

Effects of African American Mothers' Language to Their Preschool Children on Later Reading Outcomes

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1. Introduction

The extent to which language input to children in poverty is impoverished in quantity and quality, leading to a gap in later language and reading achievement, is controversial (Hart & Risley, 1995; Hoff, 2013). Early studies suggested that huge differences in the amount of talk that children from different social classes are exposed to can lead to substantial gaps in vocabulary development (the so-called "30 million word gap", Hart & Risley, 1995). However, later studies suggest that the quality of the input (e.g., variation in syntax or vocabulary: Huttenlocher et al, 2010; Rowe 2012) is more important than sheer amount of input. So Pan et al (2006) and Rowe (2012) found that vocabulary development in the elementary school years was predicted by earlier exposure to varied and more sophisticated vocabulary by parents. Hirsh-Pasek et al (2015) demonstrated in a longitudinal study of low-income mothers that the quality of the spoken communication between mothers and their young children was far more predictive of the later language development of the children than was amount of language input.

The present study examines low-income African American mothers' variation in vocabulary and syntactic structures and their use of non-mainstream English dialect (African American English (AAE)) to young preschoolers as predictors of later literacy development.

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The data for this paper were collected by the School Readiness Research Consortium: C.J. Lonigan, B.M. Phillips, and J. Clancy-Menchetti (Florida State University); S. Landry, P. Swank, M. Assel, and H. Taylor (University of Texas in Houston). The research was supported by a program grant from the National Institutes of Child Health and Development (NICHD) (P01 HD048497).

2. Method

2.1. Participants

The participants were 102 mother-preschooler pairs from low-income communities participating in a longitudinal NICHD project studying the impact of curricular interventions on school readiness (The School Readiness Research Consortium (Lonigan et al, 2015)). The children varied in age from 3;6 to 5;5 (mean=4;9) when the mothers' input language samples were collected. All of the children were in center-based day care and 98% of them were eligible for free lunches. The mothers' education levels varied from some high school to a bachelor's degree, with a median of a high school diploma or GED.

2.2. Procedure

Mothers and children were videotaped in free play with a Fisher-Price castle and playdough. The play session took place at the child's day care center in the middle of the curriculum intervention year (Time 2). Ten-minute samples of the mothers' language to their children were transcribed and then checked by a speech and language researcher familiar with AAE. Samples varied from 50 to 254 utterances (mean=124).

Children's language measures from comprehensive assessments administered as part of the NICHD curriculum intervention program at the end of the preschool year (Time 3) included: DELV-NR narratives (Seymour et al, 2005); dialect-neutral (risk) items of the DELV-ST (Seymour et al, 2003); expressive vocabulary (EOWPVT-R) (Brownell, 2000); and phonological awareness on the Test of Preschool Early Literacy (TOPEL) (Lonigan et al, 2007). The Passage Comprehension subtest of the Woodcock-Johnson III Tests of Cognitive Abilities (Woodcock et al, 2001) was administered at the end of first grade (average age 7;1). Raw scores were used for the two DELV tests, and standardized scores were used for the EOWPVT, TOPEL, and Woodcock-Johnson assessments.

2.3. Coding and Analysis of the Mothers' Language

Mothers' language samples were analyzed for variation in vocabulary (VOCD index (McKee et al, 2000)) and sentence syntax (Huttenlocher et al, 2010). VOCD has been shown to be less affected by sample size than other measures of vocabulary variation such as type-token ratio (McKee et al, 2000). The VOCD values were calculated using the computer program developed by McKee et al (2000). Mothers' use of complex syntax was measured as their production of seven different sentence structures: embedded questions, tag questions, adverbial clauses following a main clause, fronted adverbial clauses, tensed complement clauses, relative clauses, and passive voice sentences (see also Huttenlocher et al, 2010). Following the scoring system used by the IPSyn (Scarborough, 1990), mothers were given credit for up to two instances of each structure in the 10-minute transcripts. Scores therefore varied from 0 to 14.

The mothers' depth of AAE dialect spoken to their children was coded in terms of the number of semantic and syntactic features characteristic of AAE, following the descriptions of AAE by Rickford (1999) and the language research laboratory at Louisiana State University (LSU Language Research Laboratory, 2016). The scores were normalized as the number of feature tokens per 100 utterances. The AAE scores for the mothers varied from 0.7 to 51.9 feature tokens per 100 utterances, with a mean of 18.1. The most frequent AAE features in the mothers' language were zero third person 's, zero copula and auxiliary *be*, zero past tense inflection, and negative concord (double negation).

Finally, the amount of talk by the mother was measured as both the number of utterances and the number of words per 10 minutes of play.

3. Results

As previously reported by several studies of the use of AAE across the African American community, the mothers' depth of AAE dialect with their children was negatively correlated with their educational level ($\rho = -.264^{**}$), but the correlation was only moderate.

On the other hand, there was no significant relationship between the mothers' AAE usage and either their use of varied vocabulary (VOCD) ($r = -.056$) or the variety of complex sentence structures that they used in their language to the children ($r = -.049$) (See Table 1). Amount of speech (measured as either utterances or words per 10 minutes) was significantly correlated with VOCD ($r = .366^{**}$) and with complex syntax use ($r = .431^{**}$). Finally, the two measures of variety in the input, mothers' VOCD and use of different complex sentences, were strongly correlated with each other ($r = .364^{**}$).

Table 1. Pearson Correlations between Measures of the Mothers' Language

	Utts/10mins	VOCD	AAE
VOCD	.366**		
AAE	.062	-.056	
ComplexSyn	.431**	.364**	-.049

The various measures of the children's language skills at the end of preschool (Time 3) when their mean age was 5;4 were significantly intercorrelated. The correlations with the DELV-ST Risk scores are negative because that score is measured in terms of number of dialect-independent errors, not the number of items correct. Each of the language measures at the end of preschool was moderately predictive of the children's reading comprehension achievement at age 7 at the end of First Grade (Time 5). This is in keeping with prior research on the relationship between oral language development and early reading (National Early Literacy Panel, 2008; NICHD Early Child Care Research Network, 2005; Storch et al, 2002).

Table 2. Intercorrelations between Children's Language Measures at Time 3 and their Correlations with Reading Comprehension Standard Scores on the WJIII at Time 5

	DELV Risk	Narrative	Vocabulary	Reading Comprehension (First Grade)
DELV Risk				-.375**
Narrative	-.440**			.203*
Vocabulary	-.438**	.324**		.303**
PhonAware	-.276**	.265**	.376**	.298**

Stronger analyses of the relationships among the mothers' language input, the children's own language development, and the children's reading outcomes at First Grade were provided by longitudinal hierarchical linear regression and by structural equation modeling (SEM). The longitudinal regression analysis used the standardized WJIII Reading Comprehension score as its outcome measure. Possible predictor variables were entered into the regression in blocks: first, NVIQ on the pattern recognition subtest of the Stanford-Binet (assessed at Time 2); then the four measures of the children's language skills at the end of preschool (Time 3); and then the four measures of the mothers' language. As shown in Table 3, the combined children's language measures account for a significant change in the variance in later reading achievement ($\Delta R^2 = .157$, $p = .002^{**}$). Since all of the child language measures are intercorrelated, it is difficult to tease out their separate effects in this analysis, but the DELV-ST Risk score is an independent significant predictor in the set ($p = .013^*$).

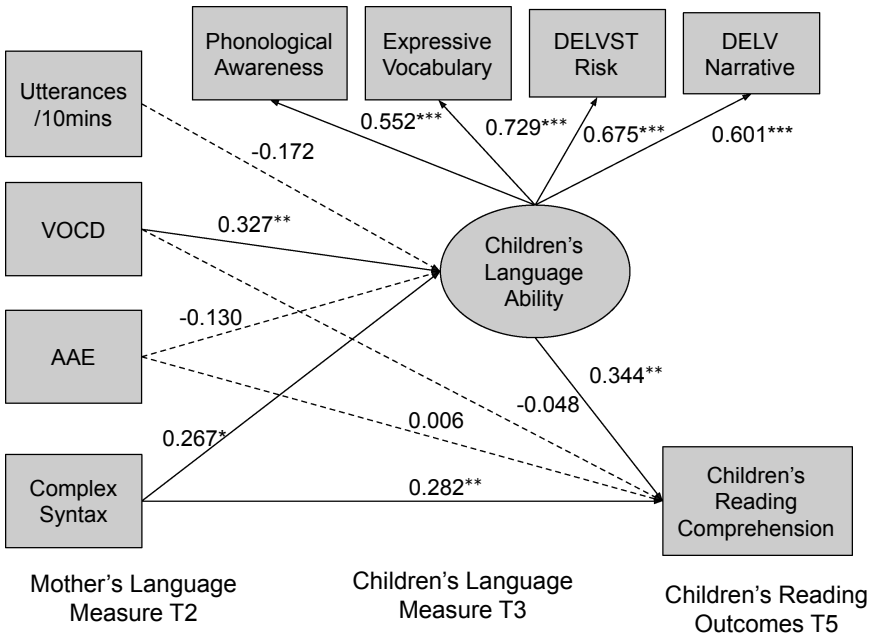
Table 3. Longitudinal Hierarchical Linear Regression Predicting WJIII Reading Outcomes at Time 5 from Time 2 and Time 3 Variables

	ΔR^2	F(df)	p	Predictor	β	t	p
Backgrnd	.045	4.72 (1,100)	.032*	NVIQ	.212	2.17	.03*
Children's Language	.157	4.73 (4,96)	.002**	DELV Risk	-.275	-2.54	.01**
				Narrative	.002	0.02	ns
				Vocabulary	.093	0.84	ns
				PhonAware	.158	1.56	ns
Mothers' Language	.101	3.34 (4,92)	.013*	Amount	-.105	-0.96	ns
				AAE	.057	0.61	ns
				VOCD	-.012	-0.11	ns
				ComplexSyn	.381	3.56	.00**

The regression shows that even when the effects of NVIQ and the children's own language development are controlled for, the mothers' language is a significant additional predictor of their children's later early reading

comprehension ($\Delta R^2 = .101, p = .013^*$). Of the different measures of the language input, only the mothers' use of several different complex syntactic structures is an independent significant predictor ($p = .001^{**}$).

The size of the participant sample allows us to carry out a longitudinal SEM analysis to explore the predictive relationships between the mothers' language input, the children's own language skills, and First Grade reading outcomes. Structural equation modeling has several advantages over linear regression analysis. First, SEM can separate correlated variables and indicate both *direct effects* of a variable on the outcome of interest, and *indirect effects* of variables on the outcome through their effects on mediating measures. Second, correlated variables can be combined into an underlying *latent variable*. So for this SEM we created a latent variable of "children's language ability" to which narrative, DELV-ST Risk, expressive vocabulary, and phonological awareness each contributed. We kept the four measures of mothers' language as separate predictor variables because we wanted to investigate their separate effects.



$\chi^2(18, N=102)=24.968, p=0.126$, comparative fit index=0.941; Tucker-Lewis index=0.902, root mean square error of approximation =0.062, standardized root mean square residual =0.048. Children's Reading Comprehension is standardized. Error Covariances are omitted.

Figure 1. Standardized parameter estimation (β) for the hypothesized model on children's reading outcomes at time 5 using mother's language measures at time 2. All reported estimates are the maximum likelihood standardized point estimates.

The SEM is a very good statistical fit to the data, with goodness-of-fit indices over .90, root mean square errors of fit less than .07, and a non-significant χ^2 test.

The SEM analysis confirms and extends the regression analysis: The children's own language development at the end of preschool is a significant direct predictor of their later First Grade reading comprehension. This analysis more clearly separates out the effects of the different measures of the mothers' language. The amount of talk and the mothers' depth of AAE dialect in talk to their children at Time 2 are not significant predictors of either the children's language at Time 3, nor of the children's First Grade reading comprehension achievement on the WJIII. On the other hand, variation in vocabulary (VOCD) has a significant direct effect on the children's language ($\beta = .327^{**}$). However it has no direct effect on the reading outcome.

The strongest predictor in the mothers' language is the use of varied complex sentence structures. This has both a significant direct effect on the children's reading comprehension ($\beta = .282^{**}$) and an indirect effect on later reading through its significant effect on the children's language development ($\beta = .267^*$).

4. Discussion

This study confirms that it is the richness rather than just the amount of language input to preschoolers in low income families that matters for their later language and reading development. The strongest predictor of later language and early reading success in African American preschoolers was the complex sentence syntax variation in their mothers' language in play with them. Vocabulary variation was also a significant contributor. However, the mothers' use of AAE dialect was irrelevant to those relationships. While amount of mother's talk was correlated with measures of syntax and vocabulary variation, the SEM analysis demonstrated that amount of talk did not have independent predictive effects.

Interventions seeking to facilitate African American children's language and reading that focus on increasing the amount of talk between the mother and child are misguided unless they target the semantic and syntactic richness of the input to the children. Concerns about possible mismatches between the dialect of the mothers and later school English (Hoff, 2013) also appear misplaced, especially during the preschool period of language development (Avineri et al, 2015; Pearson et al, 2013).

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