Emergent Uses of BE and DO: Evidence From Children With Specific Language Impairment

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The use of finiteness markers copula BE, auxiliary BE, and auxiliary DO were examined in the spontaneous speech of children with specific language impairment (SLI). Of particular interest to this study was whether the categorical distinctions between main verbs and auxiliaries and/or between the auxiliary types influenced the relative order of emergence among these forms. In addition, error analyses were used to reveal the extent of the children's grammatical knowledge with regard to the use of these forms. We argue that despite the late emergence of finiteness markers, children with SLI demonstrate knowledge of how finiteness interacts with verb movement and accurate agreement marking from the earliest appearance of these forms. These findings provide further support for descriptions of SLI as a condition characterized by selective deficits within a basically intact grammatical system.

1. INTRODUCTION

It is now well known that a common weakness among children with specific language impairment (SLI) is that they are late in mastering the use of grammatical morphemes in obligatory contexts (cf. Bishop (1992), Leonard (1989)). Recent findings have established that not all morphemes or grammatical processes are affected to the same degree. This is particularly evident in linguistically motivated approaches to the study of SLI, which focus attention on the grammatical features of Tense and Agreement that typically mark finiteness.

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One fruitful line of recent inquiry has linked the morphological limitations of SLI to the root infinitive phenomenon manifested by younger, nonaffected children (cf. Clahsen, Penke, and Parodi (1993/1994), Rizzi (1993/1994), and Waxler (1994; 1996)). In empirical studies motivated by the predictions of the Optional Infinitive (OI) account of root infinitives (Waxler (1994; 1996)), it is clear that English-speaking children with SLI around 5 years of age are very likely to omit finiteness markers. Of particular relevance to this study is the evidence showing affectedness of BE and DO. In studies by Rice, Waxler, and Cleave (1995) and Rice and Waxler (in press), the observed rate of omission of BE and DO for children with SLI is 50%, whereas their age peers omit only 1% to 2% of the obligatory markers. An alternative reference group is made up of children at the same level of mean length of utterance (who are 2 years younger than children in the SLI group), who show an omission rate of 30%. Thus, 5-year-old children with SLI exhibit a grammar different from their age peers (and the adult grammar), in that the SLI grammar allows optional use of BE and DO in obligatory contexts. At the same time, the grammars of children with SLI parallel those of unaffected children in their choice of surface forms for BE and DO. When surface forms appear, they follow the morphosyntactic principles that govern subject-verb agreement, and overt forms almost always show correct marking for subject Person and Number features. These findings are readily interpretable within the OI model, in which nonfinite root clauses are predicted (i.e., clauses in which finite forms of BE and DO are omitted) because of incomplete specification of Tense at the same time that Agreement is available.

The impression is that children with SLI know a great deal about the grammatical principles governing BE and DO, even when they are omitting the surface forms at a high rate. This could be regarded as rather surprising, given the well-known grammatical complexities of English BE and DO. Consider, for example, that BE and DO are small, unstressed, unbound forms that do not carry semantic information. Homophonous surface forms can appear as main verbs or auxiliary verbs. Although main verb uses of BE conform to some of the grammatical properties of lexical main verbs, they are allowed to move from base position, whereas lexical verbs do not. Auxiliary BE shares some grammatical

properties with auxiliary DO, but DO is exceptional with regard to base position. Such complexities seem to be understood by 5-year-old children with SLI who are nevertheless likely to omit surface forms of BE and DO (Rice and Waxler (in press), Rice et al. (1995)).

How do children with SLI come to know these grammatical distinctions? Little is known about the earliest uses of BE and DO among these children. Evidence is needed from the earliest stages of emerging uses of BE and DO in affected children in order to compare the emergent SLI grammar with the grammars of unaffected children and the target adult grammar.

In this investigation we set out to explore the earliest uses of BE and DO in the spontaneous utterances of children diagnosed with SLI. We were interested in early indicators of the distinction between finite and nonfinite forms, the grammatical properties associated with auxiliary and main verb contexts, and the extent to which the earliest uses of BE and DO follow the same grammatical constraints and morphosyntactic principles that guide the grammars of unaffected children. Examination of the emergence of these forms in children with SLI brings the advantage of a protracted period of acquisition, which is especially conducive to examining the relationships among different grammatical forms and categories. In the early stages of typical grammatical acquisition, new uses of multiple forms and categories often appear within the same relatively brief time window, making it difficult to sort out dependency relationships or relative difficulty within the set of emergent forms. Because the time of acquisition is greatly extended in young children with SLI, it offers a chance to examine relationships that may be obscured in evidence from typically developing children.

We show that the emergence of BE and DO in children with and without SLI is quite similar, although the emergence of auxiliary BE in particular is more protracted for children with SLI. We argue that, despite the exceptional properties of finiteness marking characteristic of BE and DO, children with SLI correctly identify BE as a form originating in V; they demonstrate knowledge of how finiteness interacts with V-movement, and even during the period of emergence, Agreement marking is quite accurate. Our interpretations highlight that SLI is a condition characterized by selective deficits within a basically intact grammatical system, and the selective deficits are centered in incomplete specification of Tense.

In the following introductory sections, we provide a brief overview of the distinctions between main verbs and auxiliaries and between the auxiliaries BE and DO, and we discuss how finiteness marking and V-movement interact with these distinctions.

1.1. Main Verbs, Auxiliary Verbs, and V-Movement

The grammatical exceptionalities of English BE and DO are well known, beginning with the contributions of Chomsky (1957). These exceptionalities can be identified by comparing English to languages with a "French-type" grammar, where main verbs and auxiliaries demonstrate similar syntactic behavior (cf. Pollock (1989)).
Assuming a grammatical configuration as in Figure 1, in a French-type grammar, finite lexical verbs move from the lexical head (V) to the functional head (I). This movement is best observed when the verb forms move out of V and around an intervening projection. In the case of negation, verbs are raised to I around the Negation Phrase generated between IP and VP (Chomsky (1991; 1993), Pollock (1989)). Questions also provide indirect evidence that V-movement has applied; verbs cannot move around the grammatical subject to the functional head C unless I is available as an intermediate landing site. The examples in (1a) and (2a) illustrate this movement.

(1) a. Jean (n’)aime pas Marie.
    b. *Jean likes not Marie
    c. Jean does not like Marie.

(2) a. Aime-t-il Marie?
    b. *Like he Marie
    c. Does he like Marie?

In contrast with French, English does not allow lexical verb raising, as is evident in examples (1b) and (2b). Instead, English inserts do in the functional

3Among current proposals for a more articulated representation of IP (cf. Pollock (1989), Chomsky (1989, 1993)), we would assume two separate maximal projections, TP (Tense Phrase) and Agr P (Agreement Phrase), with IP as complement of Agr. The use of additional functional projections are not necessary for the purpose of this article, insofar as the relevant points to establish include a simple distinction between forms originating in a lexical versus functional category and the fact that different mechanisms are implicated in the way finiteness is expressed on these forms. The use of an unarticulated IP satisfies these needs.

head I when the lexical verb becomes separated from the finiteness marker as in (1c) and (2c). The technical explanation for do insertion need not concern us here (cf. Bobaljik (1993), Chomsky (1991; 1993), Davis (1987), and Halle and Marantz (1993)). What is most important is that English-speaking children must come to know the highly exceptional properties of English auxiliary do.

In contrast to English lexical verbs, English allows raising for main verb be, and in this way follows the French-style grammar. This is seen in (3) and (4).

(3) a. Elle (n’)est pas contente.
    b. She is not happy.

(4) a. Est-elle contente?
    b. Is she happy?

Likewise, English auxiliary be also raises, as in (5).

(5) a. Marie is not smiling.
    b. Is Marie smiling?

Movement of main verb and auxiliary forms of be is also evident in ellipsis. In elliptical contexts it is assumed that the be forms have moved to I because they are marked for Tense and Agreement features. Moreover, if the be forms did not undergo V-movement, they would be elided with the VP constituent (in italics) in

(6) a. Marie is not happy. / but [w I am [v e; [w happy]].
    b. Marie is smiling. / I know [w she is; [w e; [v smiling]].

Because main verb and auxiliary forms of be raise, do insertion is “unnecessary” and therefore ungrammatical, as shown in (7).

(7) a. *Marie does not be happy?
    b. *Does Marie be smiling?

Another way in which main verb and auxiliary forms of be are grammatically parallel is that, like lexical verbs, they appear in both finite and nonfinite forms. When be or lexical verbs appear as the first verb in the main clause they carry finiteness, as in (8); when they are preceded by a verb or an infinitival to, they appear as nonfinite forms, as in (9).

(8) a. That dog barks.
    b. That dog is barking.
    c. That dog is mad.

4There is also main verb do, as in “he does it,” which follows the English restrictions on lexical verb raising (e.g., “does he it,” “he does not it”). In this study, we focus on auxiliary do and have separated main verb to from auxiliary do in the analyses.
(9)  a. That dog can bark/wants to bark.
    b. That dog will be barking soon/is going to be barking soon.
    c. That dog may be mad/is sure to be mad.

In contrast, auxiliary do is inherently finite, as is evident in (10).

(10)  a. *It can do bark.
    b. *It wants to do bark.

Considered as a set of observations, these properties indicate that the main verb and auxiliary forms of be originate in V and move to I in a way consistent with a French-type grammar, whereas the lexical verbs in English do not raise. In contrast, auxiliary do is inserted in negation, inversion, and ellipsis precisely because lexical verbs cannot undergo overt V-movement under conditions where the verb is separated from the grammatical Tense feature.

1.2. Grammatical Representation and the Acquisition of Finiteness Markers

Early on, children in many languages use infinitival forms of verbs in root clauses. According to Wexler’s (1994; 1996) OI account of infinitival root clauses, children in this stage regard Tense as optional instead of obligatory in clausal representations at the same time other universal and language-particular facts are known. Optional, as used here, indicates that Tense may or may not be marked in matrix clauses; however both forms are grammatical in the child’s grammar. This account is based on the existence of a tightly interrelated pattern of phenomena observed in many languages. As documented in Wexler (1994), despite the fact that finite and nonfinite forms appear in free variation in early child language, finite forms are overwhelmingly found in clearly moved positions (in languages that show overt movement) and nonfinite forms remain in base-generated positions. From these observations, Wexler concluded that children know about principles of V-movement, specifically when V-movement must occur to bind Tense features and when it cannot apply. What children do not know is that nonfinite verbs cannot appear as main verbs in matrix clauses.

Several empirical predictions follow from the OI account regarding the use of be and do. One manifestation of the OI stage of development is the omission of be and do as illustrated in (11). The prediction is that young children will most likely omit these forms in their sentences, and that is clearly the case.

(11)  a. Marie happy.
    b. Marie smiling.

The further, and more interesting, predictions are that certain possible errors are not likely to appear, such as those in (12). The OI account assumes that the facts regarding V-movement and Agreement properties are known to the child. This account predicts that when finite forms of be and do are produced, correct agreeing forms will be observed. Thus, (12a) is not likely because are does not agree with a third-person subject and computations for sentences with nonagreeing forms are expected to crash. It also predicts that finite be forms will appear in clearly moved positions, not base-generated positions as in (12b) and that nonfinite be forms will appear in base-generated positions, not moved positions as in (12c). The final prediction follows from the assumption that be and do are needed solely for the purpose of Tense-checking. Therefore, errors like the example in (12d) are not likely because there is no syntactic motivation to add nonfinite be to a representation that lacks Tense.

(12)  a. *Marie are happy.
    b. *Be Marie happy?
    c. *Why can’t Marie is happy?
    d. *Marie be happy.

On the other hand, main verb forms of be could be inserted when be functions as a lexical verb in imperative contexts, as in (13). The use of be in (13) indicates how someone should act or behave. In this context, the nonfinite form of be is expected, just as for any other main verb.

(13)  a. You be the cowboy.
    b. You be quiet.

This interpretation of young children’s acquisition of be and do predicts that the earliest uses of be and do will show finite forms that are correctly marked for subject-verb agreement and that young children will be sensitive to the exceptional properties of be and do. In other words, the OI account predicts that from the earliest uses, children will utilize clausal structures containing lexical projections in the form of V, as well as the functional projection of I, which contains Agreement and optional use of Tense.

Given this knowledge of early grammatical representations, how do young children begin to sort out the distinctions between the lexical projection of V and the functional projection of I, the homophonous use of be as main verb and auxiliary (both of which raise to I), and the English-specific uses of do? Among

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3For example, Pierce (1992) examined three French children’s knowledge of finite and nonfinite verb placement relative to the negative particle pas. Pierce noted that the children overwhelmingly placed finite verb forms before pas and nonfinite forms after pas. Similarly, Poepel and Wexler (1993) provided supporting evidence from an analysis of one German child’s matrix verb forms in V2 position. Finite forms were found moved to V2 position, whereas nonfinite verb forms remained in final position.
children developing normally, there is good evidence to suggest that the categorical distinction between main verbs and auxiliary verbs influences the emergence of these forms. Recently, Stromswold (1990; 1991) provided evidence for the earlier emergence of main verb forms of be and do in comparison to their homophonous auxiliary counterparts. In particular, all main verb forms emerged in normally developing children's speech around 28 months of age, approximately 2 months prior to auxiliary be and 5 months prior to auxiliary do. Valian (1992) reported a similar developmental priority for main verb forms in a cross-sectional sample of American children and a longitudinal sample of Italian children. In addition, differences have been noted in the types of errors observed between copula and auxiliary be. Although children sometimes fail to invert both forms of be with grammatical subjects in questions, they do so proportionately more often with copula be than auxiliary be (Klee (1983), Stromswold (1991)). Stromswold (1991) also reported instances of overregularizations of verbal inflections with copula be (e.g., be-s) and uses of unnecessary do-support (e.g., Adam, 3;5, does it be around it?). Although both types of errors were rare, they occurred only with copula be, and never with auxiliary be. It appears, then, that sometimes children ignore the exceptional status of copula be and treat copula and auxiliary be differently. Copula be is occasionally treated as an ordinary main verb, whereas auxiliary be is not.

Little is known about the emergence of I-structures in children with SLI. What is known, as discussed earlier, is that surface markers of Tense are less likely to appear in the utterances of children with SLI than for younger, language-matched children for an extended period of time (Rice and Wexler (in press), Rice et al. (1995)) and that this generalization includes be and do. This generalization has been characterized as an Extended Optional Infinitive stage. At the same time, there is little evidence to suggest that the grammars of children with SLI are missing functional categories (cf. Leonard (1993)). Agreement appears to be available at a time when omissions are frequent. In a recent longitudinal case study of a 4-year-old child with SLI, Eyer and Leonard (1995) concluded that there is early evidence for the functional categories of I, D, and C. Early indicators of I for this child included copula be, the modals can and will, do forms, third-person singular -s, and past tense -ed.

A more detailed longitudinal study of emergence of be and do in children with SLI is needed. If the grammatical systems of children with SLI are basically intact, we would expect acknowledgment of a main verb/auxiliary distinction and, thus, expect general patterns of emergence to be similar to the patterns of children developing language normally. Like their peers, children with SLI may assign structural descriptions to copula be prior to auxiliary forms. One reason for the early emergence of copula be is that it could be initially analyzed, like a main verb in affirmative, declarative contexts. Auxiliary and copula be would not be confused because the VP complementation of auxiliary be should be sufficient to prevent the miscategorization of auxiliaries as main verbs.

Knowledge of V-movement in the grammars of English-speaking children with SLI is also of interest because of its exceptional nature. If children could first analyze copula be as an irregular main verb, then copula be could appear in declarative contexts without any knowledge of V-movement. Recall that Wexler (1994; 1996) argued that typically developing children at a very young age know about V-movement. Relative to children learning languages in which evidence of V-movement is associated with all finite verbs, and is therefore abundant, children learning English may require more time to recognize the linguistic processes that applies to only a few verbs. If the discovery of this process is vulnerable for children with SLI, forms of be may be expected to emerge in moved positions well after other forms of Tense marking appear in I—in this case, auxiliary do. Therefore, to determine if children with SLI demonstrate knowledge of V-movement, a comparison of the emergence of copula and auxiliary be to auxiliary do in clearly moved positions is needed.

A third factor to consider is the underlying syntactic representation required for producing well-formed utterances with each finiteness marker. Consider the utterances in (14):

\[(14)\] a. \[\text{VP That dog is [VP barking]]\].

b. \[\text{If That dog is [VP eat [AP really mean]]}\].

c. \[\text{If That dog does [VP bite [NP people]]}\].

Despite similarities in the superficial utterance length (measured in morphemes), the utterance containing auxiliary be represents a different underlying structure. Specifically, (14a) has two VPs in its underlying structure. In contrast, (14b) and (14c) project only a single VP. Valian (1992) suggested that such structural differences may be implicated in the delayed emergence of auxiliary be. If children's abilities to produce grammatical forms are affected by the underlying configurations of the utterances in which specific forms appear, the emergence of auxiliary be would be predicted to be later than copula be and auxiliary do. Such a possibility warrants attention insofar as several proposals for the grammatical difficulties of children with SLI have invoked limited processing capacity as a contributing factor (Bishop (1994), Curtiss, Katz, and Tallal (1992), Johnston (1994), and Leonard (1993)).

Finally, the way in which children come to mark finiteness is all the more interesting when we consider the relationship between do and be in the syntactic contexts of negation, inversion, and ellipsis. That is, children must learn to insert auxiliary do in these contexts precisely because ordinary main verbs do not undergo V-movement. This is an idiosyncratic, language-specific characteristic of English and may be a potential source of confusion during the initial period of emergence. As has been discussed, normally developing children occasionally produce instances of unnecessary do-support, producing auxiliary do with a nonfinite copula be. This error, however, has not been attested with auxiliary be.
(cf. 7a,b). This may be because children understand the complement-taking requirements of auxiliary DO and know that complements of auxiliary DO must be main verbs. Yet children may still make revealing errors with auxiliary BE. Errors involving auxiliary BE might be identifiable when an auxiliary appears without the appropriate verb complement as in (15) or in elliptical contexts which clearly require a specific auxiliary form as in (16). Note that errors involving copula BE may also be evident in such contexts. The presence of various errors—and the lack of others—can provide additional data for characterizing the extent of grammatical knowledge among children with SLI.

(15) CHI: *Cowboy did fighting me.
(Adam, 2:7, Stromswold (1991))

(16) a. INV: Are you going to make coffee for Liz?
CHI: *Yeah I do.
(Christy, 2:10, Miller (1973))
b. INV: I’m Joc.
CHI: *No you don’t. You’re a Wick.
(Christy, 2:10, Miller (1973))

In summary, the main verb/auxiliary distinction appears to exert an important influence on the emergence of finiteness markers in early child grammars among children developing language normally. However, few investigations have attempted to determine if the associated characteristics of forms originating in different structural locations (namely, I and V) influence the emergence of early finiteness markers. Moreover, there are no longitudinal studies to our knowledge, that systematically document the emergence of BE and DO in a large sample of children with SLI. Although the tendency for children with SLI to omit these forms for an extended period of time is a widely accepted characterization, we are only beginning to accumulate evidence about when and how these forms emerge (Eyer and Leonard (1995)).

For these reasons, the current investigation focused on the emergence of copula and auxiliary BE and auxiliary DO in the longitudinal language samples of children with SLI. Three potential factors and their influence on the emergence of auxiliary BE and DO were explored, including knowledge of a main verb/auxiliary distinction, knowledge of grammatical processes associated with finiteness marking, and the emergence of forms as a function of underlying utterance configuration. Children with SLI were expected to demonstrate sensitivity to the main verb/auxiliary distinction as indicated by the earlier emergence of main verb forms of DO and BE relative to the homophoneous counterparts. No a priori predictions were made concerning knowledge of V-movement among children with SLI. If children with SLI lack early acquisition of this grammatical process, the emergence of both copula and auxiliary BE would be delayed relative to auxiliary DO in the syntactic context, which clearly required overt V-movement. Alternatively, if knowledge of this grammatical process is available, differences between the forms would not be expected. In addition, if differences in the underlying syntactic representation play any role in the initial emergence of these grammatical forms, the appearance of auxiliary DO and copula BE would be observed prior to auxiliary BE. Of additional interest were the types of errors (or lack of errors) observed during this early period of emergence. These included the types of surface forms appearing in relation to principles of movement and subject-verb agreement as well as the choice of forms between BE and DO. For children with SLI, an extended period of emergence was expected relative to children developing language normally. In this extended period, we thought that it might be possible to isolate individual factors contributing to the emergence of these forms, which may be otherwise obscured by the rapid pace of normal language development. At the same time, patterns of emergence could differ in typical and atypical language acquisition. Therefore, transcripts from children developing language normally were consulted to guide and constrain our interpretation of the SLI data.

2. METHOD

2.1. Participants

A total of 11 children (10 male, 1 female), diagnosed with SLI by a certified speech–language pathologist, served as the primary participants for this investigation. All children with SLI came from native English-speaking homes. They were drawn from the same preschool intervention program and demonstrated the conventional inclusions and exclusionary criteria for SLI at the time of initial enrollment (Rice (1995)). All children demonstrated normal intelligence as measured by the mental processing composite of the Kaufman Assessment Battery for Children (Kaufman and Kaufman (1983)) and normal social–emotional development. None of the children demonstrated frank physical, neurological, or sensory impairments. To be selected for this study, children were required to score more than 1 standard deviation below the mean on two expressive language measures at the time of initial enrollment or score more than 1 standard deviation below the mean on one expressive language measure for two consecutive assessments. The two expressive measures were the expressive portion of the Reynell Developmental Language Scales–Revised (Reynell and Graber (1990)) and mean length of utterance (MLU) based on the criteria developed by Miller (1981). These criteria ensured that all children shared an expressive language disorder, although variation was evident in the children's receptive language abilities. Finally, children with severely reduced intelligibility—those scoring consistently below the 1st percentile on the Goldman–Fristoe Test of Articulation (Goldman--
and Fristoe (1986)—were excluded. The standardized test scores for each child in the SLI group over the course of the longitudinal investigation are provided in the Appendix.

Longitudinal language transcripts for children with SLI were drawn from the Kansas Language Transcript Database (KLTD; Rice (1992)). The selected children with SLI were between the ages of 2;11 and 3;7 at the beginning of this investigation. The average longitudinal span covered the period from 3;4 to 4;11. Language samples were obtained at approximately 10-week intervals corresponding to the beginning and end of each academic semester. A total of 91 transcripts were available. Table 1 provides the chronological age range spanned, the number of samples for each child.

In addition, longitudinal transcripts for children developing language normally (ND) were drawn from the CHILDES database (MacWhinney and Snow (1990)). Two general criteria were used to select the ND children. First, they were as young as possible so that no more than one of the forms under investigation was present in their first sample. Second, children had to have 10 or more longitudinal samples at regular sampling intervals. A total of 7 children in the database met these criteria: Abe (Kuczaj (1976)); Adam, Eve, and Sarah (Brown (1973)); Naomi (Sachs (1983)); Nina (Suppes (1973)); and Peter (L. Bloom (1973)).

<table>
<thead>
<tr>
<th>Child</th>
<th>Age Range</th>
<th>No. of Samples</th>
<th>Sampling Interval</th>
<th>Forms Present in First Sample</th>
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*Note.* SLI = specific language impairment; ND = normally developing language.

ND children ranged from 1;6 to 2;4 at the time of the first sample. Because language samples were not available for the children with SLI beyond age 5, ND transcripts above 3;6 were not examined. This upper boundary corresponds loosely to the average age of typically developing children when matched on general language ability with 5-year-old children with SLI in experimental studies (cf. Rice and Oetting (1993), Rice et al. (1993)). The average longitudinal span for the ND group ranged from 1;11 to 3;2. Table 1 provides the chronological age range spanned, the number of samples, and the sampling interval for each of the 7 ND children.

All children were in the very initial stages of grammatical development. Table 1 shows the presence of any of the forms under investigation at the time of the first sample. With regard to the forms involved in the emergence analyses, 6 children demonstrated use of the following forms: copula be and auxiliary do (2 SLI), copula be only (1 SLI, 1 ND), auxiliary do only (1 ND) and auxiliary be (1 ND). The remaining 11 children did not use any of these forms. Among the children with SLI, several obligatory contexts for be forms were identified prior to the appearance of the first forms. An average of 8.2 obligatory contexts were apparent for auxiliary be, 10.9 for copula be. On the other hand, considerably fewer obligatory contexts were identified for auxiliary do prior to its emergence (M = 0.64 contexts). As expected, children in the SLI group typically demonstrated low percentages of use in obligatory contexts for copula and auxiliary be. If mastery is defined as 90% correct use across three consecutive samples with five or more obligatory contexts (Brown (1973)), none of the children achieved that level across both copula and auxiliary contexts at the conclusion of the sampling. If mastery is relaxed to 80% across consecutive samples following Lahey, Liebergott, Chesnick, Menyuk, and Adams (1992), 3 participants meet the criterion at the ages of 50, 51, and 55 months. Four other participants demonstrated levels of accuracy above 80% in their final samples at the ages of 53, 57, 58, and 62 months, but did not meet the requirement for consecutive samples. As a group then, children in the SLI sample demonstrated a protracted period in which be was likely to be omitted. For the majority of the children, this period was still not resolved at 5 years of age.

### 2.2. Transcription and Coding Procedures

All SLI language samples were collected by the same examiner, a certified speech-language pathologist. All samples were then transcribed and coded following the conventions of the KLTD Coding Manual (Howe (1992)). This manual follows, and expands on, the coding conventions developed for use with the

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Because of the relative precocity of a single child's language development, it was only necessary to examine Abe's transcripts through 3.0.
Systematic Analysis of Language Transcripts (Miller and Chapman (1991)). Although a number of language structures are captured by the KLTD conventions, only a few were directly relevant to this investigation. These included the codes for auxiliary do, contractible and uncontractible forms of auxiliary and copula be, and a generic error code. All forms were coded as used correctly, omitted, or in error.

Finally, each utterance with an obligatory context for auxiliary do, auxiliary be, or copula be was coded for the syntactic context. These included codes for declarative, negation, inversion, and VP ellipsis. The latter three provided relevant contexts for documenting instances of overt V-movement. Forms which were obligatory between a subject NP and its complement were recorded as declarative contexts. Contexts for inversion and negation were identified when a form was required between the subject NP or a contracted or uncontracted form of not, respectively (see (1) and (2)). However, yes–no questions that did not require inversion (e.g., *You’re going home now?*) were not identified as contexts for inversion. Elliptical contexts were identified when the form followed a subject NP with an elided, but clearly understood VP (see (6)).

After the transcription and coding procedures were completed, all SLI transcripts were converted into CHAT format for use with CLAN programs (MacWhinney (1995)). The CLAN MLU program was used to compute an MLU for each transcript. In general, MLU was computed on 100 utterances selected from the middle of each transcript.

Because the ND transcripts were collected by several investigators to address a variety of research questions, the original transcripts were coded at differing levels of morphological detail. These transcripts were not altered to reflect the coding conventions of the KLTD transcripts, because the main tier conventions were sufficient for the analyses reported here.

2.2.1. Reliability. Transcription reliability was calculated on a morpheme-by-morpheme basis for five transcripts (5%) selected randomly from the corpus. A 2nd-year graduate student in speech-language pathology checked the transcripts against the original audiorecorded transcription. Reliability was calculated on child utterances only. Disagreements between morphemes were categorized as (a) present versus absent, (b) intelligible versus unintelligible, or (c) different morphemes transcribed. Disagreements were distributed equally across categories. Overall reliability was 98.2% with a range of 97.4% to 99.6% across the individual transcripts.

To examine the reliability of the individual coding categories, one transcript was selected randomly for each child accounting for 12% of the corpus. The research associate responsible for KLTD training examined each of the transcripts for correct use of all KLTD codes. In addition, she was instructed on the syntactic context codes inserted specifically for this study. The reliabilities for the KLTD codes used in this study ranged from 98.9% to 100%. The reliabilities for the syntactic context codes ranged from 87.5% to 100%. The code for elliptical syntactic contexts was the only code for which reliability was below 97%.

2.3. Analysis Procedures

The emergence of all do and be forms were examined for children in both the SLI and ND groups. The CLAN Key Word and Line (KWAL) program was used to extract utterances in which “key” words or codes appeared, along with the preceding and following line of discourse. Concordances for each form were constructed. All uses were culled from the transcripts including those used correctly, in error, or in incomplete or partially unintelligible utterances. The rationale for examining all such forms was that emergence, and not accuracy of use, was the primary issue in this investigation.

The concordances were examined by hand, excluding the forms found in utterances that were exact repetitions of a previous utterance from all further analyses. For the emergence analyses (section 3.1), contracted forms of do and be and the negative form don’t in uninvited contexts were excluded. The elimination of the negative and contracted forms in these analyses avoided crediting a child with emergence of a form based on an unanalyzed morpheme.

In contrast, later developing negative forms such as didn’t and isn’t were judged as evidence for emergence even if affirmative forms had not yet appeared in the transcripts, because these forms typically emerge well after their affirmative counterparts (Richards (1990)). Finally, the age corresponding to the earliest use of the auxiliaries and copula be was recorded as well as the age corresponding to the earliest use of copula be, auxiliary be, and auxiliary do in negation, inversion, and ellipsis.  

We were also interested in the types of errors children with SLI demonstrated when producing these early markers of finiteness. The CLAN KWAL program was used to search all SLI transcripts and extract all utterances in which a generic error code appeared. The error concordances were examined by hand and the specific error types were identified. The following error types were observed:

(a) Tense (e.g., omission of Tense marking, beis; double marking, where do this goes; or substitutions, didn’t/don’t), (b) Agreement (e.g., they is), (c) elision of the VP in an inflected manner, (d) appearance of an auxiliary as the only verb in an utterance, (e) word order errors in questions and negation, and (f) auxiliary substitutions (e.g., doesis). Uses of don’t/doesn’t were excluded from further analysis. This substitution was characteristic of a dialectical variation spoken by...
many individuals in the speech community from which these children were drawn. No instances of unnecessary DO-support were found. The error types of particular interest to this study were the errors of Tense, Agreement, and the auxiliary substitutions. With regard to Tense, the presence or absence of Tense marking on forms of BE in relation to syntactic configurations were examined. Agreement errors were identified when the Person/Number features of the auxiliary did not match the Person/Number features of the grammatical subject. Auxiliary substitutions were identified when the form produced was unexpected in the specific discourse context (Hadley (1993)). Characteristics of the discourse contexts that determined the “expected” auxiliary type included: (a) the morphosyntactic rules for combinations of auxiliaries and nonfinite verb inflections (e.g., auxiliary BE + progressive aspect; auxiliary HAVE + perfective aspect), (b) the use of the same auxiliary when an utterance is a counterassertion or agent-contrastive assertion to a prior utterance (e.g., They’re swimming. → no, only he is/*does), (c) the use of an identical form when responding to an agent-focal or yes–no question with both the subject NP and the residual operator (e.g., Does she need a bottle? → yes, she does/*does she will), and (d) the examiner’s recast of a child’s utterance or a child’s self-correction that indicated the prior choice was in error.

3. RESULTS

3.1. Emergence Analyses

The purpose of the emergence analyses was to determine if the emergence of the set of finiteness markers under investigation was influenced by the categorical distinctions between main verbs and auxiliaries or by differences in the site of base-generation for the individual forms. Two questions were of particular interest: (a) Do main verb forms emerge earlier than auxiliary forms, and (b) Do forms directly inserted in I emerge earlier than forms undergoing overt V-movement?

The first question was addressed by examining the ages of emergence for the main verb and auxiliary forms of DO and BE. Note that in this analysis the main verb use of DO is examined as well as the auxiliary form. Examples of the main verb uses of DO are illustrated in (17). Table 2 reports the ages of emergence for each form.

(17) a. He does it.
    b. You do the puzzle.

For the children with SLI, main verb forms of both DO and BE emerged at approximately 43 months of age, although greater variability was noted for copula BE. Auxiliary forms emerged approximately ½ months later for DO and 3½ months later for BE. A repeated measures analysis of variance (ANOVA) with

<table>
<thead>
<tr>
<th>Child</th>
<th>DO MV</th>
<th>DO Aux</th>
<th>BE MV</th>
<th>BE Aux</th>
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</thead>
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<td>42.9</td>
<td>46.0</td>
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<td>45</td>
<td>48</td>
<td>54</td>
</tr>
<tr>
<td>COMOR</td>
<td>46</td>
<td>43</td>
<td>43</td>
<td>51</td>
</tr>
<tr>
<td>JPHEL</td>
<td>46</td>
<td>39</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>JRAY</td>
<td>47</td>
<td>43</td>
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<td>47</td>
</tr>
<tr>
<td>MBILH</td>
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<td>39</td>
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</tr>
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<td>PCLEN</td>
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<td>43</td>
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<td>RDAVI</td>
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<td>RPUD</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>TRIC</td>
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<td>42.9</td>
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<td>3.5</td>
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</tr>
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</tr>
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</tr>
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</tr>
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<td>Sarah</td>
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<td>32.00</td>
</tr>
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<td>M</td>
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<td>3.0</td>
<td>2.8</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Note. MV = main verb; Aux = auxiliary verb.

two within factors [Verb (MV v Aux) and Type (DO v BE)] indicated that the ages of emergence between the main verbs and auxiliaries were significantly different, $F(1, 10) = 10.19$, $p < .01$, but there were no differences between DO and BE, $F(1, 10) = 1.50$, $p > .05$, or any interaction between the factors, $F(1, 10) = 2.02$, $p > .05$.

The ND group presented a somewhat different pattern of emergence. First, all four forms emerged within approximately 2 months of one another, between 23 and 26 months of age. Although the main verbs emerged before their homonymous auxiliary counterparts, this difference was only marginally significant, $F(1, 6) = 4.02$, $p = .09$. However, a significant difference was apparent between DO and BE, $F(1, 5) = 8.06$, $p < .05$, with forms of BE emerging after forms of DO. No interaction between factors was apparent, $F(1, 6) = 0.08$, $p > .05$.

The statistical analyses indicate that the main verb/auxiliary distinction influences the emergence of these early grammatical markers of finiteness. However, this interpretation must also take the sampling intervals and the emergence pattern.
for individual children into consideration. First, the average sampling interval for
the children with SLI was 10 weeks. Therefore, for an individual child, it would
not be possible to detect differences in a time of emergence of less than 10 weeks.
Using this interval as a criterion for "detectable" differences between the ages of
emergence, the main verb/auxiliary BE difference exceeded this criterion, whereas
the difference between the forms of DO did not. Moreover, the majority of the
children with SLI (i.e., 7 of 11) demonstrated emergence of auxiliary BE more than
3 months after main verb BE. In contrast, only 4 children with SLI demonstrated
emergence of auxiliary DO 3 months after main verb DO. The infrequent number of
obligatory contexts for auxiliary DO prior to its first appearance may also suggest
that the earliest uses were not captured. Taken together, this suggests that for the
children with SLI, the main verb advantage was restricted to BE.

Similarly, the difference between the emergence of main verb and auxiliary
forms were examined relative to the sampling intervals for the children in the
ND group. Based on an average weekly sampling interval, group differences of
2 weeks were considered reliable. The mean differences for both DO and BE
exceeded this value. However, on an individual basis, forms of main verb and
auxiliary DO emerged together for 5 of the 7 children. In contrast, main verb BE
clearly preceded auxiliary BE for 6 of the 7 children. Of importance, Eve, the
only child demonstrating an exception to this pattern (i.e., auxiliary BE < main
verb BE), did not demonstrate consistent use of auxiliary BE until 3 months after
its initial appearance (when consistent use is defined as repeated use within a
single sample or a single use across consecutive samples). Thus, like the children
with SLI, the difference between main verb and auxiliary BE forms was also restricted
to the forms of BE. The primary difference between the two groups was the more
protracted emergence of auxiliary BE relative to the other finiteness markers
among the children with SLI.

To ensure that the group difference was not an artifact of different sampling
schedules, an artificial 10-week schedule was imposed on the ND group, and
the emergence analysis was repeated. Although the ages of emergence for the
ND group were approximately 2 months later, the pattern of results remained
virtually unchanged: main verb DO, 26.0 months; auxiliary DO, 26.9; main verb
BE, 27.0; auxiliary BE, 28.4. This suggests that the protracted emergence of auxiliary
BE in the SLI group was not merely a methodological artifact of the
sampling interval, but may reveal a characteristic of the population worthy of
further examination.

The previous analysis provided a preliminary glimpse of differences between
DO and BE forms, with auxiliary BE generally emerging later. This raises the
second question—whether the availability of different linguistic mechanisms for
marking finiteness for forms originating in 1 versus V might also contribute to
the observed pattern of emergence. Recall from the introduction that a varie-
ty of factors might affect the relative order of emergence between the individual
finiteness markers, including the main verb/auxiliary distinction, knowledge of
V-movement, and characteristics of the underlying syntactic representation. To
ensure that the emergence of copula BE indicated that children had knowledge
of V-movement and were not simply analyzing it as an irregular main verb
further comparisons of copula BE, auxiliary BE, and auxiliary DO were conducted.
If children with SLI clearly demonstrate knowledge of V-movement, then it
would seem more likely that the appearance of auxiliary BE is more vulnerable among the
set of finiteness markers because of differences in the underlying syntactic re-
presentation and/or the surface morphology on verbal complements, either of which
are characteristic of auxiliary BE.

To determine if the differences in the structural configuration or know-
edge of V-movement influenced the order of auxiliary emergence, the forms
auxiliary DO and BE were compared with copula BE. Of importance, copula 1
shares one characteristic with each auxiliary. With regard to the structural con-
figuration, copula BE and auxiliary DO share a similar underlying representa-
tion (cf. Valian (1992)). Both finite forms, realized in 1, take a VP comple-
ment; although V is empty in the case of copula BE and there is a surface affix on ti
verb in the case of auxiliary BE. However, copula BE, like auxiliary BE, undergo
V-movement. For this analysis, emergence was considered only in the syntac-
tic context of ellipsis, inversion, and negation. These contexts provide the be
evidence that V-movement has applied insofar as the relationship between ti
BE forms and other sentence constituents (e.g., subject, Neg) is different fro
the underlying representation and, therefore, allow comparison among the the
forms of interest. Under these circumstances, if auxiliary BE emerged before
both copula and auxiliary BE, the exceptional nature of English V-movement
was general, would be implicated as contributing to the later emergence of BE form
In contrast, if copula BE patterned with auxiliary DO, and both emerged prior
auxiliary BE, a lack of knowledge of V-movement could not explain the lat
emergence of auxiliary BE. Rather, the underlying syntactic configuration and
surface verbal morphology would be implicated as contributing to the lat
emergence of auxiliary BE relative to the other finiteness markers.

The emergence of copula BE, auxiliary BE, and auxiliary DO in the first of ti
nonneutral syntactic contexts is reported in Table 3. Among the children wi
SLI, auxiliary DO appeared first in ellipsis or negation, whereas copula at
auxiliary BE tended to emerge first in ellipsis or inversion. The mean ages
emergence (in months) for the SLI group were as follows: auxiliary DO, 44,
copula BE, 45.0; auxiliary BE, 49.4. A repeated measures ANOVA indicated th
the difference between the three forms was statistically significant, F(2, 20) =
6.91, p < .005. Three pairwise post hoc comparisons were conducted to deter-
mine if the data confirmed either of the predicted patterns of results. The Tukey
### Table 3

<table>
<thead>
<tr>
<th>Child</th>
<th>Auxiliary DO</th>
<th>Copula BE</th>
<th>Auxiliary BE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age</td>
<td>Context</td>
<td>Age</td>
</tr>
<tr>
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<td>BAYER</td>
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<tr>
<td>SD</td>
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</tr>
</tbody>
</table>

**Note.** ELL = ellipsis; INV = inversion; NEG = negation; E-I = ellipsis and inversion; E-N = ellipsis and negation; I-N = inversion and negation.

The procedure was used to set the overall α level at .05 (Stevens, 1986). Auxiliary BE emerged significantly later than both copula BE and auxiliary DO (both contrasts > q(0.05, 3, 20) = 3.75) whereas there was no difference between copula BE and auxiliary DO. Of importance, the group order of emergence was also confirmed by 9 of the 11 children in the SLI group with auxiliary BE appearing more than 3 months after auxiliary DO and copula BE in nonneutral syntactic contexts for 7 of those 9. This pattern of results seems to indicate that both DO-insertion and V-movement are accessible to children with SLI as valid grammatical mechanisms for marking finiteness at approximately the same time and that differences in the underlying structural complexity may play a role in the later emergence of auxiliary BE beyond the initial appearance of other early finiteness markers.

A strikingly similar pattern of results was apparent for the ND group (see Table 3). The ND group means were as follows: auxiliary DO, 25.50; copula BE, 25.57; auxiliary BE, 30.71. The individual variation surrounding the emergence of auxiliary BE was twice as great as for the other two forms, violating the sphericity assumption necessary for conducting a univariate repeated measures analysis (Stevens, 1986). The multivariate overall F test was not significant (F = 4.88, p = 0.07), but the descriptive means clearly reveal the same general pattern of results found in the SLI sample. In nonneutral syntactic contexts, copula BE and auxiliary DO emerge in approximately the same time period, and both precede the emergence of auxiliary BE. Again, this group pattern of emergence was evident for the majority of individual children with all 7 demonstrating reliably later emergence of auxiliary BE relative to the other finiteness markers in nonneutral syntactic contexts. In addition, imposing the artificial 10-week sampling interval on the ND group yielded similar mean ages of emergence: auxiliary DO, 27.6 months; copula BE, 29.57; auxiliary BE, 33.14.

In summary, the order of emergence of finiteness markers appeared to influence more by categorical distinctions between main verbs and auxiliary BE than by the distinctions between the site of base-generation for individual marks and the linguistic mechanisms required for marking finiteness. This was true across both the SLI and ND groups. The primary finding was the later appearance of auxiliary BE relative to copula BE and auxiliary DO, providing strong evidence that the appearance of auxiliary BE is preceded by knowledge of V-to-I movement.

### 3.2. Emergence of Finite and Nonfinite Forms of BE

Further indications of the SLI children's understanding of BE forms can be seen in their early use of nonfinite as well as finite forms. Therefore, we examined the SLI data to determine if the children did indeed correctly associate a nonfinite form with its underlying position in V and if these forms emerged approximately the same time as finite forms. We searched for correct uses of nonfinite BE co-occurring with a modal, infinitival to or in contexts in which modal or infinitival to was required, but omitted. An additional 110 correct uses of BE were identified, produced by 9 of the 11 children (excluding imperative forms, e.g., Be quiet!). Only three of these forms were nonfinite uses of auxilia BE. Examples of the first nonfinite uses of BE forms are listed in (18) where indicates an omission.

(18) a. BAYER3—45 months the hippo can be there.
   b. CMOR2—43 months <the have to> this have to be in the bath
   c. JRAY1—39 months this will be candy.
   d. MBLH1—51 months <can> I going to be the cashier.
   e. RDAV2—40 months she have to be 0to work.
   f. PCLN2—40 months that’ll be a dollar.
   g. RPRUDS—50 months <that> that will be the lake.
h. SDAVIS—50 months locked the mommy in she won’t be scared.

i. TFRIC—46 months I will be four on June.

Inspection of the SLI data showed that there was no clear pattern of precedence for nonfinite be before finite forms. Two children (CMOOR and JRAY) used both finite and nonfinite forms of copula be in their first sample, so information about emergence order could not be gleaned. Two children (BAVER and RDAVI) demonstrated use of finite forms in the sample following the first appearance of nonfinite forms, whereas 3 children (PCLEN, RPRUD, and SDAVI) used finite forms in the sample before the first nonfinite forms. Finally, only TFRIC used nonfinite be well after the first finite forms appeared. Overall, the conclusion is that there was no clear advantage for the emergence of either finite or nonfinite forms of be, but instead there was an intertwining of the two forms, much as would be expected if children understood the relationship between infinitival and finite forms.

This impression is strengthened by observing the variety of contexts in which the first correct uses of nonfinite be appeared. For the 8 children producing multiple nonfinite be forms, the first 3 uses were examined. Of those 24 uses, 12 were in modal + be constructions in main clauses, 2 were in 0modal + be main clauses (where 0 indicates an omission), 5 were in to + be constructions as infinitival complements, 4 were in 0to + be infinitival complements, and 1 was in a modal + be subordinate clause. All such uses conform to the expected grammatical configurations of nonfinite forms of be.

3.3. Error Analyses

The final set of analyses focused on the types of errors the children with SLI made as they began to mark finiteness with copula be and the early developing auxiliaries. Of particular interest was whether the errors observed (or absence of certain errors) provided any evidence for the psychological reality of the linguistic categories proposed and the status of grammatical knowledge among children with SLI.

3.3.1. Finiteness marking and V-movement. The error concordances were examined for any nonfinite uses of be used in a context that required a form marked for Tense and Agreement. If children with SLI clearly understood the relationship between finiteness marking and V-movement, we would not expect a nonfinite form to appear in an inverted, negated, or elliptical construction following the application of V-movement. A total of six errors were identified in which copula be was not marked for Tense and Agreement and one error (19f) in which copula be appeared incorrectly with infinitival to in a main clause.

(19) a. BAVER9—60 months *the lion be here.
b. JRAY5—49 months *that be a doggy.

c. JRAY5—49 months *and the doggy be in here.
d. RDAVI—39 months *it be a dollhouse.
e. RDAVI—39 months *this be a big one.
f. RDAVI—60 months *this will be [f] this to be his cage.
g. WBARK11—65 months *that be good.

These seven errors were extremely rare, occurring out of a total of 1,656 obligatory contexts for finite copula be forms. It is also possible that these errors could be construed as instances of omitted modals. However, what is most important is that these uses of nonfinite be all occurred in declarative contexts. None appeared in negated, inverted, or elliptical constructions where the presence of be could not be analyzed as nonfinite in V. This provides further evidence for the status of grammatical knowledge in children with SLI. These children understood the relationship between finiteness and V-movement, producing finite forms of be in clearly moved positions and nonfinite forms in base-generated positions.

Only one exception to this generalization was observed upon examination of errors with finite forms of be. One child made an error involving the misplacement of auxiliary be with regard to a negative particle. However, the same child made similar errors confusing the placement of the negative particle with modal will and won’t in the same sample. These errors are provided in (20).

(20) a. *INV: ok <well this> [f] this doggy be riding in the boat.
   *INV: did you see that?
   *CHI: <oh> [f] no.
   *INV: <well> [f] he is.
   *CHI: no he not is!
   %com: emphatic stress on not
   *INV: he’s not?
   *CHI: he 0is not.

b. *CHI: he not will stand.
   *INV: he won’t stand so we have to lean him up.
   c. *INV: <well> [f] the man looks like he’s driving the car.
   *CHI: he 0is drive-ing.
   *CHI: he need-0es to get her out.
   *CHI: he no won’t get her fall out.
   = he won’t let her fall out
   *INV: it’s not going to fall off.
   (MBILH4, 46 months, MLU = 2.97)

Given this evidence, an interpretation of the error in (20a) as lack of knowledge about the relationship between finiteness and V-movement seems unlikely. It may be more appropriate to conclude that this child was having trouble with the negation, in general, during this stage of language development.
3.3.2. Form choice: Agreement marking and auxiliary substitutions. We were also interested in errors children made in choosing the correct forms to mark finiteness during this period of initial emergence. Rice and Wexler (Rice and Wexler in press), Rice et al. (1995) argued that 5-year-old children with SLI demonstrate knowledge of Agreement marking at the same time that they lack knowledge that Tense marking is obligatory in matrix clauses. That is, at the same time children with SLI are very likely to omit finiteness markers, such as BE, DO, a third-person singular, and -ed past tense, when BE and DO appear, they agree with the Person and Number features of the subject. In this analysis, we examined the accuracy of agreement marking from the earliest emergence of BE and DO. We were also interested in whether the children with SLI demonstrated any confusion in their choice of finiteness markers, specifically between DO and BE. Recall that auxiliary DO is inserted in negation, inversion, and ellipsis precisely because lexical verbs cannot undergo overt V-movement. Because forms of BE can undergo V-movement, auxiliary DO is not inserted. Although errors of unnecessary DO-support were not apparent, as in (7), we wondered if confusions between these forms might manifest themselves in other ways, such as in substitutions of one form for another.

To place the number of errors of form choice in perspective, the number of obligatory contexts for all uses of copula BE, auxiliary BE, and present tense uses of auxiliary DO across the longitudinal SLI transcripts were identified. Because this analysis examined the percentage of correct use of finiteness markers, transcripts were eliminated from the corpus if the child did not produce final consonants /s, z/ in monomorphic words or a consistent approximation of these phones on articulation test protocols available as part of the archival records. This ensured that the omission or incorrect use of finiteness markers was not confounded by limitations in phonological abilities. A total of 11 transcripts from 6 different children were eliminated. In addition, all uses of the finiteness markers were tallied, regardless of whether contracted or uncontracted forms were produced. Transcripts were then divided into two developmental levels based on the children’s MLUs. The first level included transcripts in which the children’s MLUs were less than 3.00; these transcripts generally contained the first uses of finiteness markers. The second level included transcripts in which children demonstrated MLUs greater than or equal to 3.00. This level corresponded to the children with SLI in the cross-sectional studies by Rice and Wexler (Rice and Wexler in press), Rice et al. (1995). As can be observed from Tables 4 and 5, agreement errors were rare during the early period when the children’s MLUs were less than 3.00, despite the fact that children were omitting finiteness markers in well

<table>
<thead>
<tr>
<th>MLU &lt; 3.00</th>
<th>Copula BE (DEC)</th>
<th>Copula BE (ELL, INV, NEG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total contexts</td>
<td>203</td>
<td>84</td>
</tr>
<tr>
<td>% correct obligatory use</td>
<td>37%</td>
<td>13%</td>
</tr>
<tr>
<td>Agreement correct</td>
<td>86</td>
<td>36</td>
</tr>
<tr>
<td>Agreement errors</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>% correct agreement</td>
<td>99%</td>
<td>97%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MLU ≥ 3.00</th>
<th>Copula BE (DEC)</th>
<th>Copula BE (ELL, INV, NEG)</th>
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</thead>
<tbody>
<tr>
<td>Total contexts</td>
<td>950</td>
<td>254</td>
</tr>
<tr>
<td>% correct obligatory use</td>
<td>64%</td>
<td>68%</td>
</tr>
<tr>
<td>Agreement correct</td>
<td>512</td>
<td>173</td>
</tr>
<tr>
<td>Agreement errors</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>% correct agreement</td>
<td>96%</td>
<td>95%</td>
</tr>
</tbody>
</table>

Note: DEC = declarative; ELL = ellipsis; INV = inversion; NEG = negation; MLU = mean length of utterance.

Over half of their obligatory contexts, Agreement marking was highly accurate for copula and auxiliary BE across both declarative and combined contexts, ellipsis, inversion, and negation (i.e., 97% to 100%). In contrast, agreement error were more notable for auxiliary DO, although the 50% accuracy level was based on a limited number of opportunities (three correct instances and three incorrect instances). In the later developmental stage, the finiteness markers were still used

<table>
<thead>
<tr>
<th>MLU &lt; 3.00</th>
<th>Auxiliary BE (DEC)</th>
<th>Auxiliary BE (ELL, INV, NEG)</th>
<th>Auxiliary DO (ELL, INV, NEG)</th>
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<tr>
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<td>19</td>
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<tr>
<td>% correct obligatory use</td>
<td>24%</td>
<td>23%</td>
<td>16%</td>
</tr>
<tr>
<td>Agreement correct</td>
<td>28</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Agreement errors</td>
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<td>% correct agreement</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
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<tr>
<th>MLU ≥ 3.00</th>
<th>Auxiliary BE (DEC)</th>
<th>Auxiliary BE (ELL, INV, NEG)</th>
<th>Auxiliary DO (ELL, INV, NEG)</th>
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</thead>
<tbody>
<tr>
<td>Total contexts</td>
<td>478</td>
<td>69</td>
<td>81</td>
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<tr>
<td>% correct obligatory use</td>
<td>33%</td>
<td>70%</td>
<td>64%</td>
</tr>
<tr>
<td>Agreement correct</td>
<td>235</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>Agreement errors</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>% correct agreement</td>
<td>97%</td>
<td>94%</td>
<td>91%</td>
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Note: DEC = declarative; ELL = ellipsis; INV = inversion; NEG = negation; MLU = mean length of utterance. All uses of don’t were excluded from tallies of NEG contexts, restricting table of auxiliary do to correct uses of doesn’t and one error of doesn’tn’t.
### Table 6
Specific Language Impairment Auxiliary Substitutions by Phrasal Category

<table>
<thead>
<tr>
<th>Type</th>
<th>Child</th>
<th>Age</th>
<th>Substitution</th>
<th>Context</th>
<th>Total</th>
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<tr>
<td>I-for-I</td>
<td>BAYER4</td>
<td>48</td>
<td>do/will</td>
<td>ELL</td>
<td>7 (31.8%)</td>
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<td></td>
<td>PCLEN2</td>
<td>40</td>
<td>do/will</td>
<td>ELL</td>
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<tr>
<td></td>
<td>PCLEN2</td>
<td>40</td>
<td>does/will</td>
<td>ELL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TFRC7</td>
<td>55</td>
<td>can/ did</td>
<td>ELL</td>
<td></td>
</tr>
<tr>
<td>I-for-V</td>
<td>BAYER7</td>
<td>54</td>
<td>does/ is</td>
<td>ELL</td>
<td>13 (59.9%)</td>
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<tr>
<td></td>
<td>CMOR6</td>
<td>52</td>
<td>don’t/ haven’t</td>
<td>NEG</td>
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<tr>
<td></td>
<td>MBILH6</td>
<td>51</td>
<td>do/ are not</td>
<td>NEG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PCLEN2</td>
<td>40</td>
<td>will/ is</td>
<td>ELL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PCLEN2</td>
<td>40</td>
<td>can/ (cop)</td>
<td>ELL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RPRUD4</td>
<td>47</td>
<td>does/ is</td>
<td>INV</td>
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<tr>
<td></td>
<td>RPRUD6</td>
<td>52</td>
<td>can’t/ (cop)</td>
<td>NEG</td>
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<tr>
<td></td>
<td>TFRC7</td>
<td>39</td>
<td>will/ are</td>
<td>INV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TFRC7</td>
<td>39</td>
<td>did/ was</td>
<td>ELL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WBARK8</td>
<td>38</td>
<td>do/ am</td>
<td>ELL</td>
<td></td>
</tr>
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<td></td>
<td>WBARK9</td>
<td>61</td>
<td>do/ am</td>
<td>ELL</td>
<td></td>
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<tr>
<td></td>
<td>WBARK11</td>
<td>65</td>
<td>didn’t/ isn’t</td>
<td>NEG</td>
<td></td>
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<tr>
<td>V-for-I</td>
<td>JHESL3</td>
<td>45</td>
<td>I’m not/ don’t</td>
<td>NEG</td>
<td>1 (4.5%)</td>
</tr>
<tr>
<td>VI-for-V</td>
<td>MBILH6</td>
<td>51</td>
<td>I/ have</td>
<td>INV</td>
<td>1 (4.5%)</td>
</tr>
</tbody>
</table>

*Auxiliary substitutions are abbreviated according to the category in which the form produced and the target originate: I-for-I = I-auxiliary substituted for another I-auxiliary, V-for-V = V-auxiliary substituted for another V-auxiliary; I-for-V = I-auxiliary substituted for a V-auxiliary or copula BE; V-for-I = V-auxiliary substituted for an I-auxiliary.

In only 70% of the obligatory contexts, with the accuracy of finiteness marking remaining at high levels ranging from 91% to 97%. In short, from the earliest appearance of the finiteness markers, Agreement marking was highly accurate.

With regard to the second type of form choice error, a total of 22 auxiliary substitutions were identified, produced by 8 of the 11 children with SLI. These substitutions involved the production of an auxiliary form other than the one expected in the specific discourse context. Examples (in italics) are provided in (21) through (24). Table 6 summarizes the types of substitutions observed.

(21) INV: what are they going to do?
CHI: get in boat.
INV: they’re getting in the boat.
CHI: <well> I hope does.
INV: he does?
CHI: yeah.
(BAYER7, 54 months, MLU = 3.60)

(22) INV: how are you doing that?
CHI: xxx.
CHI: you don’t going to get it!
INV: I’m not going to get your helicopter.
(MBILH6, 51 months, MLU = 4.37)

(23) INV: throw this in here.
CHI: you got the dog out.
INV: how’s she pushing it for?
CHI: I don’t know.
(RPRUD4, 47 months, MLU = 3.19)

(24) INV: aren’t you hungry dear?
INV: I have your favorite fried chicken.
CHI: I’m not like that.
INV: you don’t like fried chicken.
(JHESL3, 45 months, MLU = 2.88)

Four characteristics of the auxiliary substitutions are worthy of mention. First, the majority (13 of 22) were substitutions of auxiliaries originating in I for for originating in V. In contrast, there was only one example of a child substituting a form of BE for an I-auxiliary. The remaining 8 errors were within the same phrasal category. Second, all substitutions occurred in the nonneutral context of ellipsis, inversion, or negation; none were found in declarative contexts. Third, although children did not always substitute the semantically empty auxiliary do, it was by far the most likely form to replace modal and BE/HA targets, appearing 15 times. And finally, substitutions generally maintained the correct Person and Number features of the target form. That is, after excluding the substitutions involving modal or past tense forms with ambiguous Person and Number features, 8 of the 9 remaining substitutions preserved the appropriate Person and Number features, thereby correctly marking the agreement relation between the grammatical subject and the auxiliary.

In summary, the error analyses revealed an impressive amount of underlying grammatical knowledge possessed by the children with SLI. First, these children understand the relationship between expressing finiteness on BE and V-movement producing finite forms in clearly moved positions and nonfinite forms in bus generated positions. Second, knowledge of Agreement is robust from the earliest appearance of the forms used to mark finiteness. Despite the rare errors of form choice between markers, the auxiliary substitutions also provided evidence for psychologically real, categorical equivalence between these forms and the accuracy of agreement marking co-occurring with these errors. This provided another...
compelling source of evidence documenting the robustness of some aspects of grammatical knowledge in children with SLI.

4. DISCUSSION

The primary results of this study indicate that categorical distinctions in the underlying linguistic representation influence the acquisition of the early markers of finiteness among children with SLI. The main findings are these: Although children with SLI show a greatly protracted period of emergence (relative to their typically developing peers), they are very similar to their younger, typically developing peers in their first uses of BE and DO. For all the observed children, copula BE and auxiliary DO forms appear before auxiliary BE. In the SLI group, auxiliary BE in nonneutral syntactic contexts emerged approximately 5 months later than auxiliary DO. This late emergence of auxiliary BE cannot be contributed to a lack of knowledge of V-movement, insofar as copula BE and auxiliary DO emerged together, well in advance of auxiliary BE. Furthermore, SLI children (as well as the younger normally developing children) showed strong understanding of agreement marking. From the earliest uses of BE and DO, the choice of surface forms matched the number and person features on the subject.

Considered as a set of findings, the results provide general corroboration of the Extended Optional Infinitive (EOI) account of Rice et al. (1995) and Rice and Wexler (in press). The emergence of BE and DO is extensively delayed among children who regard Tense marking as optional in main clauses. At the same time, when BE and DO appear, the surface forms show knowledge of the rules for movement of finite forms and agreement marking, predictions which were supported in these findings. It is also important to note that, despite the fact that some children in the current study had age-appropriate receptive language abilities, the results replicated findings of previous studies of children with both receptive and expressive limitations.

This study points out that the difference between copula and auxiliary contexts bears further consideration. As noted by Stromswold (1990) and Valian (1992), younger normally developing children demonstrate later uses of auxiliary BE. Available evidence for SLI children beyond the initial emergence of BE forms shows a mixed picture regarding the obligatory use of copula and auxiliary BE at later points in development. In a cross-sectional study of BE forms in spontaneous speech, Cleave and Rice (1996) report that copula BE was produced more accurately than auxiliary BE among 5-year-old children with SLI. This generalization held for 7 of the 10 children with SLI. Rice et al. (1995) also reported a higher percentage of correct use of copula BE relative to auxiliary BE in statements, yet the reverse pattern was observed in questions. Finally, Hadley and Rice (1995) and Eyer and Leonard (1995) found that children with SLI demonstrated similar levels of accuracy for both forms of BE when examined longitudinally between 4 and 5 years of age. Although omission rates for auxiliary BE were higher than for copula BE at the time of the first measurement points, this difference was not reliable over the following 9-month period. It is likely that different strategies for collapsing across obligatory contexts for BE forms contributed to this complex picture. To further understand the difficulty that children with SLI have marking finiteness with these forms, it will be necessary to explore a variety of factors including the syntactic and phonetic contexts in which these forms are required (see Cleave and Rice (1996) for issues related to contractibility). In addition, a more complete longitudinal study is needed to determine if the pronounced difficulty that children with SLI demonstrate in the acquisition of auxiliary BE (relative to the other early markers of finiteness) is related primarily to its initial appearance in specific syntactic constructions or to its use in obligatory contexts throughout development.

The comparisons across finiteness markers in this study indicate that difficulties with auxiliary BE does not lie in later than expected emergence of the gene category “auxiliary” or in the acquisition of available linguistic mechanisms marking finiteness. In fact, the source of the difficulty is not clear and could be attributed to several possible factors. It is highly probable that the VP complement structure of auxiliary BE is implicated, perhaps because of the additional “represented” and the iterative nature of the derivations. Alternatively, the difficulty in the acquisition of auxiliary BE could also have something to do with the presence of the verbal affix, the -ing progressive marker. Because children with SLI, as well as typically developing peers, are likely to be using the -ing at the same time they are omitting auxiliary BE, this surface morpheme somehow blocks insertion of the finiteness marker elsewhere in children’s utterances in the computation of surface forms. This possibility also warrants additional inquiry.

It is important to note that a simple processing account which would predict that sentence length or metrical structure would influence the presence of BE and DO forms would not be able to capture the selective delay of auxiliary BE. Eq consideration of both underlying grammatical representations and processing demands will be needed in order to identify the sources of the later emergence of auxiliary BE (cf. P. Bloom (1990), Valian (1992)). As the underlying complexity of the verbal projection increases, additional processing resources will be required to produce sentences with auxiliary BE. An elicited imitation task similar to that of Richards (1990) could be adapted to include carefully selected test sentences equated for word/morpheme length and syllable structure, such as the one in (25), to examine the contribution of underlying structural configurations.

(25) a. They are apples. 
   b. They are running.

Presumably, a processing account that only takes surface features of the utterance types into account would predict similar ages of emergence and equal levels
accuracy between finiteness markers, whereas a configurational account would predict later emergence and less accurate use of auxiliary be during this early period of acquisition.

This study revealed further details regarding SLI children’s knowledge of agreement marking, and several limitations must be acknowledged. One is that the number of obligatory contexts for grammatical subjects across all Person–Number distinctions were not controlled and that, in fact, third-person singular subjects dominated. However, our results are highly compatible with those obtained by Rice and her colleagues (Rice and Wexler (in press), Rice et al. (1995)) in which elicitation probes were used to control this variable. In addition, our error rate is a conservative one. Several utterances such as There’s the legos (JRA10) and Where’s some people? (SRAV15) were included in our tally of errors. It could be argued that these represented unanalyzed forms that did not undergo V-movement, and therefore were not subject to agreement checking (Chomsky 1993). In addition, it is interesting to note that agreement errors with auxiliary do occurred primarily in elliptical constructions such as I does (BAVER6) or the dog do (RDAV18), with one doesn’t/don’t error in negation. If a more articulated representation of IP is assumed, it might be possible to argue that these forms were inserted into T, head of Tense Phrase, but did not undergo movement to Agr, head of Agreement Phrase, where agreement relations are thought to be checked. In contrast, no agreement errors were observed in the 23 uses of present tense auxiliary do forms in inverted contexts where movement through the intervening functional projections is assumed for do to end up in C. In light of these caveats, the agreement marking demonstrated by the children with SLI in this study appears to be remarkably robust.

Finally, the auxiliary substitutions, though rare, provided an interesting source of insight into the grammatical knowledge of this sample of children with SLI, specifically about their knowledge of auxiliary do. Given that auxiliary do is a language-specific form needed to mark finiteness in a restricted set of syntactic contexts, we might have expected the children with SLI to have had particular difficulty with its acquisition. Yet the emergence of auxiliary do took considerably less difficulty for these children than did the emergence of auxiliary be. Despite frequent omissions of auxiliary do, the analysis of auxiliary substitutions indicated that the children were well aware of its potential use to mark finiteness when other means were not available. Auxiliary do surfaced as a default form when access to a desired target auxiliary failed, and of importance, the default form preserved the Person–Number features of the target. We might speculate that this form surfaced because auxiliary do is inserted late in the course of a syntactic derivation (cf. Chomsky 1991), (Davis 1987), or alternatively, because auxiliary do has no features other than its categorical status making it an extremely appropriate default (Halie and Marantz 1993). Of importance, the children also restricted the use of do-insertion to the nonneutral contexts of ellipsis, negation, and inversion, yet these contexts were far less frequent in the database than declarative contexts. Specifically, in nonneutral syntactic contexts the auxiliary substitution rate was approximately 10%. In contrast, there were nearly seven times more obligatory contexts for auxiliary be in declarative contexts, though auxiliary substitutions were not observed. Thus, the use of auxiliary do to mark finiteness appeared to be an option only in the contexts in which it was permissible in the adult grammar. Given the general tendency for children with SLI to mark finiteness optionally, it seems all the more surprising that these errors appeared. At the same time, the errors reveal knowledge of categorical equivalence between the auxiliary forms, as well as the ability to select a default form indexed appropriately for the correct Person–Number features of the grammatical subject.

4.1. Linguistic Competence Among Children With SLI

The broad conclusion to be drawn from this investigation is that children with SLI demonstrate a great deal of underlying linguistic competence. They can correctly identify copula be as a main verb originating in V and form an initial auxiliary category. They recognize that auxiliaries have distinct syntactic privileges not shared by main verbs and that copula is exceptional in this regard. They also know that in clearly moved positions, copula and auxiliary be must appear as finite forms and when they appear in their base-generated positions they must appear as nonfinite forms. Finally, when finiteness is expressed with copula or auxiliary be or auxiliary do, Agreement is almost always marked correctly from the earliest uses. In fact, when children with SLI in this investigation selected the wrong finiteness marker as reflected by errors such as does/dis dolore, or is/does, they were nevertheless correct with regard to Agreement (see Table 6).

Taken together, these findings support the conclusion of Rice and Wexler regarding the nature of linguistic representations among children with SLI (cf. Rice 1994, Rice et al. 1995, and Wexler and Rice 1996). That is, some aspects of grammatical competence appear to be largely intact, even when surface finite forms are often missing. Specifically, children with SLI appear to understand the distinction between finite and nonfinite forms of copula and auxiliary be and properties of subject–verb agreement for early finiteness markers from the first appearance of these forms. With regard to the first uses of be and do, what appears to be vulnerable is the emergence of auxiliary be in relation to the other early markers of finiteness. It is not clear if the delay in emergence of auxiliary be persists as a particularly problematic morphosyntactic form beyond the time of first use. What is clear is that children with a grammar that treats Tense as optional nevertheless know, from the earliest uses, that surface forms follow the morphosyntactic principles that govern English lexical and functional heads.
ACKNOWLEDGMENTS

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Appreciation is extended to Bethany Gertner, Mary Howe, and Lesley Stephens for various aspects of transcription, reliability coding, and technical assistance. We also express special thanks to the children and families of the Language Acquisition Preschool and our colleagues Betty Bunce and Kim Wilcox. Finally, we are grateful to Clifton Pye, Matthew Rispoli, and Sara Rosen and to three anonymous reviewers for their comments and criticism.

REFERENCES


Rice, M. (1992) [The Kansas Language Transcript Database], University of Kansas, Lawrence, Kansas.

## Specific Language Impairment Participant Descriptors

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<th>Child</th>
<th>Age</th>
<th>KABC</th>
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<th>Z-score</th>
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**Note.** KABC = Kaufman Assessment Battery for Children (Kaufman and Kaufman 1983); PRC = Processing Composite; Reyneil = Reynell Developmental Language Scales-US Edition (Reynell and Gruber 1990); Rec = Receptive; Exp = Expressive; MLU = mean length of utterance; PPVT = Peabody Picture Vocabulary Test–Revised (Dunn and Dunn 1983); GFTA = Goldman-Fristoe Test of Articulation (Goldman and Fristoe 1986); NA = test could not be administered.

The Z-score is based on Miller (1981). MLU calculated on 75 utterances selected from the middle of the transcript. Less than 60 total utterances, MLU calculated on all utterances. MLU calculated on 50 utterances selected from the middle of the transcript.