

Examining the Relationship between Quantity and Quality Measures of Child Language

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INTRODUCTION

In the past few years, several researchers have investigated the relationship and predictive ability of data obtained from LENA recordings to other measures of child language performance. Findings across studies and populations have been somewhat inconsistent.

- The LENA Foundation (2009): Average daily Adult Word Count (AWC) measured when a child was 2-6 months old was significantly related to later child performance on a standardized assessment of language (PLS-4) when the children were between 18-32 months old ($r = .59, p < .01$). A significant relationship was also found for Conversational Turns (CTC) and later child language ability ($r = 0.51, p < .01$).
- Greenwood et al. (2011): CTC and Child Vocalization Count (CVC) were significantly correlated with PLS-4 child measures; however, none of the LENA indicators were significantly related to performance on the BSID. AWC was not significantly related to any measure.
- Ambrose, VanDam, and Moeller (2012): Non-significant relationships between AWC and the Mullen Scales of Early Learning (MSEL) and the Comprehensive Assessment of Spoken Language (CASL); however, the relationships between CTC and receptive/expressive MSEL child performance, as well as with child performance on the CASL were significant (p 's $< .05$).
- Although standardized measures often offer a comprehensive picture of child language abilities, they are often not the only tool used by Early Childhood Educators to assess language ability; language sampling is often commonly used as well.

The purpose of this study was to analyze the correlations between AWC, CVC, CTC, mean length utterance (MLU), number of total words (NTW), number of different words (NDW), and maternal education.

PARTICIPANTS

- 69 children between the ages of 2;0 and 4;11 were recruited from preschools primarily located in Northwest Florida.
 - Mean Age in Months 44.8 (SD = 9.36)
 - 2;0 – 2;11: 12 children (17%)
 - 3;0 – 3;11: 29 children (42%)
 - 4;0 – 4;11: 28 children (41%)
- 37 females (54%), 32 males
- 79% Caucasian, 11% African American, 7% Hispanic, 1.5% Asian, 1.5% Native American.

METHOD

- Upon receiving consent, families were provided with a LENA recording device, clothing, and a parental questionnaire. Each family was asked to provide a day-long recording; however, this was not possible for all families (mean duration of recording: 8.69 hrs (SD = 3.93 hrs)).
- Using the LENA software, measures of AWC, CVC, and CTC were calculated for the duration of the recording. These values were then transformed into average hourly totals to control for the differences in recording duration found within our sample.
- Additionally, a portion of the audio recording was transcribed and coded using Systematic Analysis of Language Transcripts (SALT) coding conventions. Trained research assistants transcribed and coded 100 intelligible utterances for each child. Reliability of the transcription and coding conventions was conducted for 10% of each transcript using point-by-point agreement for the number of c-units, number of codes (e.g., word and utterance-level error codes), and morphemes.
- While the LENA indicators only provide a measure of language quantity, SALT indicators provide measures of both quantity and quality of language. Mean Length Utterance, a measure of syntactic complexity, and NDW were chosen as indicators of child language quality. NTW served as another measure of child language quantity (in addition to the LENA CVC indicator).

DISCUSSION

- Non-significant relationships were found between all LENA indicators of AWC, CVC, and CTC and SALT child measures of MLU_w, NDW, and NTW.
- Although these non-significant relationships appear to be somewhat surprising at first, perhaps the difference in measurement between the two “systems” is the cause. LENA uses acoustic information to determine AWC, CVC, and CTC, while transcribers coding with SALT use linguistic information (as well as the context of the situation) to determine when and how utterances are separated.
- AWC was not significantly related to CVC; however, CTC was.
- Although this finding is in contrast to the work of Hart and Risley’s longitudinal study (1992), it is consistent with the results of more recent studies that used LENA indicators to examine the relationship between the predictors of child language (Ambrose et al., 2011; Greenwood et al., 2012).
- SALT measures of quantity and quality were significantly correlated.
- Mean Length Utterance, measured in words or in morphemes, is essentially the same measure within this sample.
- Maternal level of education was not significantly related to any measure of child language quantity or quality.

RESULTS

Table 1 Pearson's Bivariate Correlations between Variables

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Child NTW	331.13	79.21	1.00							
2. Child NDW	116.13	28.38	0.82**	1.00						
3. Child MLU _w	3.31	0.79	1.0**	0.82**	1.00					
4. Child MLU _m	3.61	0.9	0.99**	0.84**	.99**	1.00				
5. Avg Hourly CVC	279.39	139.44	0.73	0.00	0.73	0.10	1.00			
6. Avg Hourly AWC	1270.04	629.44	-0.02	0.00	-0.02	-0.04	0.12	1.00		
7. Avg Hourly CTC	60.38	31.79	-0.07	-0.09	-0.07	-0.06	0.69**	0.61**	1.00	
8. Maternal Education			0.10	0.83	0.10	0.12	0.04	0.17	0.20	1.00

** $p < .01$