the grantors. Correspondence concerning this article should be addressed to Kimberly D. McDowell, Ph.D.