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THE IMPLICATIONS OF PARENT-CHILD CONNECTEDNESS FOR CHILD LANGUAGE DEVELOPMENT

CORYNNE ROSS
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Reviewed and approved* by the following:

Pamela M. Cole
Liberal Arts Research Professor of Psychology and Human Development and Family Studies
Thesis Supervisor

Jeffrey Love
Lecturer, Psychology
Honors Adviser

Lori Bedell
Senior Lecturer of Communication Arts and Sciences
Honors Adviser

* Signatures are on file in the Schreyer Honors College.

ABSTRACT

Language skills are important for children for many reasons. Research has shown that the better young children's language abilities are the better their academic, social, and emotional developmental outcomes (Ensor & Hughes, 2008; Fujiki, Brinton & Clarke, 2002; McCabe & Meller, 2004; Walker, Greenwood, Hart, & Carta, 2008). The early language learning environment is especially important in contributing to children's early language development; parental language input, for example, is particularly influential in children's early language learning environment (Hart & Risley, 2003; Hoff, 2006; NICHD Early Child Care Network, 2000). The aim of this thesis is to examine the potential contribution of parent-child conversation, i.e. connectedness, as a feature of the early language learning environment, to young children's language ability. Connectedness is defined as "the frequency with which each speaker's utterances are semantically related to another speaker's prior utterance" (Ensor & Hughes, 2008). Connectedness differs from standard conceptualizations of language input in that it examines not only the amount of exposure to language but more importantly the *quality* of young children's verbal interactions with their parents. The objective of this thesis project is to determine the degree to which parent-child connectedness predicts young children's subsequent level of language ability as measured by (a) natural speech samples and (b) standardized language performance. Connectedness assessed in parent-child interactions at child age 30 months was predicted to account for different aspects of children's language skill at age 36 months. Results provide partial support for the influence of connectedness, which contributed to some, but not all, aspects of children's language abilities at age 36 months.

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Chapter 1 Introduction

Language skills are important for children for many reasons. Research has shown that the better young children's language abilities are, the better their academic, social, and emotional developmental outcomes are (Ensor & Hughes, 2008; Fujiki, Brinton & Clarke, 2002; McCabe & Meller, 2004; Walker, Greenwood, Hart, & Carta, 2008). The early language learning environment is especially important in contributing to children's early language development; parental language input, for example, is particularly influential in children's early language learning environment (Hart & Risley, 2003; Hoff, 2006; NICHD Early Child Care Network, 2000). The aim of this thesis is to examine the potential contribution of parent-child conversation, i.e. connectedness, as a feature of the early language learning environment, to young children's language ability. Connectedness is defined as "the frequency with which each speaker's utterances are semantically related to another speaker's prior utterance" (Ensor & Hughes, 2008). Connectedness differs from standard conceptualizations of language input in that it examines not only the amount of exposure to language but more importantly the *quality* of young children's verbal interactions with their parents.

Normal Language Development

Children begin to acquire aspects of language in infancy, including babbling, gesturing, and receptive language skills (Golinkoff & Hirsh-Pasek, 1999; Chapters 1-3). Receptive language growth is first evident around age 12 months when parents realize their children understand single words and commands (Tayloe, 2009). Receptive language growth parallels

but precedes expressive language growth, which typically becomes evident around age 18 months when children have reached an expressive vocabulary size of about 10-50 words (Kuhl, 2004; Tayloe, 2009). Scholars note failure to speak a word by 18 months is not a concern, but that failure to understand simple words by 18 months requires careful attention (Golinkoff & Hirsh-Pasek, 1999, p. 112). Because the period between 12 and 36 months is a period of rapid language growth, both receptive and expressive, this study focuses on children's language input at age 30 months as a predictor of children's language development outcomes at age 36 months (Cole, 2010; Golinkoff & Hirsh-Pasek, 1999, pp. 116-117).

Individual Differences in Language Development

Within the normative trends described above, substantial individual differences exist in the timing and tempo of language development. Some children speak their first word as early as 10 months, while others may speak as "late" as age 19 months (Golinkoff & Hirsh-Pasek, 1999; p. 6). There are currently several known predictors of individual differences in early language development. One of the main predictors is exposure to language or language input (Greenwood, Thiemann-Bourque, Walker, Buzhardt, & Gilkerson, 2010; Rich, 2014). Language exposure differs greatly across home environments and one of the best predictors of that variation is socio-economic status (SES), which in turn has been linked to child language development (Hart & Risley, 1992; Hart & Risley, 2003; Sohr-Preston, et al., 2013). More recently, certain aspects of the language input have been identified as key contributors, specifically child-directed speech and adult-child conversations (Greenwood, Thiemann-Bourque, Walker, Buzhardt, & Gilkerson, 2010; Golinkoff & Hirsh-Pasek, 1999; Rich, 2014; Zimmerman et al., 2009). The goal of the present study is to further investigate more nuanced

influences of conversations that may contribute to child language development, notably the influence of conversational or connected speech.

Connectedness

Connectedness as a construct is not unique to the study of language development. Several studies have indicated that not only language communities but also interpersonal conversations can support a child's socio-cognitive understanding and the development of theory of mind (Ensor & Hughes, 2008; Hughes & Leekam, 2004; Rosnay & Hughes, 2010; Slomkowski & Dunn, 1996). These studies establish that language experiences, including semantically-related exchanges (i.e. conversations) contribute to social and cognitive development. Of interest to the current study is the possibility that one facilitator of socio-cognitive development, connected conversation, could serve as a predictor for language development, another facilitator of socio-cognitive development, as well as development in other areas as described above.

Within "conversations" with very young children, parents model the flow of interpersonal speech through use of turn-taking, paving the way for richer parent-child conversations (Snow, 1977). As parents talk to their children and allow pauses, perhaps even responding to children as if they had answered the parents' questions, children are learning how conversations should be constructed even before they are able to actively verbally contribute (Golinkoff & Hirsh-Pasek, 1999; p. 31). While turn-taking models the back-and-forth of the timing of a conversation, semantically connected conversational turns model the task of staying on-topic in conversation, an even richer language interaction. The movement toward connected conversation may contribute to vocabulary and grammar development, including the number and diversity of words understood and used. That is, extended conversations on the same topic can introduce

more new words to young children's vocabularies. Moreover, as parents "connect" with the child's utterances they may serve as a scaffold for longer utterances and better understanding of the basic grammar of word order. The longer the connected conversation continues, the more chances there are for parents to reinforce the child's existing vocabulary as well as tie in and introduce new words. The use of these new words in conversation with the child may improve the child's vocabulary size and lexical diversity as new words are introduced in the context of words a child already knows. In addition to parents using more and new words in conversation, they are also modeling use of longer utterances or sentences, as well as the correct word order within those sentences. When this modeling occurs in the context of semantically connected conversation, this can lead parents to natural scaffolding of child responses.

Young children first start using words, on average, during the early part of the second year of life but there are wide individual differences in the onset of the expressive language abilities that allow children to engage conversationally. By 30 months of age, most children have uttered their first words and are in a period of rapid vocabulary growth, of putting morphemes together to communicate their ideas and needs, and of elementary word order, e.g., "I want." Thus, because the environment plays an important role in language development, the more involvement young language learners have in connected conversations, the better their language abilities should be. Thus parent-child connectedness at age 30 months should function as one predictor for individual differences in children's level of language mastery at age 36 months. Research has shown that for children with autism, not only do parents initiate communication with their children, but that children also elicit parental language input (Siller & Sigman, 2008). Because child verbal ability may predict parental language input, the current project includes a control for early child language abilities.

In addition to the differences in child language abilities stemming from SES and language exposure, research suggests that setting impacts a child's language use, specifically the use of emotion language (Laible, 2004). The use of emotion language by both parent and child can differ in the lab setting from in the home setting (Howe, Rinaldi, & Recchia, 2010). The current project draws language samples both from lab visits and from home visits to capture a range of aspects of children's language environments. Home visits provide a window into naturally-occurring speech and laboratory visits provide more standardized assessment of children's language. Although the nature of children's language skills may vary from setting to setting, standardized measures of speech and measures of spontaneous speech are generally correlated even for children with impaired speech (Condouris, Meyer, & Tager-Flusberg, 2003). The present study utilizes both types of language measures for both control and outcome measures of language.

It is important for any study of child development to take a longitudinal approach. Such an approach enables us to interpret temporal relations that should exist if one factor, for example conversational connectedness, is a contributor to an outcome such as children's language growth. The data from the present study are drawn from a longitudinal study, offering a glimpse into a child's early home environment, including factors which are important for child language development, such as SES and the early language exposure. Data collected by the larger study provides sufficient information about early child language abilities to serve as a control for the present study, allowing for the singling out of the influence of connectedness for later child language abilities.

Predictions

Evidence suggests, therefore, that greater connectedness, as assessed during parent-child verbal interactions when children are age 30 months, will predict greater diversity of word use (word type), children's knowledge of more word meanings (vocabulary), longer utterances (mean length of utterance) and better understanding of word order (grammatical understanding) by child age 36 months. Specifically, the thesis prediction is that the frequency of parent-child connectedness at child age 30 months will account for significant variance in children's language skills when they are age 36 months as demonstrated by (a) more diverse word usage as indexed by word type (Peirce, 1906), assessed from children's spontaneous speech samples during the 36 month home visit, and (b) larger vocabulary knowledge based on the Vocabulary Subtest of the Wechsler Preschool and Primary Scale of Intelligence, 3rd edition (WPPSI-III; Wechsler, 1989), as well as (c) longer average utterances, as indexed by mean length utterance (MLU; Brown, 1973), and (d) higher receptive understanding of word order based on the Clinical Evaluation of Language Fundamental Standardized Test of Language Development Preschool Sentence Structure Subtest (CELF-Preschool; Wiig, Secord, & Semel, 1992).

Chapter 2 Methods

Participants

For this study, data were drawn from a larger longitudinal study that followed 120 children from age 18 months to age 48 months. This larger longitudinal study investigated language development as well as development of self-regulatory skills (Cole, Crnic, Nelson, & Blair, 2000). The present study focused on home visit data for 94 children who had completed data at both age 30 months when children were observed at home and at ages 18, 24, and 36 months when children were observed in the laboratory. The difference between the total N of 120 in the larger study and the sample N of 94 for the present thesis reflects the exclusion of cases in which either connectedness data were missing for both parents or there was incomplete child language data at one time point. The final sample comprised 51.1% boys and 48.9% girls. The mean household annual income at 30 months was $46,290, with a range of $83,352. In terms of level of parental education, 44.7% of mothers had a college degree or higher, as compared to 30.2% of fathers.

Procedures

Home visits. Data from the 30 and 36 month home visits were used for the present study. During the home visits, a research assistant from the DOTS project visited children and their families at their homes and observed as families went throughout their normal daily routines. Audio recordings were collected during home visits, timed to include 4 intervals that were 10 minutes each, with five minute breaks in between. The research assistant took notes during observation to aid in later transcription and coding of audio recordings. For this current project, the transcripts of audio recordings from home visits of 30 month olds were coded for

connectedness. A team of research assistants was trained to code for Connectedness (see below for description). Data from the 36-month home visit was used to obtain a naturalistic speech sample at age 3. Audio records of the visit were transcribed into CHAT (MacWhinney, 2000), and then analyzed with CLAN to obtain measures of target child language ability (see below for description).

Lab visits Data for this project were also drawn from in-lab sessions at 18, 24, and 36 months. During 24 month lab visits, children alternated between challenging and non-challenging tasks, and at 18 and 36 months children underwent assessments of language and cognitive abilities. Non-challenging lab tasks at 24 months included semi-structured tasks such as reading and free play. The one challenging task from which language data were drawn for 24 months for the current project is the clean-up task. Mothers were present in the room with the children for all three of these tasks. In the reading task, mothers were given two wordless picture books (Mercer Mayer, 1967) and were instructed to read with their children for five minutes. The wordless books are commonly used with preliterate children and are thought to help support emergent literacy as they draw on visual and cultural knowledge to aid language understanding (Jalongo, Dragich, Conrad, & Zhang, 2002). During the free play task, mothers and children spent five minutes in unstructured activity with age-appropriate toys provided by the lab. At the end of the five minutes, mothers were instructed to ask their child to clean up the toys (constituting the clean-up task). Video-recordings of the reading task and free play at 24 months were transcribed using CHAT (MacWhinney, 2000) and then analyzed using CLAN to obtain measures of target child language ability. Child language ability was assessed by standardized assessments of parent-report at 18 months and by standardized tasks at the 36 month lab visit.

Measures

Connectedness. A team of undergraduate research assistants was trained to transcribe audio recordings of speech during the home visits in the CHAT system. These transcripts were subsequently coded by a separate team of undergraduates who were trained to use the Connectedness Coding System, which was adapted from published coding systems developed by Brown and colleagues (Brown, Donelan-McCall, & Dunn, 1996) and Ensor and Hughes (2008). For connectedness coding, only the speech of parents and the target child was coded, as a means of quantifying the quality of semantic turn-taking during parent-child conversation. The coding system measured connectedness as defined by the frequency with which parents continued semantically related conversational turns with the toddler. Semantic relatedness of turns was defined by Brinton and Fujiki's (1984) system that accounts for topic introduction, reintroduction, and maintenance. For the purposes of the current study, the frequency of parents' connected turns was the variable used. A speaker's turn was considered bound by another speaker's utterances or significant silence (10 seconds). Each turn directed to a child from a parent or from a child to a parent was assigned a quality code. A turn received a connected code if the speaker's utterance was semantically related to the other speaker's previous turn.

In the present study, mother and father connected turns were combined as an index of overall connectedness. If two parents were present during the home visit, the scores from both parents were added together for the Total Parent Connected Turns composite. For cases in which only one parent was present, the absent parent was assigned a code of zero rather than a missing score, and then the total was therefore based on the available parent's score. The mean number of Total Parent Connected Turns was 49.17, with a standard deviation of 31.44 and a range of 0-183.

Child Language.

***Spontaneous Speech Samples*.** For children's spontaneous language use, speech samples from both lab (at 24 months) and home (at 36 months) visits were used to generate two variables: mean length of utterance (MLU) and number of word types, which were calculated by the CLAN program after CHAT transcription (MacWhinney, 2000). MLU is the average number of words or morphemes within a child's sentence or utterance (Brown, 1973). The number of word types reflects the number of different parts of speech the child uses when speaking. The number of word types spoken by a child was calculated from speech samples during lab tasks at 24 months and from speech samples during the home visit at 36 months.

***Standardized Language Performance Measures*.** The MacArthur Communicative Development Inventory for Infants (MCDI; Fenson et al., 1993) is a parent-report used to measure receptive vocabulary comprehension as well as vocabulary production for children age 18 months. The MCDI is correlated with other developmental measures such as the Bayley Scales of Infant development, and has been shown to be valid and reliable for children within two standard deviations of the norm (Kopparthi et al., 1991). To determine language skills for children age 36 months, two standardized measures were used: (1) the Wechsler Preschool and Primary Scale of Intelligence 3rd edition (WPPSI-III; Wechsler, 1989) Vocabulary score was used as a standardized measure of child receptive vocabulary, and (2) the Clinical Evaluation of Language Fundamental Standardized Test of Language Development Preschool Sentence Structure Subtest was used to evaluate sentence structure understanding (CELF-Preschool; Wiig, Secord, & Semel, 1992).

Early Child Language Composite. Because there is considerable stability in children's language status over the course of childhood, it is necessary to control for earlier language skills when testing the contribution of parental connectedness. A single composite variable was created to control for earlier influences of language development in children's language abilities at 36 months. The Early Child Language Composite was created by standardizing scores and adding them. The scores were the MCDI vocabulary comprehension and production scales at age 18 months, MLU at age 24 months, and number of word types at age 24 months. These 4 measures were significantly correlated (*r*'s range from .22 to .64, all *p*'s < .05) (see Table 1). The composite did not include language indices taken from the home visit at child age 30 months as this was the source of connectedness data and would be conflated with connectedness scores.

Table 1. *Correlations among early language variables (n=94)*

	1	2.	3	4
1. MCDI Comprehension 18 mos	-			
2. MCDI Production 18 mos	.59	-		
3. MLU 24 mos	.22	.45	-	
4. Word Types 24 mos	.22	.44	.64	-

Note. All correlations significant at $p < .05$ or lower

Data Analytic Plan

Four step-wise hierarchical linear regressions were conducted using SPSS 23.0 (IBM Corp., 2015), to assess the degree to which parent connectedness at 30 months predicts four aspects of 36 month language: 1) number of word types used in the home, 2) receptive vocabulary as measured by the WPPSI-III (Wechsler, 1989), 3) MLU in the home, and 4) sentence structure understanding, as measured by the CELF-Preschool (Wiig, Secord, & Semel,

1992). The Early Language Composite was entered as a control in Step 1 and Parent Connected Turns were entered in Step 2.

Chapter 3 Results

Descriptive Statistics

As noted above, some cases were excluded due to insufficient data for either the Early Child Language Composite or for the Total Parent Connected Turns Composite. For the remaining 94 cases, two cases were missing the 36 month WPPSI Vocabulary score, three cases were missing the 36 month CELF, and 12 cases were missing 36 month number of word types and MLU from the home visit. The descriptive statistics reported below refer to the 94 cases whose data were used in regression analyses. The reporting of descriptive statistics includes information for the control, predictor and outcome variables (see Table 2).

Table 2. *Descriptive statistics for controls, predictors, and outcomes*

	N	Mean	SD	Range
Controls:				
Early Child Language Composite	94	-0.08	2.95	-6.10-7.48
18 mos MCDI Vocab Comprehension	94	236.57	88.73	14.00-396
18 mos MCDI Vocab Production	94	75.10	71.91	0-318
24 mos Lab Tasks MLU	94	1.54	0.43	1-2.99
24 mos Lab Tasks # Word Types	94	38.57	22.56	3-111
Predictors:				
Parent Connected Turns 30 mos	94	49.17	31.44	0-183
Outcomes:				
Word Types 36 mos	82	95.37	41.12	1-209
WPPSI Receptive Vocabulary 36 mos	92	11.36	3.28	1-19
MLU 36 mos	82	2.83	.67	1.25-4.5
CELF Sentence Structure 36 mos	93	9.36	3.34	0-19

In addition, zero-order correlations between Total Parent Connected turns, the Early Child Language Composite and the four language outcomes of interest: the number of word types spoken, the WPPSI-III receptive vocabulary score, the MLU, and the CELF-Preschool score are reported in Table 3. Total Parent Connected Turns at 30 months were significantly correlated only with child number of word types spoken at 36 months, $r(80)=.29$, $p<.01$, and not correlated with any of the other three child language outcome measures at 36 months. Total Parent Connected Turns at 30 months was also not correlated with the Early Language Composite. The Early Language Composite was significantly correlated with the WPPSI receptive vocabulary score at 36 months $r(90)=.28$, $p<.01$, and significantly correlated with the

number of word types spoken at 36 months $r(80)=.26$, $p<.05$ and the CELF score at 36 months $r(89)=.21$, $p<.05$. However, the Early Language Composite was not significantly related to 36 month MLU, $r(82)=.17$, $p>.10$.

Table 3. *Correlations among control, predictor, and outcome variables*

	1.	2.	3.	4.	5.	6.
1. Early Language Composite	-					
2. Total Parent Connected Turns 30 mos	.19	-				
3. Child # Word Types Spoken 36 mos	.26*	.29**	-			
4. WPPSI Receptive Vocabulary 36 mos	.28**	.19	.22*	-		
5. Child MLU 36 mos	.17	.05	.60**	.18	-	
6. CELF 36 mos	.21*	.05	.15	.31**	.60**	-

Note. *$p < .05$, **$p < .01$

Regression Analyses

To analyze the relation between parent-child connectedness and child language development, four step-wise hierarchical linear regressions were conducted, each with one of the four language outcomes. Each regression model was constructed in the following manner. In Step 1, the control variable was entered and in Step 2, Parent Total Connectedness was entered. As a reminder the four outcomes of interest were: lexical diversity as indexed by number of word types spoken during spontaneous speech samples, vocabulary knowledge (as measured by the WPPSI-III Receptive Vocabulary subtest score), utterance length as indexed by MLU from

spontaneous speech samples, and child word order understanding (as measured by the Preschool CELF Sentence Structure subtest score).

Lexical Diversity. In Step 1, Early Child Language accounted for significant variance in children's spontaneous lexical diversity. Specifically, Higher Early Child Language scores were associated with more word types spoken at 36 months, β=.261, $t(80)=2.42$, $p<.05$ (see Table 7). Model 1 accounted for 6.8% of the variance in lexical diversity, $F(1,80)=5.87$, $p<.05$. As predicted, after controlling for early child language ability, parental connectedness contributed unique and significant variance to the model, $F_{change}(2, 79)=5.62$, $p<.05$. Early Child Language continued to be a significant predictor of Lexical Diversity, β=.221, $t(79)=2.08$, $p<.05$. Moreover, over and above the effect of Early Child Language, Total Parent Connectedness at 30 months significantly predicted the number of word types spoken by the child at 36 months, β=.25, $t(79)= 2.37$, $p<.05$. Higher frequency of total parent connected turns at age 30 months was associated with a greater number of word types expressed by the target child in the home at 36 months. The overall model, $F(2, 79)=5.91$, $p<.01$, accounted for 13% of the variance in number of word types spoken by the child in the home at 36 months.

Table 4. *Hierarchical regression model predicting child word types at 36 months*

	Model 1			Model 2		
	B	*SE B*	β	*B*	*SE B*	β
Step 1						
Early Child Language Ability	3.71	1.53	.26*	3.14	1.51	.22*
Step 2						
Total Parent Connected Turns				.33	.14	.25*
R^2		.07			.13	
F		5.87*			5.91**	
F change					5.62*	

Note. *$p<.05$, **$p<.01$

Vocabulary Knowledge. In Step 1, early child language accounted for significant variance in children's knowledge of the meaning of words. Higher Early Child Language Composite scores were associated with higher receptive Vocabulary (WPPSI-III) subtest scores at 36 months, β=.282, $t(90)=2.79$, $p<.01$ (see Table 5). Model 1 accounted for 8% of the variance in vocabulary knowledge, $F(1,90)=7.78$, $p<.01$. Contrary to prediction, after controlling for early child language ability in Step 1, parental connectedness in Step 2 did not contribute unique and significant variance to the model, $F_{change}(2, 89)=0.18$, $p=.01$. In Step 2, the Early Child Language Composite remained a significant predictor of receptive Vocabulary (WPPSI-III) subtest scores, β=.254, $t(89)=2.48$, $p<.05$. Parent Total Connectedness at 30 months, however, was unrelated to receptive vocabulary at 36 months, β=.139, $t(89)=1.35$, $p=.18$. Model 2, which included both the Early Child Language Composite and Total Parent Connected Turns, $F(2, 89)=4.84$, $p<.05$, accounted for 9.80% of the variance in the Vocabulary subtest scores.

Table 5. *Hierarchical regression model predicting child WPPSI at 36 months*

	Model 1			Model 2		
	B	*SE B*	β	*B*	*SE B*	β
Step 1						
Early Child Language Ability	.32	.11	.28**	.29	.12	.25*
Step 2						
Total Parent Connected Turns				.01	.01	.14
R^2		.08			.10	
F		7.78**			4.84*	
F change					1.83	

Note. *$p<.05$, **$p<.01$

Utterance Length. In Step 1, early child language did not account for significant variance in utterance length, $F(1,80)=2.28$, $p=.135$ (see Table 6). Higher Early Child Language Composite scores were not associated with greater MLU, β=.166, $t(80)=1.51$, $p=.135$. Contrary

to prediction, after controlling for early child language ability in Step 1, parental connectedness in Step 2 did not contribute unique and significant variance to the model, $F_{change}(2, 79)=.03$, $p=.325$. Early child language ability remained unrelated to 36 month utterance length, β=.163, $t(79)=1.45$, $p=.15$. Total Parent Connected Turns at 30 months also did not significantly predict MLU at 36 months, β=.02, $t(79)=.05$, $p=.174$.

Table 6. *Hierarchical regression model predicting child MLU at 36 months*

	Model 1			Model 2		
	B	*SE B*	β	*B*	*SE B*	β
Step 1						
Early Child Language Ability	.04	.03	.16	.04	.03	.16
Step 2						
Total Parent Connected Turns				.00	.002	.02
R^2		.03			.03	
F		2.28			1.14	
F change					.03	

Word Order Understanding. In Step 1, early child language accounted for significant variance in word order understanding. Higher Early Child Language Composite scores were associated with higher Preschool CELF Sentence Structure subtest scores at 36 months, β=.211, $t(89)=2.04$, $p<.05$ (see Table 4). Model 1 accounted for 4.5% of the variance in word order understanding, $F(1,89)=4.16$, $p<.05$. Contrary to prediction, after controlling for early child language ability in Step 1, parental connectedness in Step 2 did not contribute unique and significant variance to the model, $F_{change}(2, 88)=.003$, $p=.959$. In Step 2, the Early Child Language Composite dropped slightly below the accepted level of significance, β=.21, $t(88)=1.98$, $p=.051$. Moreover, Parent Total Connectedness was unrelated to Sentence Structure understanding, β=.006, $t(88)=.052$, $p=.959$. Model 2, which included both the Early Child

Language Composite and Total Parent Connected Turns, accounted for 4.5% of the variance in CELF Sentence Structure scores at 36 months, $F(88)=2.06$, $p=.134$. In sum, the full model of child language abilities and parental connectedness did not predict significant variance in children's understanding of word order.

Table 7. *Hierarchical regression model predicting child CELF at 36 months*

	Model 1			Model 2		
	B	*SE B*	β	*B*	*SE B*	β
Step 1						
Early Child Language Ability	.24	.12	.21	.24	.12	.21
Step 2						
Total Parent Connected Turns				.001	.01	.006
R^2		.05			.045	
F		2.16*			2.06	
F change					.003	

Note. *$p<.05$

Chapter 4 Discussion

The purpose of this study was to investigate the extent to which parental conversational connectedness with older toddlers, i.e. 30-month-olds, predicted different aspects of children's language development six months later at 36 months. It was hypothesized that the more frequently parents engaged in semantically related conversation turns, i.e. connectedness, with their 30-month-olds, the greater children's understanding of word meaning and order and the longer and more diverse children's spontaneous speech would be at age 36 months. The analyses revealed that parent-child connectedness at age 30 months accounted for significant unique variance in one of the four predicted outcomes after the stability of child language achievements was taken into account.

Of four child language measures, only one—lexical diversity—was predicted by the frequency of parental connectedness six months earlier, over and above stability in child language abilities. That is, in addition to a composite of earlier child language abilities, the more parents connected their conversations with their 30-month-olds, the more varied the words and word types children used in spontaneous speech at age 36 months. Contrary to prediction, the length of children's spontaneous utterances, in terms of the average number of morphemes in their utterances, as well as children's vocabulary knowledge, as indicated by a standardized vocabulary test, and their understanding of word order were not predicted by parent-child connected turns. Three of the four 36 month language outcomes of interest were predicted by children's earlier language abilities; utterance length was not predicted by early child language

abilities. The findings suggest that *vocabulary use* is greater as a function of exposure to connected conversations than vocabulary understanding and grammar.

The findings suggest that children's expressive vocabularies were increased by the degree to which their parents engaged in verbal interactions on a semantic theme with them. That is, parent connectedness appears to uniquely contribute to vocabulary use development but not necessarily vocabulary knowledge, utterance length, or grammatical correctness of word order. While children's vocabulary knowledge, as measured by the WPPSI-III Receptive Vocabulary subtest, was not significantly predicted by parent connectedness, Beta weights reveal that the two were more strongly related than were associations between utterance length and understanding of word order, and parent connectedness. These findings support the view that conversation quality, in addition to sheer amount of language input, contributes to children's capacity to use, and possibly to understand, a variety of words (Ensor & Hughes, 2008; Golinkoff & Hirsh-Pasek, 1999; p. 31; Hughes & Leekam, 2004; Rosnay & Hughes, 2010; Slomkowski & Dunn, 1996; Snow, 1977).

The fact that connectedness did not predict other aspects of children's early language development, specifically vocabulary knowledge, utterance length, and grammatical understanding, may not rule out its influence. Rather, there may be limitations to the study design that may account for the lack of findings, limitations that should be addressed in future research. For example, it may be possible that the small sample size (94) affected the ability to fully ascertain the relationship between connectedness and child language development. In terms of predictor variables, because a composite was created for Total Parent Connected Turns, no analyses were run for mother and father connectedness separately. The comparison of mother

and father connectedness and their effects on child language development may prove an interesting direction for future research.

Additionally, it may be possible that parent-child connectedness at this young age contributes specifically to the development of vocabulary and not to the development of grammar or sentence use. It would be a fascinating direction for future research to investigate and compare the influence of connectedness for children 30 months and children later in toddlerhood. It is possible that the children in this sample were too young, having just reached their third birthday, for effects of connectedness for grammar development to be evident. Slobin summarizes literature on the development of grammatical understanding by explaining that correct understanding and use of word order in its simplest form, for instance the verb-object structure, is a pre-requisite for the development of understanding and use of other more complex parts of grammar, like noun pluralization and questions without rising intonation (1973). In regards to measures of child language outcomes drawn from natural speech samples, parent connectedness was not predictive of expressive language as measured by MLU, but was predictive of expressive vocabulary as measured by word tokens.

The results of the present study support the view that semantically related conversations contribute to children's language development, at least in terms of the diversity of young children's vocabulary use. Because connectedness was demonstrated to contribute to one language outcome, it is important that future studies examine what about the child, parent, or parent-child relationship may contribute to greater connectedness in conversation. Future research should consider which areas of language understanding and use are most developmentally salient for any given age group, and examine the contributions of parent connectedness for those specific areas. Another direction for future research would be to explore

which aspects of parenting, for instance parenting style, might be associated with more connected parent verbal engagement with children. Parenting style, among other aspects of the parent-child relationship, are greatly influenced by culture; some emerging research implies that culture may play a role not only in parenting overall but also specifically in the amount of parent-child communication (Fuller, Bein, Kim, & Rabe-Hesketh, 2015). With these effects in mind, this study could be improved through use of a larger, more geographically and culturally diverse sample, or through focus on comparison across cultural groups.

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ACADEMIC VITA

Corynne Ross

Current Address: 670 East Prospect Avenue, Apartment I
State College, PA 16801
Permanent Address: 437 Nye Road
Hummelstown, PA 17036
Telephone: (717) 421-9475
Email: cer5266@psu.edu

Education:
The Pennsylvania State University, University Park, PA
Majors: Psychology and Communication Arts and Sciences (CAS)
Degrees: BA in Psychology, anticipated May 2015; BA in CAS, anticipated May 2015
Overall GPA: 3.94, GPA for Psychology Major: 3.94

Honors:
Schreyer Honors College Scholar
Member of Phi Beta Kappa Honors Society
Member of Phi Kappa Phi Honors Society
Member of Lamda Pi Eta, National Communication Association Honors Society
Dean's List, Fall 2011-present

Clinical Experience:
Mental Health Practicum with Children: Friendship Group coach, The Pennsylvania State University, University Park, PA. Fall 2014—Spring 2015. Duties: aided in delivery of social skills intervention through Penn State's Child Study Center "Friendship Group" program, via weekly sessions with children and weekly supervision. Supervisors: Tyler Sasser, MS & Carla Kalvin, MS. 7 hours weekly.

Research Experience:
Honors Thesis Research: The Pennsylvania State University with Pamela Cole, PhD. Spring 2014—present. Duties: proposed and conducted an original project; helped to code necessary data; conducted data input and analysis using SPSS; will complete write-up and oral defense. Topic: investigation of the potential contribution of semantically-connected parent-child speech to subsequent child language development.

Research Assistant: The Pennsylvania State University in Development of Toddler Studies (DOTS) lab with Pamela Cole, PhD and Megan Fields, MS. Fall 2013—present. Duties: transcription of speech from video of various in-lab tasks, Fall 2013; coding of speech from audio recordings of home-visits for connectedness, Spring 2014-present. 10 hours weekly.

Research Assistant: The Pennsylvania State University in Head Start Research Based, Developmentally Informed (REDI) lab with Karen Bierman, PhD, and Tracy Spalvins. Spring

2015—present. Duties: conducting home visits with ninth grade participants and their families, including administering parent and child interviews, administering the Kaufman Test of Educational Achievement (KTEA) reading and math assessments, and administering Multi-Source Interference Task (MSIT) and Audio Computer-Assisted Self Interview (ACASI). 8-10 hours weekly.

Professional Presentations and Papers:
Friendship Group Parent Presentation: Presentation at Schlow Library, State College, PA, to local parents interested in Friendship Group Social Skills Intervention. April 1, 2015. Topic: Provided information for interested parents about the design and details of the intervention.

Volunteer Experience:
The HopeLine Crisis Hotline: The HopeLine call center, Harrisburg, PA. Summer 2014. Duties: underwent training for handling various types of crisis topics (suicide, abuse, interpersonal struggles), answered calls and chats from distressed teens and young adults, provided callers/chatters with and connected them to relevant resources, wrote summary reports for each call/chat. Supervisor: Cindy Lear.

References:
Pamela Cole, PhD., Research Professor, Department of Psychology, The Pennsylvania State University, University Park, PA 16802. Voice: 814-863-1746; e-mail: pmc5@psu.edu
Melissa Hunter, PhD., Lecturer, Department of Psychology, The Pennsylvania State University, University Park, PA 16802. e-mail: mdh23@psu.edu
Kristin Buss, PhD., Research Professor, Department of Psychology, The Pennsylvania State University, University Park, PA 16802. e-mail: kab37@psu.edu