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Item Analysis of the Grammar Subtests of the CDI: Words & Sentences
for African American Children

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Chapter 1 INTRODUCTION

As I learned about the field of communication disorders during my undergraduate career, I began to find the subject of child language development intriguing. For the purpose of this project, I wanted to look at a tool clinicians use to assess the language development of African-American children who live in the South. Given this, I chose to further explore the *MacArthur Bates Communicative Developmental Inventory (CDI; Fenson et al., 2007)* by conducting an item analysis of the CDI Words and Sentences Inventory.

In this literature review, I describe the CDI and its test components. Then, I review research studies in order to determine the validity of the CDI for American children who have been primarily White. The purpose of this review is to assess the validity of the CDI and determine whether parent report is a valid measure of children's language development. Lastly, I look at the relationship between children's language acquisition and socioeconomic status by reviewing two studies which examined the relationship between children's maternal education and their scores on the CDI.

The CDI as an Assessment Tool

The CDI (Fenson et al., 2007) is a nationally recognized assessment tool and an instrument which uses parent report to assess early language development in children. The CDI is used to identify children with possible language delays, identify children's communicative skills which may be used as a basis for intervention, and screen children at different levels of language development (Fenson et al., 1994). The CDI has also been adapted for use in a wide range of languages including Spanish, French, German, and Chinese (Bates, Caselli, & Casadio, 1990; Camaioni, Caselli, Longobardi, & Volterra, 1990; Jackson-Maldonado, Thal, Marchman, Bates, & Gutierrez-Clellen, 1993; Ogura & Murase, 1991).

The CDI consists of two separate inventories. The first inventory focuses on Words and Gestures (WG) for children 8 to 16 months of age. The second inventory focuses on Words and Sentences (WS) for children 16 to 30 months of age. Both inventories allow parents to report their children's language development skills, and then the children's raw scores on the inventories are converted to percentile scores.

The CDI/WG consists of two parts which are each split in to subsections. The first part of the CDI/WG is *Early Words* and it consists of four sections: *First Signs of Understanding*, *Phrases*, *Starting to Talk*, and a *Vocabulary Checklist*. The *First Signs of Understanding* section includes questions which are designed to ask parents whether or not their children respond to language. The *Phrases* section consists of a 28-item list in which parents are asked to identify which phrases their children understand. The section on *Starting to Talk* includes two questions which asks parents the frequency of their children's imitations of new words and the frequency with which their children can label objects. The last section consists of a 396-item *Vocabulary Checklist* in which parents indicate which words their children understand and/or produce.

The second part of the CDI/WG is *Actions and Gestures* and it consists of five subsections. Part II of the CDI/WG emphasizes a child's understanding of communicative and symbolic gestures. The 63 gestures are organized into five categories. They are: section A, *First Communicative Gestures*, which focuses on the onset of intentional communication; section B, *Games and Routines*, which focuses on the important role in early social interactions; sections C, *Actions with Objects*, and Section E, *Imitating Other Adult Actions*, which both focus on a growing understanding of objects and the use of things; and section D, *Pretending to Be a Parent*, which focuses on symbolic gestures.

The CDI/WS is also split into two parts with each part consisting of subsections. The CDI/WS is similar to the format of CDI/WG but there are several noticeably age-related differences. Part I of the CDI/WS is *Words Children Use* and it is split into two sections. Section A, *Vocabulary*, consists of 680-items classified into 22 semantic categories. This vocabulary section differs from the CDI/WG in that parents are asked to identify words that their children actually produce rather than just recognize. Section B, *How Children Use Words*, focuses on how children use language to refer to the past, the future, and absent objects/people.

Part II of the CDI/WS is *Sentences and Grammar* and it is divided into five categories. Section A, *Word Endings/Part 1*, assesses the children's production of the regular plural (-s), possessives (-'s), progressive (-ing), and past tense (-ed). Section B, *Word Forms*, asks parents to identify whether their children have begun to use five common irregular plurals and 20 common irregular past tense verbs. Section C, *Word Endings*, consists of a checklist of 14 common overregularized plural nouns and 31 overregularized past tense verbs. In Section D, *Examples*, parents are asked to give examples of their children's most complex utterances. Section E, *Complexity*, consists of parents choosing which member of 37 phrases/sentence pairs best reflects the way their children talk.

Validity of the CDI

Five research studies have examined the utility of the CDI to effectively portray early children's development of language (Dale, 1991; Dale, Bates, Reznick, & Morriset, 1989; Heilmann, Weismer, Evans, & Hollar, 2005; Miller, Sedey, & Miolo, 1995; Thal, O'Hanlon, Clemmons, & Fralin, 1999). Most of these studies have included children whose race is White. Two of these studies are reviewed below.

Dale (1991) compared the use of parent report measure to both naturalistic and structured forms of assessment to determine the vocabulary and syntactic development of 24 typically developing children, aged 24-months. Four measures of the CDI: *Total Vocabulary*, *Total Complexity*, *Mean of Three Longest Utterances*, and *Use of Regular Morphemes* were compared to language sample measures which included the children's mean length of utterance (MLU), vocabulary type-token ratio, total number of different words, the *Index of Productive Syntax* (Scarborough, 1990) and regular bound morpheme use. Results indicated moderately strong correlations between the CDI measures with the children's MLU, total number of different words, and *Index of Productive Syntax* scores (r ranged from .60 to .70). Also, significant correlations were found for the CDI measures with regular bound morpheme use and vocabulary type-token ratio (r ranged from .38 to .58).

In another study, Dale et al. (1989) examined the validity of an early version of the CDI which was called Part I of the *Early Language Inventory (ELI)*. The *ELI* and direct measures of language which were adapted from the *Bayley Scales of Infant Development* (Bayley, 1969) were administered to children twenty months of age. Dale et al's study included several special populations: high social risk, preterm, full term, and precocious children in this study. The study showed a significant positive correlation between Part I, *Vocabulary Checklist*, of the *ELI* and the expressive language subscore of the *Bayley Scales of Infant Development* (r ranged from .43 to .63). Dale et al. also noted a low relationship between the children's vocabulary scores and their socioeconomic status (SES) which suggests the usefulness of this measure across various social classes.

Relationship between Language Acquisition and Socioeconomic Status

Dollaghan et al. (1999) conducted a study of the relationship between a mother's education and her child's language acquisition. Participants were 241 three-year-old children who were drawn from a larger sample of children participating in a longitudinal study.

Dollaghan et al. (1999) found that using the *Peabody Picture Vocabulary Test-Revised (PPVT-R*; Dunn & Dunn, 1981), the children of mothers with low maternal education earned lower vocabulary scores than mothers with a high school or college degree. Mothers who had not completed high school received a score of 90, and mothers with a high school education scored 101. Lastly, mothers with a college degree scored the highest with 110. Another measure they studied was the children's MLU. Results showed that the children of mothers with lower maternal education scores earned lower MLU scores. These results indicate that children's language ability can vary by the maternal education level of their caregivers.

Wooden (2006) also examined children's CDI scores as a function of their age and maternal education. Her participants included 87 African American (AA) children, aged from 8 to 30 months of age, from low-income homes located in the urban South. Thirty-one children were given the CDI/WG inventory and 56 children were given the CDI/WS inventory. Wooden wanted to know how the children's CDI scores distributed relative to normative means and as a function of their age. Wooden found that the low-income children's CDI/WG and CDI/WS standard scores lowered relative to the normative means as the children got older. Wooden also found that the correlation between the children's CDI/WG and CDI/WS standard scores and their ages decreased as the children got older.

In critique of Wooden's study, her item analysis focused only on the vocabulary items from the CDI/WG and CDI/WS inventories. In order to further explore her findings and the

robustness of her findings, item analyses of the grammar sections of the CDI/WS need to be examined.

In summary, the CDI is a nationally recognized assessment tool and an instrument which uses parent report to assess early language development in children. The CDI consists of two separate inventories, the CDI/Words and Gestures and the CDI/Words and Sentences. Previous studies have shown that parent report measures are a valid means of assessing children's early language development. Findings are mixed as to the relationship between a child's socioeconomic status (SES) and their CDI scores. Dale (1989) did not find a relation between these variables whereas Wooden's (2006) study did. In particular, Wooden's (2006) results showed that low-income children's standard scores decrease relative to normative means as they age. However, Wooden's study only focused on the vocabulary items from the CDI inventories.

Purpose of Research

Focusing on the grammar items from the CDI/WS and using data that was previously examined by Wooden (2006), the purpose of my study was to complete a more in-depth analysis of low-income AA children's grammar scores as a function of their age. The following questions guided my work.

1. For low-income AA children, does MLU vary by the children's age?
2. For low-income AA children, do morpheme totals in the grammar sections of the CDI/WS (*Word Endings/Part 1, Word Forms, Word Endings/Part 2, Combining, and Complexity*) vary by the children's age?
3. What types of morphemes do low-income African American children produce in the grammar sections of the CDI/WS (*Word Endings/Part 1, Word Forms, Word Endings/Part 2, Combining, and Complexity*)?

Chapter 2 METHODS

The data came from 56 (28 males and 28 females) low-income African American children. The CDI/WS inventories of these participants were collected as part of Louisiana State University's Speech, Language, Hearing Clinic. They were collected from parent training programs, childcare centers, local clinics, and public hospitals serving low-income populations in and around Baton Rouge, Louisiana. Participants consisted of normally developing children, aged 16 to 30 months, who had been raised by an African American caregiver in a monolingual English speaking environment. Caregivers were required to provide socio-demographic information and written consent in order to participate in the study. Following this, each caregiver completed the CDI/WS inventory for one of her children. A certified speech language pathologist oversaw the administration of the CDI inventory forms. Following the completion of the inventory, each inventory was hand scored by Wooden (2006). For each major inventory section, raw scores were converted to percentiles and standard scores. In order to ensure reliability of the data scores, a second examiner was trained to score the CDI forms. Once CDI forms were scored by both examiners, the children's CDI scores were entered into SPSS.

Demographic information about the participants is listed in Table 1. As can be seen, the age in months for the children ranged from 16 to 30 months, with a mean age of 23.34 (SD = 4.10) months. Fifty-six participants provided information regarding maternal education, whereas only 50 participants provided information regarding paternal education. The mean maternal education was 11.95 (SD = 2.16). The mean paternal education was 11.62 (SD = 1.93). The levels of the maternal and paternal education ranged from 7 to 18 years. A total of 54 participants provided information regarding birth order. Fifty-six percent were first born, and the remaining 44% ranged from second- to fourth-born children within their families.

Table 1. Participant Characteristics			
	Boys (<i>n</i> = 28)	Girls (<i>n</i> = 28)	Total (<i>N</i> = 56)
CDI Inventory			
Words and Sentences	28	28	56
Ethnicity			
Caucasian	0	0	0
African American	25	28	53
Other	2	0	0
Maternal Education			
< High school	11	13	24
High school graduate	9	8	17
High school graduate +	7	7	14
College Graduate	1	0	1
Paternal Education			
< High school	10	11	21
High school graduate	11	9	20
High school graduate +	3	5	8
College Graduate	1	0	1
Birth Order			
First-Born	16	14	30
Later-Born	10	14	24
<i>Note:</i> “< High school graduate” indicates fewer than 12 years of education. “High school graduate” indicates 12 years of education. “High school graduate +” indicates 13 to 16 years of education. “College graduate” indicates 17+ years of education.			

Procedure

Subtests. To examine the CDI/WS inventory, the following subtests were examined.

The first subtests analyzed were Part B and C: *Word Forms* and *Word Endings/Part 2*. These sections include morphology related to the production of regular and irregular noun plurals and irregular and regular past tense verbs. For Part B: *Word Forms* and Part C: *Word Endings/Part 2*, parents/caregivers marked whether or not their child produced those words. Part D consists of a section asking parents/caregivers whether or not their child had begun to combine words such as “nother cracker” or “doggie bite.” For Part D, parents/caregivers were given the following response options: “not yet,” “sometimes,” and “often.” The last subtest was Part E: *Complexity*. This subtest consists of short sentence pairs in which the caregiver/parent chooses the sentence

which sounds most like the way their child talks at the time of completing the CDI/WS inventory. Examples and response options can be seen below in Table 2.

Table 2. Subtest Examples				
Subtest	Subtest Name	Forms/Endings	Examples	Response Option
Part B	<i>Word Forms</i>	Irregular Noun Morpheme Endings	<i>children, feet</i>	Mark whether child uses these words or not
		Regular Verb Endings	<i>ate, blew</i>	Mark whether child uses these words or not
Part C	<i>Word Endings/ Part 2</i>	Regular Noun Morpheme Endings	<i>blockses, children</i>	Mark whether child uses these words or not
		Irregular Verb Endings	<i>ated, blewed</i>	Mark whether child uses these words or not
Part D	<i>Combining Words</i>		<i>nother cracker doggie bite</i>	Not yet Sometimes Often
Part E	<i>Complexity</i>		<i>Two shoe. Two shoes.</i>	Mark which sentence sounds like those child uses

Data entered into SPSSS. Data was entered into SPSS using the following response option codes. For Part B: *Word Forms* and Part C: *Word Endings/Part 2*, “1=yes” was entered if the parent/caregiver marked the word, and “2=no” was entered if there was no response indicated. For Part D, the response options were: “1=not yet,” “2=sometimes,” and “3=often.” For Part E: *Complexity*, a “1=yes” was entered for the first response option and “2=no” was entered for the second response option.

Once data was entered into SPSS, an analysis was run to calculate the numbers and percents of children as a function of the different response options. Also, the minimum and maximum of the children’s average mean length (MLU) of three utterances was calculated. Secondly, a Pearson correlation was conducted to determine the relationship between children’s MLU and their age and maternal educational level. Thirdly, irregular and regular noun and verb morphemes from Part B: *Word Forms*, Part C: *Word Endings/Part 2*, were analyzed to determine the percentage of “yes” responses. Fourthly, items on Part D *Combining Words* were analyzed to

determine the percentage of “not yet,” “sometimes,” and “often” responses. Lastly, Part E: *Complexity* was analyzed by determining the percentages of “yes” and “no” responses.

Chapter 3 RESULTS

Average Mean Length Utterance (MLU) of Three Utterances

Fifty-five caregivers completed the MLU section of the CDI/WS. The minimum MLU of the 55 participants was 1.00, whereas the maximum was 9.00. The mean was 2.97 (SD = 1.79).

Table 3 lists the children's average MLU as a function of their maternal education level. Results showed that MLU was not correlated to maternal education, $r = .24$, $p = .081$. A significant correlation was found between the children's MLU levels and their ages, $r = .46$, and $p < .001$.

Table 4 lists the mean MLU scores as a function of the children's ages. As can be seen, scores increased as age increased from 16-24 months to 25-30 months. According to Brown's (1973) stages of children's morpheme development, the MLU scores of these children were typical of children for their age. According to Brown's Stage 1, approximate ages being 19-26 months, MLU is 1.00-2.00. The children aged 16-24 months presented a mean MLU of 2.05. According to Brown's Stage 2, approximate ages being 27-30 months, MLU is 2.00-2.50. The children aged 25-30 months presented a mean MLU of 3.77.

Table 3. Mean Calculated According to Years of Maternal Education				
	Years of Maternal Education	Number of Children	Mean	Standard Deviation
< High school	7	1	2.00	.
	8	2	2.00	1.41
	9	2	1.75	1.06
	10	6	3.37	1.68
	11	12	2.42	1.95
High School Graduate	12	17	3.11	2.01
High school graduate +	13	4	3.05	1.71
	14	4	3.28	1.66
	15	1	1.00	.
	16	5	4.44	1.34

College graduate	18	1	3.30	.
<i>Note:</i> “< High school graduate” indicates fewer than 12 years of education. “High school graduate” indicates 12 years of education. “High school graduate +” indicates 13 to 16 years of education. “College graduate” indicates 17+ years of education.				

Table 4. MLU by Age			
Age in Months	Number of Children	Mean	Standard Deviation
16	1	1.00	.
17	4	2.95	1.67
18	3	1.67	1.15
19	3	2.50	1.32
20	7	2.13	1.22
21	5	1.94	0.93
22	3	2.87	0.51
23	3	1.33	0.58
16-23 Months	29	2.05	1.05
25	5	3.04	1.24
26	3	4.20	1.82
27	6	4.05	1.86
28	8	3.90	2.81
29	1	2.34	.
30	3	5.10	0.17
25-30 Months	26	3.77	1.62

Combining Words

Forty-eight of the 56 caregivers completed this section of the CDI/WS. Table 5 lists the number of children who were combining words. Children were classified as combining words if their parent reported that they combined words “sometimes” or “often.” Overall, the percentage of children combining words was 71%. This high percentage indicates that the majority of the children were combining words such as “nother cracker” or “doggie bite.” Also listed in Table 5, are the children’s percentages of combining words as a function of their age. In particular, for

children aged 16-23 months, 55% were combining words as compared to 91% for children 25-30 months. Both of these findings are consistent with their reported MLU levels.

Table 5. CDI/WS Item Analysis Word Endings Part D					
	Response	Total	Percentage	16-24 Months*	25-30 Months*
Not yet	14	48	29%	44%	10%
Sometimes	22	48	46%	44%	48%
Often	12	48	25%	11%	43%
*Note: Response totals for 16-24 months = 27 Response totals for 25-30 months = 21					

Irregular and Regular Noun Morphemes

Fifty-four of the caregivers completed this section of the CDI/WS. In Tables 6a and 6b, results for irregular and regular noun morphemes are presented. For irregular noun morphemes, two of the items, “feet” (72%) and “teeth” (74%), were produced by more than 50% of the children. However, the word “mice” had the lowest percentage at 6%. The following items were produced by less than 25% of the children: “children,” “men,” and “mice.”

For regular noun morphemes, the percentages of children who produced the regular noun morphemes were exceptionally low. All items on the list were produced by less than 25% of the children, except for “feets” which was reported to be produced by 26% of the children. The following regular noun morphemes closely resembled the irregular noun morphemes (“children” = 20% versus “childrens” = 4%), (“feet” = 72% versus “feets” = 26%), (“teeth” = 74% versus “teeths” = 17%), (“mice” = 6% versus “mices” = 0% versus “mouses” = 2%). These results indicate the children’s caregivers responded “yes” to more of the irregular noun morphemes as compared to the regular noun morphemes.

Also, as can be seen in Table 6a and 6b, percentages for “yes” responses were calculated according to two age groups. In Table 6a, the percentage of “yes” responses increased as the children got older except for the word “mice” which went from 7% (16-24 months) to 4% (25-30

months). In Table 6b, the majority of the “yes” responses increased as the children got older except for the following words: “blockses” (0%, no change from 16-24 months to 25-30 months), “childs” (7% at 16-24 months, 4% at 25-30 months), “mices” (0%, no change from 16-24 months to 25-30 months), and “tooths” (10% at 16-24 months, 8% at 25-30 months).

Table 6a. CDI/WS Item Analysis: Part B *Word Forms*

	Response = Yes	Response = No	Percentage = Yes	16-24 Mos. Percentage = Yes*	25-30 Mos. Percentage = Yes*
Irregular Noun Morphemes					
Children	11	43	20%	10%	32%
Feet	39	15	72%	62%	84%
Men	6	48	11%	10%	12%
Mice	3	51	6%	7%	4%
Teeth	40	14	74 %	66%	84%
*Note: Response totals for 16-24 months = 29 Response totals for 25-30 months = 25					

Table 6b. CDI/WS Item Analysis Noun: Part C *Word Endings/Part 2*

	Response =Yes	Response = No	Percentage = Yes	16-24 Mos. Percentage = Yes*	25-30 Mos. Percentage = Yes*
Regular Noun Morphemes					
Blockses	0	54	0%	0%	0%
Childrens	2	52	4%	0%	8%
Childs	3	51	6%	7%	4%
Feets	14	40	26%	17%	36%
Foots	11	43	20%	14%	28%
Mans	2	52	4%	3%	4%
Mens	1	53	2%	0%	4%
Mices	0	54	0%	0%	0%
Mouses	1	53	2%	0%	4%
Shoeses	8	46	15%	10%	20%
Sockses	3	51	6%	0%	12%
Teeths	9	45	17%	7%	28%
Toeses	7	47	13%	10%	16%
Tooths	5	49	9%	10%	8%
*Note: Response totals for 16-24 months = 29 Response totals for 25-30 months = 25					

Regular and Irregular Verbs

Fifty-four of the 56 caregivers completed this section. In Tables 7a and 7b regular verb and irregular verb endings are presented. Overall, the percentage of children who produced the regular verbs and irregular verbs were less than 50%. The lowest percentage for regular verbs, at 6%, was for the verb “flew” and “heard.” The highest percentage for regular verbs, at 41%, was for the verbs “ate” and “fell.” The highest percentage for irregular verbs, at 11%, was for the verb “broked.” The lowest percentage for irregular verbs, at 0% was for the following verbs: “blewed,” “bringed,” “buyed,” “flied,” “runned,” and “satted.” These results indicate that the majority of children did not produce either the regular or irregular verb endings.

Also presented in Tables 7a and 7b, are percentages for “yes” responses calculated according to two age groups. In Table 7a, regular verbs, the majority of the children’s “yes” responses increased with age except for the following verbs: “flew” (percentages decreased) and “ran” (percentages remained the same). In Table 7b, irregular verbs, the majority of the children’s “yes” responses increased with age except for 14 of the irregular verbs. Six (“blewed,” “bringed,” “buyed,” “flied,” “runned” and “satted”) of the 14 irregular verbs responses remained the same, and eight (“breaked,” “camed,” “comed,” “doed,” “getted,” “maked,” “ranned” and “taked”) of the 14 irregular verbs responses decreased with age.

Table 7a. CDI/WS Item Analysis: Part B <i>Word Forms</i>					
	Response = Yes	Response = No	Percentage = Yes	16-24 Mos. Percentage = Yes*	25-30 Mos. Percentage = Yes*
Regular Verbs					
Ate	22	32	41%	28%	56%
Blew	8	46	15%	7%	24%
Bought	6	48	11%	7%	16%
Broke	16	38	30%	17%	44%
Came	7	47	13%	10%	16%
Drank	9	45	17%	17%	16%
Drove	5	49	9 %	3%	16%

Fell	22	32	41 %	28%	56%
Flew	3	51	6%	7%	4%
Got	17	37	38%	21%	44%
Had	6	48	11%	7%	16%
Heard	3	51	6%	3%	8%
Held	4	50	7%	7%	8%
Lost	11	43	20%	10%	32%
Made	8	46	15%	3%	28%
Ran	15	39	28%	28%	28%
Sat	7	47	13%	7%	20%
Saw	8	46	15%	10%	20%
Took	12	42	22%	10%	36%
Went	8	46	15%	10%	20%
*Note: Response totals for 16-24 months = 29 Response totals for 25-30 months = 25					

Table 7b. CDI/WS Item Analysis: Part C Word Endings/Part 2					
	Response = Yes	Response = No	Percentage = Yes	16-24 Mos. Percentage = Yes*	25-30 Mos. Percentage = Yes*
Irregular Verbs					
Ated	3	51	6%	3%	8%
Blewed	0	54	0%	0%	0%
Blowed	2	52	4%	3%	4%
Bringed	0	54	0%	0%	0%
Buyed	0	54	0 %	0%	0%
Breaked	1	53	2 %	3%	0%
Broked	6	48	11%	7%	16%
Camed	1	53	2%	3%	0%
Comed	1	53	2%	3%	0%
Doed	1	53	2%	3%	0%
Dranked	2	52	4%	3%	4%
Drinked	5	49	9%	3%	16%
Eated	4	50	7%	7%	8%
Falled	2	52	4%	3%	4%
Flid	0	54	0%	0%	0%
Getted	3	51	6%	7%	4%
Goed	3	51	6%	3%	8%
Gotted	3	51	6%	0%	12%
Haved	3	51	6%	0%	4%
Heared	1	53	2%	0%	4%
Holded	2	52	4%	0%	8%
Losed	2	52	4%	3%	4%
Losted	3	51	6%	3%	8%

Maked	3	51	6%	3%	0%
Ranned	5	49	9%	10%	8%
Runned	0	54	0%	0%	0%
Seed	3	51	6%	3%	8%
Satted	0	54	0%	0%	0%
Sitted	2	52	4%	0%	8%
Taked	3	51	6%	7%	4%
Wented	1	53	2%	0%	4%
*Note: Response totals for 16-24 months = 29 Response totals for 25-30 months = 25					

Complexity

Interestingly, the total response options in this section were lower than that of the previous sections: Part B *Word Forms*, Part C *Word Endings/Part 2*, and Part D *Combining Words*. Out of the 56 total participants, the highest caregiver response in this section was 35 responses, with the lowest being 23 responses for the item about reading. In contrast, the highest caregiver response option in the previous sections was 54 for Part B *Word Forms* and Part C *Word Endings*, with the lowest being 48 for Part D *Combining Words*. Complexity was examined in two ways. Two sentences were given for each pair, and the percentage totals were calculated for each response as can be seen below. The majority of the response options chosen was for the first sentence in each pair, except for seven items listed below in Table 9. The caregiver chose the second response option for these seven items.

Table 8 also lists the total response options caregivers provided for their children as a function of the children's age. It was difficult to see a pattern in this data, but most (86%) response options for the second response (more complex response) increased with age except for a few. Examples of responses that increased with age are: ("Two shoe. vs. Two shoes.," "I fall down. vs. I fell down," and "Where Mommy go? vs. Where did Mommy go?"). Examples of responses that stayed the same are: ("These my tooth." vs. "These my teeth.," "No wash dolly."

vs. “Don’t wash dolly,” and “I no do it.” vs. “I can’t do it.”). Of the items which remained the same, 60% were high and 40% were low, for both ages.

Table 8. CDI/WS Item Analysis *Word Endings* Part E

	Total Response	Item in Pair Selected	16-24 Months		25-30 Months	
			Total Response	Item in Pair Selected	Total Response	Item in Pair Selected
Two shoe. Two shoes.	31	13 (42%) 18 (58%)	11	6 (55%) 5 (45%)	20	7 (35%) 13 (65%)
Two foot. Two feet.	30	6 (20%) 24 (80%)	12	4 (33%) 8 (67%)	18	2 (11%) 16 (89%)
Daddy car. Daddy’s car.	33	22 (67%) 11 (33%)	13	12 (92%) 1 (8%)	20	10 (50%) 10 (50%)
Kitty sleep. Kitty sleeping.	32	22 (69%) 10 (31%)	12	9 (75%) 3 (25%)	20	13 (65%) 7 (35%)
I make tower. I making tower.	26	18 (69%) 8 (31%)	10	9 (90%) 1 (10%)	16	9 (56%) 7 (44%)
I fall down. I fell down.	32	21 (69%) 11 (31%)	11	10 (91%) 1 (9%)	21	11 (52%) 10 (48%)
More cookie! More cookies!	33	13 (39%) 20 (69%)	12	7 (58%) 5 (42%)	21	6 (29%) 15 (71%)
These my tooth. These my teeth.	29	2 (7%) 27 (9%)	11	1 (9%) 10 (91%)	18	1 (6%) 17 (94%)
Baby blanket. Baby’s blanket.	29	23 (79%) 6 (21%)	11	11 (100%) 0 (0%)	18	12 (67%) 6 (33%)
Doggie kiss me. Doggie kissed me.	29	20 (69%) 9 (31%)	11	11 (100%) 0 (0%)	18	9 (50%) 9 (50%)
Daddy pick me up. Daddy picked me up.	31	25 (81%) 6 (19%)	13	13 (100%) 0 (0%)	18	12 (67%) 6 (33%)
Kitty go away. Kitty went away.	27	18 (67%) 9 (33%)	10	10 (100%) 0 (0%)	17	8 (47%) 9 (53%)
Doggie table. Doggie on table.	28	12 (43%) 16 (57%)	10	6 (60%) 4 (40%)	18	6 (33%) 12 (67%)
That my truck. That’s my truck.	33	14 (42%) 19 (58%)	13	8 (62%) 5 (38%)	20	6 (30%) 14 (70%)
Baby crying. Baby is crying.	32	28 (88%) 4 (13%)	13	13 (100%) 0 (0%)	19	15 (79%) 4 (21%)
You fix it? Can you fix it?	26	19 (73%) 7 (27%)	10	7 (70%) 3 (30%)	16	12 (75%) 4 (25%)
Read me story, Mommy. Read me a story, Mommy.	28	21 (75%) 7 (25%)	11	11 (100%) 0 (0%)	17	10 (59%) 7 (41%)

No wash dolly. Don't wash dolly.	23	13 (57%) 10 (43%)	10	6 (60%) 4 (40%)	13	7 (54%) 6 (46%)
Want more juice. Want juice in there.	32	24 (75%) 8 (25%)	14	12 (86%) 2 (14%)	18	12 (67%) 6 (33%)
There a kitty. There's a kitty.	26	16 (62%) 10 (38%)	10	9 (90%) 1 (10%)	16	7 (44%) 9 (56%)
Go bye-bye. Wanna go bye-bye.	35	25 (71%) 10 (29%)	16	15 (94%) 1 (6%)	19	10 (53%) 9 (47%)
Where Mommy go? Where did Mommy go?	27	19 (70%) 8 (30%)	11	11 (100%) 0 (0%)	16	8 (50%) 8 (50%)
Coffee hot. That coffee hot.	25	21 (84%) 4 (16%)	9	8 (89%) 1 (11%)	16	13 (81%) 3 (19%)
I no do it. I can't do it.	25	8 (32%) 17 (68%)	10	4 (40%) 6 (60%)	15	4 (27%) 11 (73%)
I like read stories. I like to read stories.	24	17 (71%) 7 (29%)	8	7 (88%) 1 (13%)	16	10 (63%) 6 (38%)
Don't read book. Don't want you read that book.	23	15 (65%) 8 (35%)	8	6 (75%) 2 (25%)	15	9 (60%) 6 (40%)
Turn on light. Turn on the light so I can see.	27	23 (85%) 4 (15%)	9	9 (100%) 0 (0%)	18	14 (78%) 4 (22%)
I want that. I want that one you got.	31	29 (94%) 2 (6%)	13	13 (100%) 0 (0%)	18	16 (89%) 2 (11%)
Want cookies. Want cookies and milk.	27	17 (63%) 10 (37%)	9	7 (78%) 2 (22%)	18	10 (56%) 8 (44%)
Cookie mommy. Cookie for mommy.	29	24 (83%) 5 (17%)	12	12 (100%) 0 (0%)	17	12 (71%) 5 (29%)
Baby want eat. Baby want to eat.	28	20 (71%) 8 (29%)	10	9 (90%) 1 (10%)	18	11 (61%) 7 (39%)
Lookit me! Lookit me dancing!	26	19 (73%) 7 (27%)	10	9 (90%) 1 (10%)	16	10 (63%) 6 (38%)
Lookit! Lookit what I got!	25	16 (64%) 9 (36%)	9	7 (78%) 2 (22%)	16	9 (56%) 7 (16%)
Where's my dolly? Where's my dolly name Sam?	23	18 (78%) 5 (22%)	8	8 (100%) 0 (0%)	15	10 (67%) 5 (33%)
We made this. Me and Paul made this.	23	18 (78%) 5 (22%)	8	7 (88%) 1 (13%)	15	11 (73%) 4 (27%)
I sing song. I sing song for you.	26	20 (77%) 6 (23%)	10	10 (100%) 0 (0%)	16	10 (63%) 6 (38%)
Baby crying. Baby crying cuz she's sad.	29	27 (93%) 2 (7%)	12	12 (100%) 0 (0%)	17	15 (88%) 2 (12%)

Table 9. CDI/WS Item Analysis <i>Word Endings</i> Part E. Individual Item						
			16-24 Months		25-30 Months	
	Total Response	Item in Pair Selected	Total Response	Item in Pair Selected	Total Response	Item in Pair Selected
Two shoe. Two shoes.	31	13 (42%) 18 (58%)	11	6 (55%) 5 (45%)	20	7 (35%) 13 (65%)
Two foot. Two feet.	30	6 (20%) 24 (80%)	12	4 (33%) 8 (67%)	18	2 (11%) 16 (89%)
More cookie! More cookies!	33	13 (39%) 20 (69%)	12	7 (58%) 5 (42%)	21	6 (29%) 15 (71%)
These my tooth. These my teeth.	29	2 (7%) 27 (93%)	11	1 (9%) 10 (91%)	18	1 (6%) 17 (94%)
Doggie table. Doggie on table.	28	12 (43%) 16 (57%)	10	6 (60%) 4 (40%)	18	6 (33%) 12 (67%)
That my truck. That's my truck.	33	14 (42%) 19 (58%)	13	8 (62%) 5 (38%)	20	6 (30%) 14 (70%)
I no do it. I can't do it.	25	8 (32%) 17 (68%)	10	4 (40%) 6 (60%)	15	4 (27%) 11 (73%)

Chapter 4 DISCUSSION

The purpose of this study was to conduct an item analysis of the CDI/WS to learn more about the usefulness of the CDI for assessing language development of low-income, African-American children in the urban South.

Interpretation of Results

The first question asked whether or not MLU varies by maternal education and children's age. Results indicated that MLU did not vary by maternal education, but MLU did vary by the children's ages. As the children got older, MLU increased. Their MLU levels were also age-appropriate based on Brown's (1973) normative data. These results indicate that these low-income African American children were producing MLU levels typical and above of children of other socioeconomic status.

The second question explored the morpheme totals in the grammar sections of the CDI/WS. Results indicated the majority of children produced the irregular noun morpheme endings as compared to the regular noun morpheme endings. For irregular and regular verb morphemes, the children's results showed that the majority of them did not produce their verb morphemes. However, once noun and verb morphemes were looked at as a function of the children's ages, results indicated that the children's percentages increased with age for the majority of the responses.

Lastly, the types of morphemes low-income African American children produced in the grammar sections of the CDI/WS were explored. Part E: *Complexity* was split into 3 sections: bound morphemes, function words, and early-emerging complex sentences. The majority of the responses were for the first response option pair. However, when response options were conducted as a function of the children's age the responses varied, and the majority of the

response options for were for the second more complex response option. Also, the percentage of the second response option increased as the children got older for the majority of item pairs.

Limitations

There are two main limitations to this study: number of participants and range of maternal education. In order to determine more conclusive results, more participants are needed. Also, a wider range of maternal education, including bachelor's and graduate degrees, is needed in order to determine whether or not the children's scores vary by maternal education. A final limitation of the study was that it was descriptive in nature and the CDI manual does not provide normative information for each of the items of the CDI/WS. If normative information were available, I could have examined whether or not the children's scores in the CDI/WS were similar to those of other children's scores of the same age. Currently, the CDI manual provides this information for the vocabulary sections of the CDI/WS but this information is not provided for the grammar items.

Conclusion

The results of this study indicate that low-income AA children's MLU levels increase as children age and are age-appropriate for typically developing children. The low-income AA children studied here also produced the majority of the irregular noun morphemes, but not the regular noun morphemes. The children did not produce many of the irregular and regular verb morphemes. However, as the children aged their results did increase for most of the noun and verb morphemes. Lastly, response options for the complexity items varied, but percentages of the more complex item within the pairs increased for the majority of the responses as the children aged.

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