

Relationships among quality and quantity of caregiver input and vocabulary size in 3-year-old children from diverse backgrounds

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BACKGROUND

Rationale

- How do we respond to the United State's most important public education problem, the **"achievement gap"**: the well-documented observation that children from low-socioeconomic status (SES) families perform less well academically than children from middle- and high-SES families (Loeb, 2007).
- Compared with peers from more affluent families, children living in poverty hear approximately **30 million fewer words by age 3** (Hart & Risley, 1994)
- Intervention programs such as Thirty Million Words or Providence Speaks focus primarily on increasing **quantity** of home language input
- But what about **quality** of home language input?
 - Quality is also related to SES (Gilkerson & Richards, 2009)
 - Quality also predicts a child's later vocabulary skills (Rowe, 2012)
 - Increasing quantity of language through intervention measures doesn't necessarily increase language quality (Trask, 2012)

Research Questions

- Is quantity or quality a better predictor of vocabulary size, and does this relationship differ as a function of maternal education level?
- Do measures of linguistic quality differ across levels of maternal education?

METHODS

Participants

- 52 children who participated in a larger longitudinal study of language development
- Monolingual English speakers and their primary caregivers.
- Aged between 28 and 38 months (mean = 32)
- Normal hearing and typical speech and language development

Table 1. Demographic information for participants (standard deviations in parentheses)

Maternal Education Level	Males/Females	AAE Speakers	Mean Age in months	Mean EVT-2 Standard Score	Mean PPVT-4 Standard Score
Low	7/7	7	33 (4)	109 (19)	102 (21)
Middle	10/12	3	32 (3)	102 (20)	105 (22)
High	9/7	0	33 (3)	121 (18)	119 (19)

3-step scale for maternal education level:

Low = less than high school degree, G.E.D., high school degree
 Middle = some college, associate's degree, trade school degree
 High = college or graduate degree

PROCEDURE



The Language Environment Analysis System (LENA) is a small digital language processor that is placed in a specially designed vest and unobtrusively records 16 hours of a child's natural language environment. LENA software provides quantitative measures of home language input.

- The LENA was used by the 55 families in this study. They were participating in a larger longitudinal study on the relationship between lexical and phonological development.
- Expressive and receptive vocabulary size was measured using standardized tests (EVT-2 and PPVT-4).

Analysis

- Orthographic transcription of 30-minute language sample from each participant's LENA recording, using the Computerized Language Analysis (CLAN) program.
- Language samples taken from the hour with the highest Conversational Turn Count (CTC).
- Transcribed the speech of the primary caregivers and their child; coded all child-directed speech for pragmatic measures of language quality using a custom-made coding system

Measures

Dependent variables:

- Expressive vocabulary size (standard score on EVT-2)
- Receptive vocabulary size (standard score on PPVT-2)

Independent variables:

Quantitative measures (from LENA 16-hour recording):

- Percent meaningful speech (percent of auditory environment that was child-directed speech)
- Adult word count (average number of words per hour spoken to the child)

Qualitative measures (from 30-minute transcribed language sample)

- Percent contingent speech: topic-continuing replies (Hoff, 2006)
 - Child: "chocolate!" Mother: "no we don't have any chocolate" → contingent
 - Child: "chocolate!" Mother: "oh my goodness I have peanut butter on my pants" → not contingent
- Percent decontextualized speech: language that does not refer to the here and now. Includes abstract explanations, pretend play, and narratives. (Rowe, 2012)
 - "Monkeys are good at climbing aren't they?"
 - "Yeah grass is growing...because Daddy planted grass seeds there"
 - "Grandma will be so proud when we tell her tomorrow at dinner"
- Percent open-ended questions (as opposed to closed-ended and Yes/No questions), (Trask, 2012)
- Percent of commands
 - Percent indirect commands
 - Percent prohibitions
- Percent Negative Feedback: negative comments and prohibitions (Trask, 2012)

ANALYSIS

Statistical Analyses

Question 1:

- Stepwise linear regression analysis
- Dependent variable: Standard scores on EVT-2 and PPVT-4
- Independent variables: Quantitative and qualitative measures of home language input, maternal education level

Question 2:

- ANOVA
- Dependent variables: Quantitative and qualitative measures of home language input.
- Grouping variable: maternal education level.

Table 2. Measures of significant correlations observed * $p < .05$ ** $p < .01$

	Percent contingent speech	Percent decontextualized speech	Percent prohibitions	Percent negative speech	Percent indirect commands
EVT-2 Standard Score	.695**	.343**	.404**	-.255	.312*
PPVT-2 Standard Score	.695**	.154	.334*	-.388**	.371**

RESULTS

Question 1

- (See Table 2) Both receptive and expressive vocabulary size were significantly correlated with several qualitative measures of home language input.
- Receptive vocabulary size was also correlated with proportion of meaningful speech.

Figure 1: Expressive vocabulary

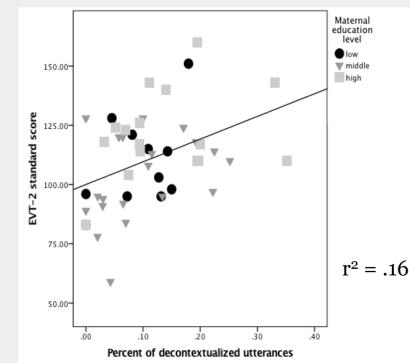
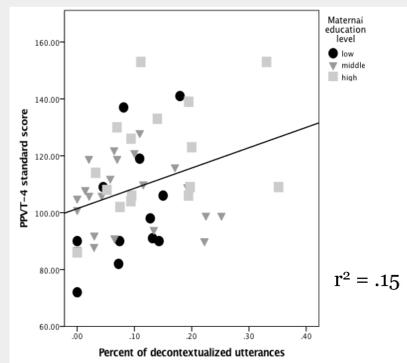


Figure 2: Receptive vocabulary



- The only significant predictor of both expressive and receptive vocabulary size was the percent of **decontextualized** speech.
- Quantitative measures of home language input were significant predictors; maternal education level was not significant.

Question 2

- Significant differences as a function of maternal education level in one quantitative measure and three qualitative measures
- Variability was high within groups and other measures were marginally significant ($.05 > p < .1$): percent meaningful speech, percent decontextualized speech, percent negative speech (comments and commands).
- No differences as a function of maternal education level in the percent of contingent speech

Table 3. Measures of quantity and quality by maternal education level * $p < .05$

Maternal Education Level	Adult Word Count*	Percent of decontextualized speech	Percent of commands*	Percent of prohibitions*	Percent of indirect commands*
Low	851 (349)	.08 (.06)	.27 (.15)	.22 (.15)	.21 (.15)
Middle	1030 (333)	.09 (.08)	.18 (.09)	.23 (.15)	.22 (.15)
High	1302 (323)	.14 (.1)	.19 (.08)	.10 (.13)	.35 (.21)

DISCUSSION

Question 1:

- Across all levels of maternal education, the percentage of decontextualized language that a child heard was a significant predictor of their expressive and receptive vocabulary size.

Question 2:

- Children from high maternal-education-level families heard more adult words, and received language input of higher quality compared to their peers from low maternal-education-level families.

Overall conclusion

- Intervention programs should teach parents of families with low maternal education levels to use more decontextualized language with their children, rather than simply focusing on increasing the amount of child-directed speech.

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