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# Verb Use in Specific Language Impairment

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The aim of the present study was to use longitudinal data to provide a detailed profile of early word combinations by children with SLI. Three children with SLI were videotaped during mother-child interactions in the home over a 2-year period. The data obtained were compared to MLU-matched samples of normal language-learning children from Wells' (1981) longitudinal database, which provided a control for the linguistic measures used in this study. A range of analyses were carried out on controlled data samples in order to determine how the children with SLI's early utterances compared with those of MLU-matched normal language peers. The measures were specifically designed to assess the children's use of verbs and verb morphology because recent research has suggested that verbs may play a central role in the acquisition process, and children with SLI may have particular problems with verbs. We found that children with SLI used verbs less frequently, nouns more frequently, and were more input-dependent than their MLU-matched peers. The children with SLI used verb bare stems incorrectly more often than their MLU-matched counterparts. However, further analyses showed that this high frequency of incorrect bare stems may be at least partly due to the fact that children with SLI have particular difficulties using auxiliaries. Furthermore, the proportion of verb use that consisted of General All Purpose (GAP) verbs for children with SLI was similar to that of the MLU-matched children. The above findings were compared with those from other relevant studies of lexical diversity in children with SLI, and the potential implications of these data for theories of SLI language development were discussed, particularly with reference to Marchman and Bates' (1994) "critical mass" hypothesis.

**KEY WORDS:** verb use, specific language impairment, longitudinal considerations

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**T**he majority of work on lexical limitations in children with specific language impairment (SLI) has focused solely on their use of nouns (Leonard, 1988; Rice, 1991). Such studies have found that children with SLI are delayed in using their first words, and continue to add new words to their lexicons at a slower rate than do normally developing children. Recent accounts of semantic and syntactic development in typically developing children have focused our attention on verb use and have highlighted the central role of verbs in language development. Increasingly, researchers believe that verbs play a particularly important part in language learning and use since the conceptual roles specified by verbs (e.g., the giver, the thing given, the receiver, in the case of the verb "give") may be said to provide a framework for organizing other word class members into appropriate linguistic expressions. If this is the case, then verbs can be seen as a sort of "stimulus" for early grammatical development as the verbal information provides a series of conceptual frames that "beg to be completed into sentences" (Tomasello, 1992).

This increased awareness of the importance of verb use in the process of normal language learning has encouraged researchers investigating language development of children with SLI to focus on the way in which verbs are acquired; such research has suggested that children with SLI do have particular problems with verbs. Fletcher and Peters (1984) found that children with SLI used a greater number of uninflected verb forms and had a more limited verb diversity than an age-matched normal comparison group. In the same vein, Watkins, Rice, and Moltz (1993) found that children with SLI had fewer different verbs than both their age-matched equivalent and MLU-equivalent peers as measured by type-token ratios. In addition, Rice and Bode (1993) have suggested that children with SLI tend to rely on a restricted set of high-frequency verbs in their expressive language, often referred to as general, all-purpose (GAP) verbs (e.g., go, put, make). These verbs have also been referred to as "light verbs" by Pinker (1989). Rice and Bode proposed that the characteristics of GAP verbs (occur frequently in the input, often have a simple, monosyllabic phonetic form, and allow for syntactic/semantic nonspecificity) may make their use easier than more specific lexical verbs for children with SLI. A number of researchers have argued that, although their language problems may become less significant, children with SLI often have problems with verbs that are likely to persist into school age (King & Fletcher, 1993; Paul, 1993).

The idea that grammatical morphemes are particularly challenging for children with SLI has been widely accepted for some time, and indeed, much of this work has served as a foundation for many of the current major accounts of SLI (Johnston & Schery, 1976; Khan & James, 1983; Steckol & Leonard, 1979). Studies in this area have tended to monitor the acquisition of Brown's (1973) 14 morphemes in children with SLI. However, more recent research has also focused on verb morphology. For example, Rice and her colleagues (Oetting & Rice, 1993; Rice & Oetting, 1993) showed that some aspects of grammar (e.g., the past tense inflection *-ed* for regular verbs, the third person singular inflection *-s*, the copula) are more difficult for children with SLI to learn and use than other aspects (e.g., plural *-s*, progressive *-ing*). These findings for the past tense *-ed* have been replicated by Leonard (1994), and Moore and Johnston (1993). In accordance with this, Rice and her colleagues have suggested that children with SLI have particular problems with verb agreement (Rice, 1994; Rice & Oetting, 1993) and finiteness marking on the verb (Rice, Wexler, & Cleave, 1995). Thus, the emerging picture suggests that verbs, and verb-related grammatical properties, may be a particular locus of vulnerability for children with SLI.

Recent research has suggested that the development of verbal morphology may be related to lexical

acquisition; the productive use of verb morphology is dependent upon the size of the verb lexicon reaching a "critical mass" (Marchman & Bates, 1994). Thus, it is quite possible that the particular problems with verb morphology displayed by children with SLI may, in fact, be due to their verb vocabularies failing to reach such a "critical mass" in order for productive use of verb morphology to be possible.

Detailed longitudinal studies documenting the development of children with SLI's language acquisition are obviously needed in order to gain an accurate picture of the acquisition process. However, studies incorporating longitudinal data have only recently begun to emerge (Paul & Alford, 1993; Rescorla & Schwartz, 1990). Unfortunately, these studies have mainly been from the perspective of children with delayed expressive language, known as "late talkers." The studies have shown that late talkers acquire grammatical morphemes in a similar order to normal language learning children, although late talkers seem to acquire fewer morphemes than their MLU would predict. In other words, late talkers seem to need to reach higher levels of MLU (than their normal counterparts) before they can learn certain morphemes. Similar results have been found in cross-sectional studies of children with SLI (see Leonard, 1989, for a review). Thus, longitudinal studies addressing verb use, and the lexical characteristics of children with SLI's early word combinations are still clearly needed.

Furthermore, such longitudinal studies can provide the data necessary for investigating the potential effect of input on children's language learning. Several studies have shown that normal children's early word combinations are sensitive to the input (e.g., Ninio, 1988; Tomasello, 1992). However, it is clear that normal children move away from the input as they progress grammatically. Given the problems that children with SLI have with learning language, it would be interesting to investigate the possibility that they may be less able to move away from the input and are thus more "input dependent" than normally developing children of the same MLU.

Accordingly, the aim of the present study is to provide a detailed description of early word combinations for 3 children with SLI. The present longitudinal study data focused on verb use, with particular attention to verb vocabulary size and verb morphology, and explored the potential role of the input on the language learning process of 3 children with SLI.

## Method

### *The Families of the Children With SLI*

The families involved in this longitudinal study were part of a larger project investigating the language

development of children with specific language impairment (SLI), and of their younger non-impaired siblings (Conti-Ramsden & Dykins, 1991; Conti-Ramsden, Hutcheson, & Grove, 1995). Families were informed of the research project through the speech and language treatment services in the northwest of England, and asked if they would be willing for the research workers to visit them and discuss their possible involvement in more detail. During an initial visit, the research project was explained and parents were given the opportunity to opt for a longer longitudinal involvement of approximately 2 years. In addition, the researchers collected audiorecorded language samples from the child with SLI and, at a separate session, from the younger sibling. The first 50 child utterances were transcribed from the recordings in order to ascertain the mean length of utterance of the children using Brown's (1973) criteria, with the modifications suggested by Miller (1981). From the outset, it was made clear to the parents that no identifying information would be revealed except to the research workers, and that the family could terminate their longitudinal involvement in the research project at any time. Accordingly, any data collected from the family at that point would be destroyed if desired. Three families agreed to participate in the longitudinal phase of the project. In this paper, we examine the data obtained from these 3 children with SLI, but do not discuss the younger sibling data. The children with SLI are named Colin, Andrew, and Mark.

### Characteristics of the Children with SLI

The characteristics of the children with SLI at the beginning of the study are presented in Table 1 in terms of age and psychometric test results. It can be seen that the subjects were three expressively impaired children, all male, with severe problems (as can be seen from the

**Table 1.** Characteristics of the language-impaired children at the beginning of the study.

	C.A.	MLU	IQ	PLS-AC	ACQ	TROG	BPVS
Colin	5;8	1.45	89	5;4	91	4;9 (20%)	4;7 (22%)
Andrew	5;3	1.77	115	5;6	105	5;0 (40%)	4;4 (26%)
Mark	3;9	1.28	105	3;10	103	N/A	2;8 (18%)

Note. C.A. = chronological age  
 MLU = mean length of utterance in morphemes from audio-recorded sample  
 IQ = intelligence quotient  
 PLS-AC = Preschool Language Scale Auditory Comprehension  
 ACQ = auditory comprehension quotient  
 TROG = Test of Reception of Grammar  
 BPVS = British Picture Vocabulary Scale, age equivalent below 3 years is based on extrapolations  
 % = percentile rank

discrepancy between their age and their MLU obtained on the language sample). The 3 children performed within one standard deviation of the mean on the Leiter International Performance Scale that provided a measure of IQ. In addition, they were tested on a number of comprehension measures. As previously reported by Conti-Ramsden, Donlan, and Grove (1992), these children had varying comprehension profiles with below-average vocabulary comprehension (as measured by the British Picture Vocabulary Scale; 18–26 percentile rank), poor comprehension of grammar (as measured by the Test of Reception of Grammar, TROG; 20–40 percentile rank), but better overall auditory comprehension abilities (as measured by the Preschool Language Scale).

In addition, all 3 children had adequate hearing sensitivity as determined by pure-tone audiometry screening bilaterally at 500, 1000, 2000 Hz at 25 dB (equivalent to pure tone thresholds of 25 dB HL, re: ANSI, 1989). The 3 children with SLI had eventful birth histories, all 3 being anoxic at birth. Developmental histories ascertained by a questionnaire to parents revealed all developmental language milestones to be delayed in the 3 children with SLI. In addition, motor milestones appeared delayed for Colin and Andrew.

All three children spoke English in monolingual homes and came from intact (two parent) families. In all three families, the mothers remained at home as housewives while the fathers went out to work; all the parents had secondary education. All children with SLI were receiving speech treatment in a clinic or were enrolled in language-based classrooms for children with SLI (called "language units" in England).

### Video Recordings

The video recording sessions lasted approximately 15–20 minutes and were conducted in the homes of the families using the play materials available there (e.g., jigsaws, Fisher-Price toys, books, Lego, models). In order to keep the parents as unconcerned as possible about the nature of their own speech, they were told that the research was primarily about the children's communicative development. The instructions given to the parents were "play as you normally do." The three families participated in a number of dyadic interactions including mother, father, and sibling. The present paper mainly concerns itself with the mother-child with SLI play interactions although some father-child with SLI interactions were occasionally also used.

All the children were videotaped every 6 weeks, but illness and cancellations meant that video samples were, on average, once every 3 months over a 15-month period. An additional sample was taken after approximately 10–16 months, completing a 2-year observation

period. As the aim of the study was to examine the development of expressive language (in particular the early stages of word combinations and verb use), MLU in words was thought to be a better indication of expressive language than MLU in morphemes. This was also a more appropriate measure for comparisons with the non-impaired, control children. We were interested in what the children were doing at the point at which they were just starting to use multiword speech, hence, matching at the morpheme level would have matched the children on one of the variables we were aiming to look at (i.e., verb morphology). Once the MLU in words for the samples was obtained, samples that replicated a particular MLU point were excluded from the study. The first sample that met the MLU criteria was used, leaving a total of 5–6 data points for each of the 3 children as illustrated in Table 2. The samples in Table 2 are listed in MLU order rather than in chronological order (e.g., the sample of 1.7 MLU did not come after the MLU 1.6 sample for Colin).

### Transcription

The first 10 minutes of each of the mother-child sessions were transcribed. The transcriptions contained information about verbal and nonverbal interactions, and the context in which these events occurred. This was carried out in accordance with the guidelines produced by the Codes for Human Analysis of Transcripts (CHAT), which is part of the Child Language Data Exchange system (CHILDES) (MacWhinney, 1995). The computerized transcripts were then compared with the original videotaped data by an independent transcriber in order to verify their accuracy. This process resulted in 97.0% intertranscriber reliability. Any disagreements concerning the transcription were resolved by re-examination until consensus was reached. The data from the present study are available in the CHILDES database.

The number of child utterances was noted for each MLU point for each child. We were able to include in

the analysis 80 child utterances for the sessions of MLU 1.2–1.8, and 100 child utterances for the sessions of MLU 2.0–3.8 (i.e., the analysis was based on a total of 460–520 child utterances). Transcripts from the father-child interaction sessions (carried out on the same day) were used in some cases to supplement those mother-child sessions containing too few child utterances.

### The Control Children

Gordon Wells' longitudinal database of British children was used as a normative comparison (Wells, 1981). This database is available from CHILDES and contains 299 files from 32 British children (16 girls and 16 boys) aged 1;6 to 5;0 recorded in a naturalistic setting. The original intent of that study was to provide a normative survey of British children growing up in an urban environment. The samples were recorded by tape recorders that turned on for 90-second intervals and then automatically turned off. The aim was to record spontaneously occurring conversation, and to minimize the possible distorting effects of the observation process. To this end, special equipment was constructed that allowed the children to wear a harness with a radio microphone on their top garment. Therefore, the children were able to carry on with their daily activities undisturbed. Each child was observed a total of 10 times, at 3-month intervals.

All 299 files were analyzed using the MLU program available from CLAN (MacWhinney, 1995). From these files, 75 samples of children whose MLU in words ranged from 1.2–3.8 were used. Five samples were selected for each .2 MLU interval; thus, there were five samples at MLU 1.2, 1.4, 1.6, and so forth until MLU 3.8 to match with the range of MLU data points obtained using the longitudinal data for children with SLI. Eighty child utterances were extracted for MLU 1.2–1.8 and 100 utterances for MLU 2.0–3.8 for both the SLI and the normal language samples.

Table 2. MLU levels for children with SLI's data points.

	Colin	Andrew	Mark
MLU	1.2		1.2
Levels	1.4		
	1.6		
	1.7		
			1.8
	2.0	2.0	
		2.4	
		2.5	2.5
	2.7	2.7	
			3.0
		3.2	
			3.8

### CHILDES and Data Analyses

CHILDES and the relevant CLAN programs were used for the data analyses. In addition to the MLU program, the *FREQ*, *KWAL*, and *CHIP* programs were also used. The *FREQ* program was used to compute a frequency count of the codes inserted in the coding line of the analyzed transcripts, and also for specific word counts. The *KWAL* program was used to extract key words or codes and their context (i.e., an *x*-number of previous and following codes and their transcript lines). Thus, *KWAL* was used to look at particular uses of a particular word in the input language. The *CHIP* program was used to analyze specified pairs of utterances and was particularly useful for exploring parental input and degree of imitativity in children.

## Results

### Graphical Analysis

The control children were used in this study as a "norm" or "guide" of expected behavior at a particular MLU level. The control children's data were processed using the mean, and plus or minus one standard deviation for each of the measures being examined. This range of normal behavior is represented in the graphs below as a shaded area; the shaded area appears continuous, but it actually represents data from .2 MLU increments. The data for the children with SLI are presented as bars that show whether or not their behavior falls within the shaded "normal" area.

A range of measures will be presented in order to provide as complete a picture as possible of the overall characteristics of the early multiword productions of the children with SLI.

## General Measures

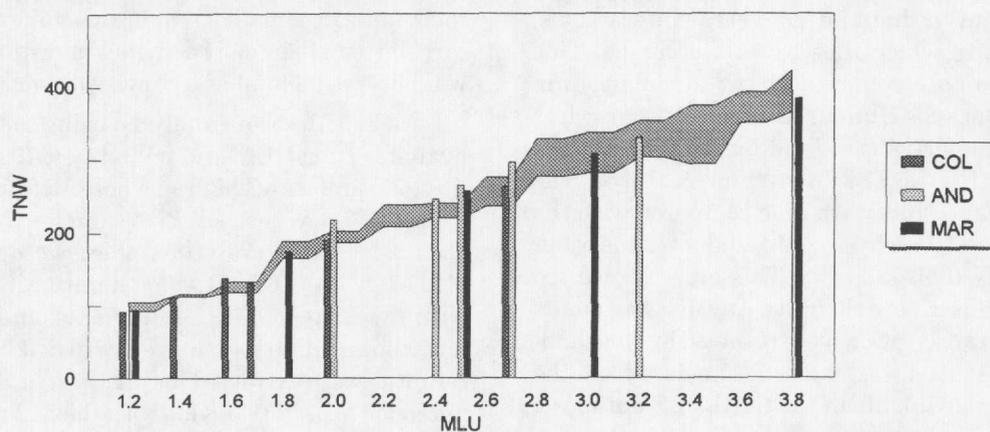
### General Lexical Analysis

Figures 1 and 2 present the results for the children's total number of words (TNW) and total number of different words (TDW), a measure of lexical diversity. As can be seen from Figure 1, children with SLI appear to fall within the normal range in their total number of words used per sample since all the bars fall within or surpass the shaded area. This is not surprising as the children were matched for MLU in words, and the samples examined contained the same number of utterances. The total number of different words index shown in Figure 2 suggests that 12 of the data points fall within or above the shaded area, and four data points fall below the shaded area.

### Verb Use: General Lexical Analysis

Figures 3 and 4 show the data for the total number

**Figure 1.** Total number of words. *Note.* The figure represents the range of expected normal language behavior with the shaded area. Individual data for the children with SLI are presented in bars for Colin (COL), Andrew (AND), and Mark (MAR).



**Figure 2.** Total number of different words. (See note to Figure 1.)

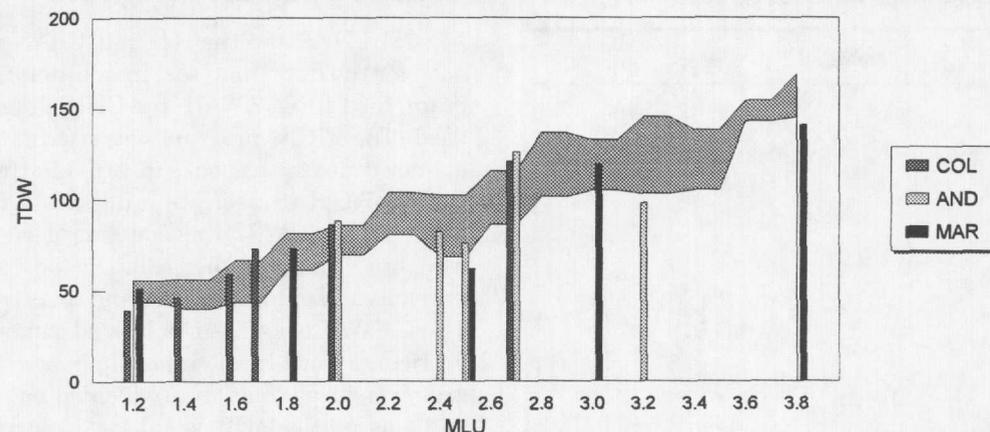


Figure 3. Total number of verbs. (See note to Figure 1.)

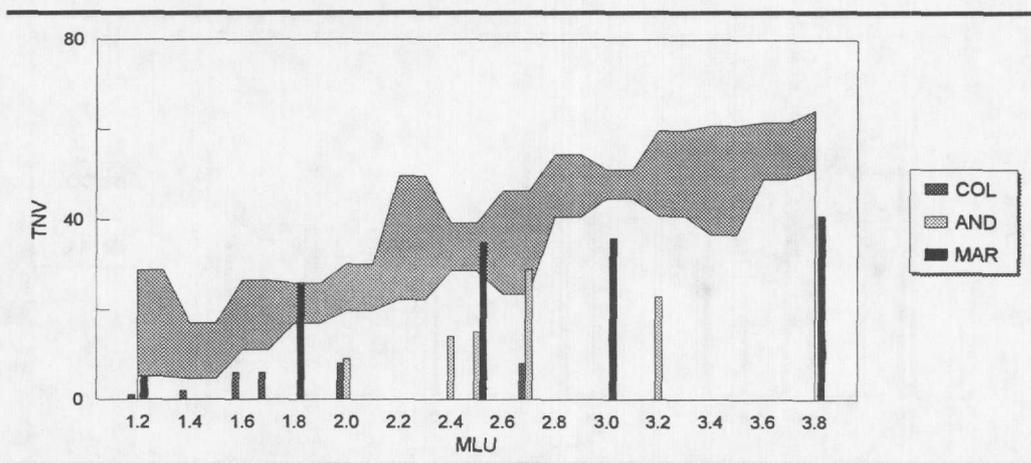
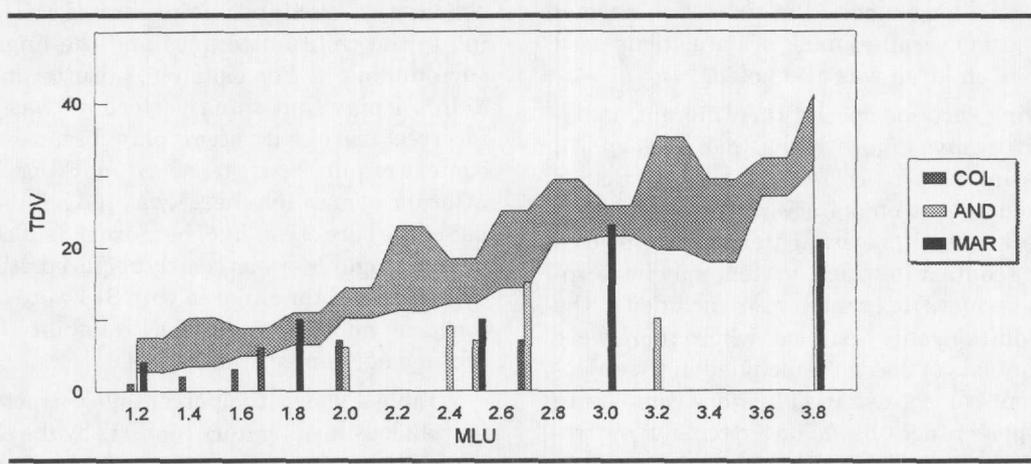


Figure 4. Total number of different verbs (TDV) by MLU for three groups: COL, AND, and MAR. The graph shows TDV on the y-axis (0 to 40) and MLU on the x-axis (1.2 to 3.8). The shaded area represents the total TDV, which increases from approximately 10 at MLU 1.2 to about 35 at MLU 3.8. Individual bars for each group show that MAR consistently has the highest TDV, followed by COL, and then AND.



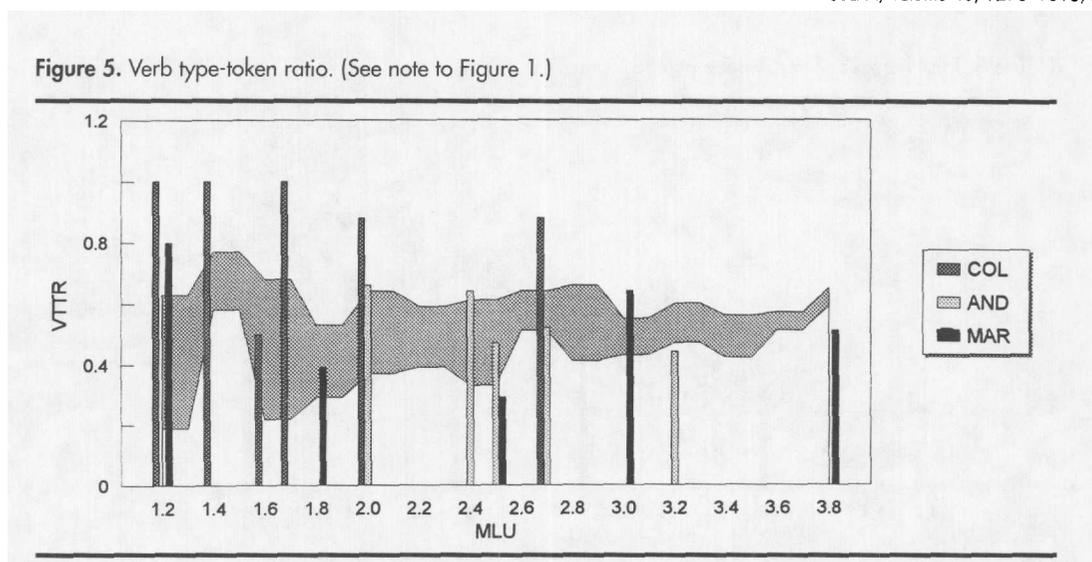
of lexical verbs used (TNV) and for the total number of different lexical verbs used (TDV) by the children in the study. This analysis did not include auxiliaries or copulas. These were investigated in a separate analysis below. Although copulas function as main verbs in many theories of grammar, there are a number of theories that treat the function of the copula separately (see, for example, Dixon, 1991). The data suggest that the children with SLI use fewer verbs and fewer different verbs than control children.

Other studies investigating children with SLI's use of verbs have employed verbal type-token ratios (TTRs) as an indication of lexical diversity and semantic skills with verbs. Type-token ratios are calculated by dividing the total number of different words (or, in this case, verbs), into the total number of different words (verbs). Thus, for the purposes of comparison and discussion, the verb TTRs for the children in this study were calculated. Figure 5 shows that about half of the data points for the children with SLI fall within the normal range or above 1SD in relation to the control group.

### Specific Measures

#### Verb Use: Morphosyntactic Analysis

To gain a more complete picture of the children's morphological knowledge of verbs, it was necessary to include auxiliaries and copulas in the following analysis. All utterances involving verbs (including auxiliaries and copulas) were extracted from the data of the children with SLI. Due to the small number of utterances containing verbs in the speech of children with SLI the data were pulled together into three MLU groups: MLU 1.2–2.0, MLU 2.2–3.0, and MLU 3.2–3.8. Consequently, we were able to obtain 80 utterances containing verbs for the 1.2–2.0 MLU group, 192 utterances containing verbs for the 2.2–3.0 MLU group, and 96 utterances containing verbs for the 3.2–3.8 MLU group. For comparison, the same number of utterances involving verbs were extracted from the control children's transcripts; the first x-number of utterances involving verbs were taken from any child or children in the particular MLU group in question. Thus, all analyses included verbal utterances only. Several studies (e.g., Rice et al., 1995)



have suggested that children with SLI will omit finiteness markers for a longer period of time than normal children. Thus, the overall number of bare stems used by both groups of children was also noted.

The following sections specify the different analyses carried out to investigate verbal morphology. All analyses assessing percent correct use of a particular item or inflection refer to obligatory contexts defined as those contexts in which a verbal item has appeared rather than any context in which an item may have appeared (i.e., no verbless utterances were included in the analyses). In addition, only instances where there were four or more contexts of use were included in the calculations of percent correct use in obligatory contexts in order to avoid percentages based on extremely low frequencies of occurrence.

### Analysis of Lexical Verbs

Each verb in an utterance was classified according to its morphosyntactic characteristics. That is, verbs were categorized as: bare stem (e.g., play); irregular past (e.g., went); past tense *-ed* (e.g., played); third person singular (e.g., plays); progressive (e.g., playing); past participle (e.g., gone). It is important not to be overly generous in categorizing words such as "broken" as past participles as children may interpret such high frequency forms as adjectives. Thus, in these analyses past participles were determined by the context of their use. Notably, it was observed that many early uses of past participles without the clarifying auxiliary were later observed to be used in correct constructions involving auxiliaries.

Table 3 shows the frequency of use of verbs, and verbal morphology used by the children in the three MLU groups. As can be seen, there are no overwhelming differences in the children's use of verbal inflections, or bare stems, at any of the MLU stages. However, the crucial question here is whether the children are using the verbal morphology correctly when producing verbal

utterances (i.e., appropriate use of verbal inflections in obligatory contexts). Appropriate use was judged according to the child's utterance and the linguistic context surrounding it. For example, an utterance such as "I didn't, I play that thing yesterday" was judged as an incorrect use of bare stem "play" because the linguistic context requires past tense *-ed* marking. Similarly, the utterance "man live here" was judged as an incorrect use of the bare stem "live" because the inflection for third person singular *-s* was clearly required. All of the verbal utterances for the children with SLI were independently coded by another researcher; reliability based on percentage agreement was 99.7%.

Table 4 shows the percentage correct use of verbal morphology in obligatory contexts by the children in the three MLU groups. The results for bare stem use show fairly clearly that children with SLI, unlike normally developing children, often use uninflected verb forms (i.e., bare stems) when inflected verb forms are required. The persistence of this pattern across the three MLU groups supports Rice et al.'s (1995) proposal that children with SLI omit finiteness markers for a longer time than normal children. As can be seen, both groups of children use the irregular past correctly, but appear to

Table 3. Frequency of use of verbs and verbal morphology.

Verb morphology	MLU 1.2-2.0		MLU 2.2-3.0		MLU 3.2-3.8	
	SLI	Control	SLI	Control	SLI	Control
Bare stem	42	53	106	107	45	49
3 person singular <i>-s</i>	2	0	1	1	0	4
Regular past <i>-ed</i>	9	0	3	2	1	2
Irregular past	6	0	10	6	6	9
Progressive <i>-ing</i>	1	7	11	19	4	6
Past participle	3	0	5	19	7	3
Infinitive "to"	0	2	1	2	1	4
Total verbs	63	71	137	156	64	77

**Table 4.** Percentage correct use of verbal morphology in obligatory contexts.

Verb morphology	MLU 1.2–2.0		MLU 2.2–3.0		MLU 3.2–3.8	
	SLI	Control	SLI	Control	SLI	Control
Bare stem	55%	96%	61%	89%	67%	98%
3 person singular -s	—	—	—	—	—	100%
Regular past -ed	100%	—	—	—	—	—
Irregular past	100%	—	100%	100%	100%	100%
Progressive -ing	—	0%	27%	26%	25%	83%
Past participle	—	56%	0%	63%	86%	—
Infinitive “to”	—	—	—	—	—	100%
Total verb frequency	63	82	58	79	69	95

have some problems with progressive *-ing* and past participle inflections.

### Analysis of Auxiliaries and Copulas

The children’s morphosyntactic skills were further analyzed by looking specifically at their use of copulas and auxiliary verbs; both the primary auxiliaries (BE, HAVE, DO), and the modals (CAN, WILL, MAY). Table 5a shows the frequency of use of auxiliary verbs by the children in the three MLU groups. At MLU 1.2–2.0, both groups of children show very restricted use of auxiliaries (children with SLI mostly “can” and “don’t,” and normal language children mostly use the primary auxiliaries). At MLU 2.2–3.0, the control children are using a wider range of auxiliaries, whereas auxiliary use by children with SLI is still largely restricted to “can” and “don’t.” However, by MLU 3.2–3.8, the children with SLI are showing more variety in their use of auxiliaries, but they are still using less than half as many auxiliary tokens as the normal

**Table 5.** Comparison of auxiliary verb use and copula use.

	MLU 1.2–2.0		MLU 2.2–3.0		MLU 3.2–3.8	
	SLI	Control	SLI	Control	SLI	Control
<b>(a) Frequency of auxiliary verb use</b>						
BE	0	2	3	8	1	7
HAVE	0	2	0	14	6	1
DO	12	6	4	13	1	7
CAN	6	1	13	11	3	20
HAVE	0	1	1	3	3	2
MIGHT	0	0	1	1	1	0
Total	18	12	22	50	15	37
<b>(b) Frequency and percentage correct use in obligatory contexts of copula verbs</b>						
Total frequency of copula	0	8	43	30	22	26
% correct use	—	100%	95%	93%	91%	100%

language children (for the same overall number of utterances). Table 5b shows that, in contrast to auxiliary verb use, copula use by the children with SLI seems to be comparable to that of the control children at the higher MLU points.

Table 6 shows the percent correct use of progressive *-ing*, past participle, and bare stems in obligatory contexts. As already mentioned, the differences in auxiliary use by the two groups of children will, undoubtedly, have had an effect on the results obtained for correct use of the progressive *-ing* and of the past participle. This is because the correct use of these inflections not only requires correct use of the inflection itself, but also of the auxiliary that goes with it (auxiliary BE forms with the progressive *-ing* such as “Mummy’s going,” and auxiliary HAVE forms with the past participle such as “it’s got number”). All the errors of the children with SLI involved using the progressive *-ing* and the past participle without the accompanying auxiliary whereas 71% of the errors for the control children were of the “missing auxiliary type.” The remaining 29% of errors by the control children involved the use of an incorrect auxiliary (e.g., “Dolly does got her dress off”). A parallel case can be made for bare stem use. There are two different ways in which a child’s use of a bare stem can be classified as incorrect: when an inflection is missing (clearly an uninflected form where an inflected form is required), and when a modal auxiliary or auxiliary “do” is missing (a correct use of the bare stem form, but an incorrect construction overall, e.g., “he go” for “he can go,” or “where car go?” for “where did the car go?”). Thus, it is difficult, from the previous analysis, to determine whether the children with SLI’s “incorrect” bare stem uses are due to the omission of an inflection, or of an auxiliary. As can be seen from Table 6, children with SLI show more incorrect uses of bare stem forms than MLU-matched normal language children. However, further qualitative analysis of bare stem uses revealed that although many of the errors by children with SLI are due to the omission of an inflection (resulting in a bare stem), 42% of “errors” are, in fact, “correct” uses of the bare stem form that are classified as incorrect because of the omission of the auxiliary.

In summary, the analyses investigating the children’s

**Table 6.** Percentage correct use of progressive *-ing*, past participles, and bare stems.

	MLU 1.2–2.0		MLU 2.2–3.0		MLU 3.2–3.8	
	SLI	Control	SLI	Control	SLI	Control
Bare stem	55%	98%	58%	89%	62%	98%
Progressive <i>-ing</i>	—	0%	27%	42%	25%	0%
Past participle	—	78%	0%	74%	86%	—

use of lexical verbs, auxiliary verbs, and copulas in early word combinations seem to suggest two particular deficits in the use of verbal morphology by children with SLI. The children with SLI used uninflected verb forms (when inflected verb forms were required) and omitted auxiliary verbs (from verbal constructions in which they are obligatory) more frequently and for a longer period of time (in terms of MLU) than the normal language children.

**Verb Use: GAP Verbs**

Children with SLI may rely more heavily on General All-Purpose (GAP) verbs than normal language children (Rice & Bode, 1993). To test this hypothesis, each lexical verb occurrence, from the verbal utterances used in the previous analysis, was classified as a GAP or non-GAP verb. The classification criteria were based on a list of GAP verbs (Kelly, in press; Rice & Bode, 1993) and focused mainly on the surface form of the verb taking into consideration semantic (general all-purpose verbs), frequency (they are high frequency verb forms), and phonological (they are usually monosyllabic) information. The

**Table 7.** Frequency of GAP verbs.

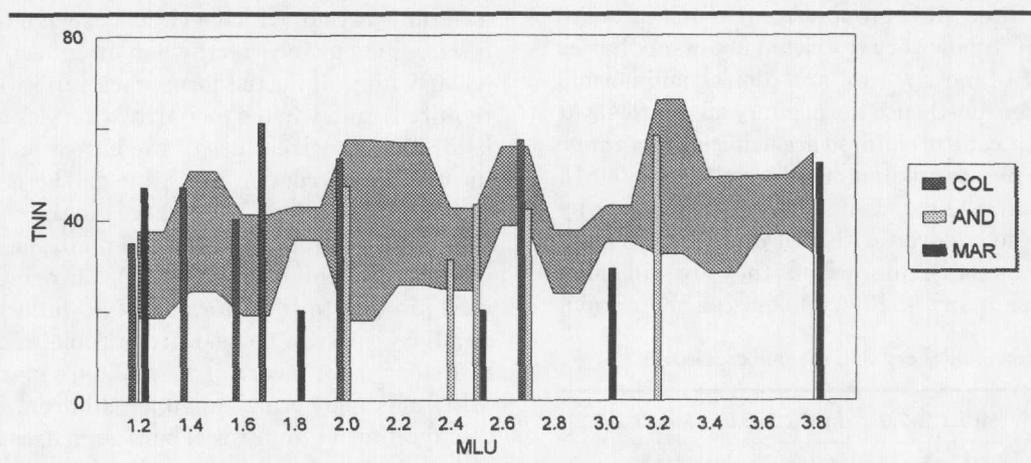
	MLU 1.2-2.0		MLU 2.2-3.0		MLU 3.2-3.8	
	SLI	Control	SLI	Control	SLI	Control
Number of GAP verbs	34	44	79	94	46	55
Total number of verbs	63	77	137	156	64	7

Appendix presents the list of the GAP verbs used by the children in this study. Children with SLI use similar numbers of GAP verbs as normal language learning children of the same language stage (see Table 7).

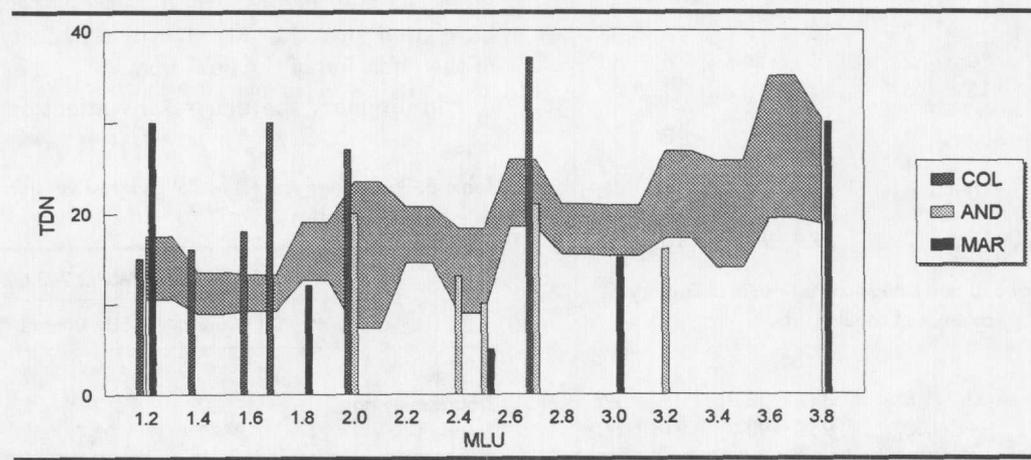
**Noun Use**

Children with SLI used fewer verbs than normal language, MLU-matched children, while producing a similar total number of words and total number of different words (see Figures 1, 2, 3, and 4). Therefore, the question that arises is: What are they using more of? The children with SLI seemed to be using more nouns in their word combinations, thus, "filling in" for the lack of verbs (see Figures 6 and 7). Some examples of noun

**Figure 6.** Total number of nouns. (See note to Figure 1.)



**Figure 7.** Total number of different nouns. (See note to Figure 1.)



use in word combinations of children with SLI included: "Colin little boy"; "Back door roof"; "Colin lady ticket"; "Lights on my camera"; "Okay dinner hay"; "Her a bone, a bone broken bone"; "Mum a farmer mum in"; "Not that the horse, where a big horse?"

### Input Measures

The differences between the sampling methods used by Wells with typically developing children (90-second chunks) and the use of consecutive utterances in the present study may affect the input measures of overlap and imitation. The large number of samples in the non-impaired group (75 samples) recorded randomly for 90-second chunks during the day makes it unlikely that there would be a systematic bias in the results. Furthermore, these data were used to derive a general range of expected normal behavior.

### Parental Input: Overlap and Child Imitation

The parent's utterance was considered the *source* and the child's utterance was considered the *response*, regardless. In addition, given the technique used for recording the language samples from the control children (90-second interval recordings), the children were talking to people other than the mother some of the time. Therefore, in order to achieve better comparability, only the portions of the control children's material that involved mother-child interaction were included in the input analyses. For the control sample this included play activities comparable to the play context used with the experimental children, routine activities such as eating and bathing, and daily household activities such as mother cleaning the house or cooking.

The percentage of child responses in which there was an overlap of at least one word with the source

parental utterance provided an index of children's potential "input dependency." The overlap measure provides an indication of the child's use of the input, focusing on the words used by the child and ascertaining if they overlap with maternal use of those words (but excluding imitations that are included in the analysis below). Figure 8 shows that children with SLI have equal or greater proportions of overlap with their parents' speech than do control children. Children with SLI appear to be more input dependent in their language use than typically developing children.

The percentage of child responses that were exact imitations of the parental source utterance was also calculated. Here the picture is not so clear; only half the time percentage imitations by the children with SLI were greater than that of the normal language control children (see Figure 9).

### Parental Input and Verb Use

The first measure was the proportion of shared lexical verbs used by each parent-child with SLI pair. For this purpose, we identified the lexical verbs used by the children with SLI in each of the sessions, and then searched for parental use of the same verbs in the same session. We found a large proportion of overlap in the verbs used by each parent-child with SLI dyad. Of the 26 different verbs used by Colin, 23 were also used by his mother (88.5%). Similarly, 40 of the 49 verbs used by Andrew were also used by his mother (81.6%). Of Mark's 69 different verbs, 45 were also used by his mother (62.5%). In light of their input dependence, we examined the possibility that the children with SLI used the input to construct their verbal utterances.

The different lexical verbs used by the children with SLI in each of the sessions were identified along with any prior parental use of the same verb in the same session. There were individual differences in the extent

Figure 8. Percentage overlap. (See note to Figure 1.)

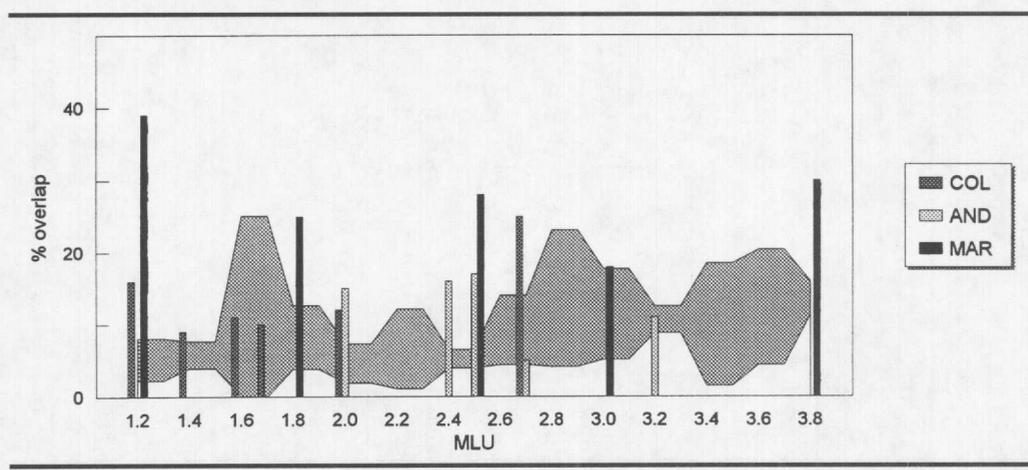
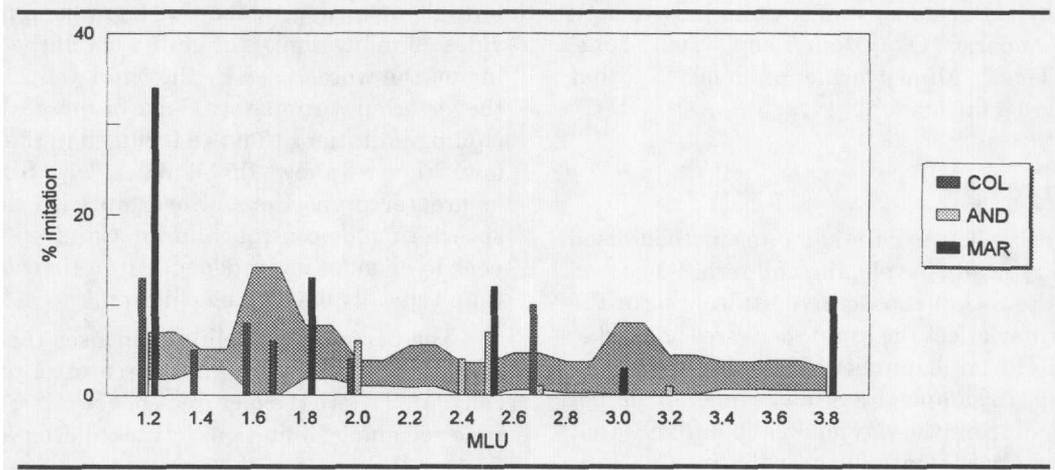


Figure 9. Percentage imitation. (See note to Figure 1.)



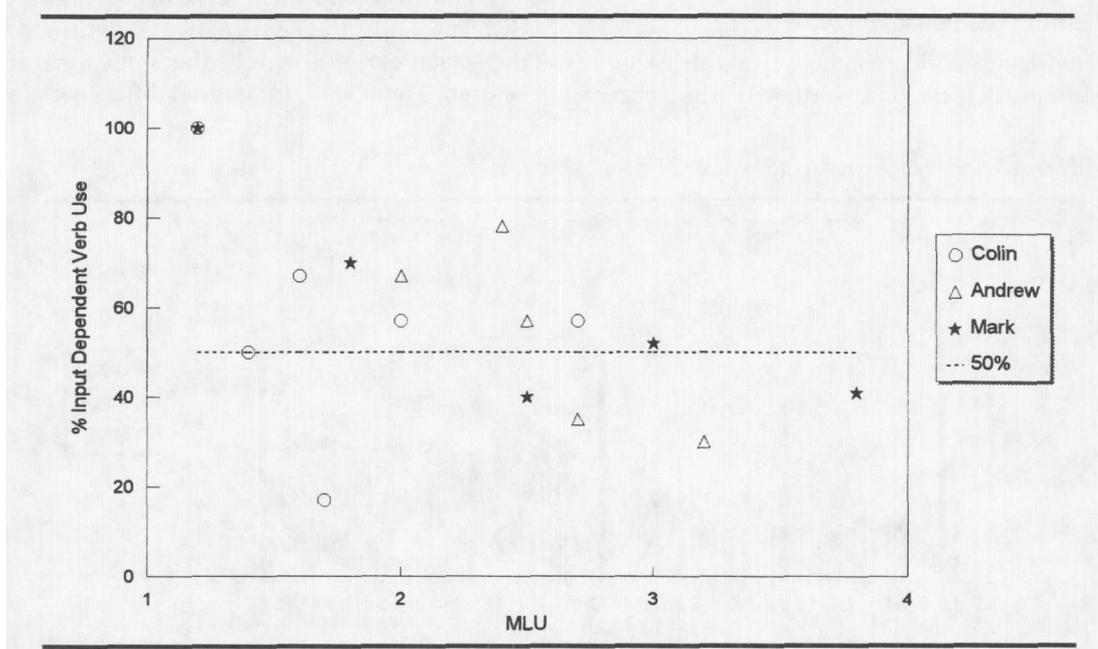
to which children with SLI may be “input dependent” in their use of verbs (see Figure 10). There does not appear to be a clear pattern of change with increased language use as measured by MLU for Colin. He appears to be input dependent in his use of verbs 50% of the time (or more) in all sessions except the session with MLU 1.7 (100%, 50%, 65%, 17%, 57%, 57% respectively). For Andrew and Mark, there appears to be a decrease in input dependency of verb use with increased expressive language, with Mark’s data presenting the clearest trend to decrease. For Andrew, the proportions of input dependent verbs used were 67%, 78%, 57%, 35%, and 30%, respectively. In the case of Mark the proportions of input dependent use were 100%, 70%, 40%, 52%, and 41%, respectively.

## Discussion

### Issues of Data Interpretation

It has been recognized, and it is well documented, that children with SLI form a highly heterogeneous group of children with differing profiles of abilities and difficulties (Bishop, 1992). It is also apparent that European and American scholars do not always use the same criteria to identify children with SLI. Most researchers in the United States apply Stark and Tallal’s (1981) exclusion criteria. There are two notable differences between the children in the present study and the American descriptions of specific language impairment. Firstly, the eventful birth histories and neurological status (i.e., anoxia) of the children in this study, and secondly, the

Figure 10. Proportion of input-dependent verb use.



general developmental history of the children (two of the children had delayed motor milestones such as sitting and walking). It is therefore important to emphasize that the present investigation is dealing with a particular subgroup of severely expressively delayed children with SLI who have accompanying receptive difficulties in vocabulary and understanding of grammar. As a consequence, our results may not be generalizable to other subgroups of children with SLI.

Furthermore, the results of the present longitudinal study should be considered both modest and preliminary in nature. We have been able to analyze 16 data points from 3 children with SLI over a 2-year period. The results obtained are thought provoking and hypothesis generating, but must be interpreted with caution.

### **Methodological Considerations: Lexical Measures Used**

The aim of the present study was to use a variety of measures in order to assess lexical diversity of children with SLI in as much detail as possible. Until recently, type-token ratios have been used extensively for the purposes of quantifying children's semantic skills. Watkins, Rice, and Moltz (1993) have suggested that type-token ratios (TTRs) are a particularly useful tool for assessing verb diversity in children with SLI. They found that children with SLI had significantly lower verb TTRs than did their age- and language-equivalent peers (.42 for the children with SLI, .50 for the language equivalent peers, and .48 for the age-equivalent peers). Nonetheless, informal analysis of the number of types and tokens composing the verb TTRs in the Watkins, Rice, and Moltz study suggested that children with SLI produced similar number of verb types but more number of verb tokens than their language-equivalent peers, and fewer verb types and verb tokens than their age-equivalent peers. In other words, it seems that TTR can mask important differences in the lexical abilities of children with SLI. A similar argument has been made recently by Watkins, Kelly, Harbers, and Hollis (1995). They found that alternative measures of lexical diversity such as Number of Different Words (NDW) and Number of Total Words (NTW) were better tools to describe the lexical strengths and weaknesses of children with SLI. Furthermore, they suggested that using NTW and NDW for specific grammatical classes may be a better option than the use of TTR. Results of the present study corroborate the suggestions made by Watkins et al. We found that verb TTRs did not accurately describe the 3 children with SLI's verb use. The TTRs obtained for the 3 children with SLI across the 16 data points were largely within or above what is expected of normal children (see Figure 5), but these results masked the

finding that children with SLI use a smaller number of verbs and a smaller number of different verbs than their normal language learning peers (Figures 3 and 4). One possible conclusion is that TTR is particularly unreliable when small numbers of items (i.e., verbs) are involved. Furthermore, Bates, Bretherton, and Snyder (1988) have suggested that TTR is most useful after normal children have achieved productive control over grammar, which again suggests the need to be cautious about using this index with young children who are just beginning to put words together. Thus, it seems that a certain level of productive use and a minimum number of observations of the linguistic category/construction under investigation may be needed in order for TTR to provide a useful measure of lexical diversity. Moreover, the lack of sensitivity of TTR to different patterns of lexical diversity, as discussed by Watkins et al. (1995), leads us to suggest that verb TTR is not well suited to the description of lexical diversity in children with SLI, and that the use of NTW and NDW for specific classes of words (such as verbs) may not only provide a better descriptive index, but may allow us to identify actual lexical differences in children with SLI and their normal language learning peers.

In the present study we found that the overall measures of number of total words (NTW) and number of different words (NDW) served well to describe the overall lexical skills of the children with SLI. We found that the 3 children with SLI had similar NTW as the normal MLU peers. In the case of NDW, approximately half of the data points for the children with SLI fell within one standard deviation below the mean for the normal children, though three points fell below that range. Children with SLI may have less diverse lexicons, but this problem is not always consistent when we compare them with MLU peers across time. This explanation is consistent with the work of Watkins et al. (1995) who found differences between children with SLI and their age peers in NDW, but no differences in the NDW when comparisons were made with MLU peers.

### **Verb Use and Children With SLI**

The 3 children with SLI used fewer verb tokens and fewer verb types than their MLU control peers across the 2-year observation period. This finding lends weight to recent literature focusing on verb use in children with SLI. For example, Fletcher and Peters (1984) also found that children with SLI used fewer verb types than their age-matched peers. Similarly, Watkins, Rice, and Moltz (1993) found that children with SLI had less diverse verb lexicons than their age peers and their language peers. However, as already mentioned, it should be noted that Watkins et al. (1993) used type-token ratios as their measure of lexical diversity, which may, in fact, miss

important differences between the groups being compared. The central point of issue here is that the children with SLI in this study had both fewer verb tokens and fewer verb types and, thus, they had *both* smaller verb lexicons *and* less diverse verb lexicons. Furthermore, these verb findings occurred within the context of greater use of nouns by the children with SLI than the normal-language children.

Why do verbs present a particular challenge for children with SLI? Large studies of vocabulary composition in normal language learning children, such as those carried out by Bates and her colleagues (Bates et al., 1994; Caselli et al., 1995), have made it clear that nouns are learned before verbs, at least for English- and Italian-speaking children. There are several theoretical and empirical arguments in favor of the proposed noun-verb sequence in language learning (but see Gopnik & Choi [1990, 1995] and Tardiff [in press] for possible counter-arguments when working with Korean and Mandarin). For example, Gentner (1982) argues in favor of the Natural Partitioning Hypothesis that suggests that a perceptual-conceptual distinction accounts for the noun-verb sequence of acquisition. Nouns are easier to learn because they refer to object-reference concepts (e.g., persons, things) that more consistently map onto the perceptual-conceptual structure of the world. Conversely, verbs refer to relational concepts (e.g., activities, changes of state, instruments, causal relations) that show more variability in how they map onto the world (what Tomasello [1992] calls the "packaging" problem).

In addition, a number of researchers have suggested that the nature of actions and changes of state within events may make the acquisition of verbs a more complicated matter than the acquisition of nouns (Huttenlocher, Smiley, & Charney, 1983; Merriman & Tomasello, 1995; Tomasello, 1992). Verbs often represent events that have a limited temporal availability; thus, many actions can only be observed for a brief period and so understanding such actions requires processes other than direct perception (e.g., memory, reasoning). Furthermore, many actions can be carried out either by oneself or by another person; feedback from participation in an action (one's intentions, kinaesthetic cues) can be very different from feedback from observing the same action being carried out by somebody else.

These various explanations are not mutually exclusive, and two in particular provide us with some insight into why children with SLI may be having particular problems learning verbs. Firstly, it has now been established that, although children with SLI usually have nonverbal abilities within the normal range in overall tests of intelligence, they have subtle but significant cognitive problems across visual, auditory, and tactile stimuli, and across many domains of knowledge (see

Johnston, 1991, for a review). Thus, it may be that verbs simply present a greater cognitive load for children with SLI. The second point is that using verbs may require more extensive use of processes such as memory and reasoning that have also been found to be problematic for children with SLI (see Bishop, 1992, for a review). However, these explanations, although interesting, are rather global and speculative at present. What is clear is that research focusing on understanding how children with SLI learn verbs is certainly warranted.

As previously mentioned, Rice and her colleagues (Rice & Bode, 1993) have argued that children with SLI overuse a small set of high frequency, general all-purpose (GAP) verbs (verbs such as *do*, *go*, *get*, *put*, *want*). However, analyses of the children's production of GAP verbs in the present study revealed that the proportion of GAP verbs in the spontaneous speech of the 3 children with SLI was similar to that of the MLU control children. These results therefore call into question the suggestion put forth by Rice and Bode (1993) that children with SLI may be atypical or unusual in their preference for GAP verb production. Our results are in accordance with the findings of Watkins et al. (1993) who found no significant differences between groups on the proportion of GAP verbs used by children with SLI and their age and language peers, and those of Kelly (in press) who found that normal language-learning preschoolers rely more heavily on GAP verbs than children with SLI in an online elicitation task.

Besides the late onset of first words and word combinations, a hallmark characteristic of children with SLI is their pronounced difficulties with grammatical morphology in the preschool and early school years (Johnston, 1988; Leonard, 1989), although most of the evidence for this characterization has come from cross-sectional studies of these children. Thus, the present investigation is a much-needed longitudinal study examining early grammatical morphology in children with SLI who have both expressive and receptive language difficulties. The results are consistent with cross-sectional findings of more inconsistent use of grammatical morphemes in obligatory contexts by children with SLI. We found that children with SLI used verb bare stems incorrectly more often than their MLU-matched counterparts. However, further analyses showed that high frequency of incorrect verb bare stems may be at least partly due to the fact that children with SLI have particular difficulties using auxiliaries (see Rice, Wexler, & Cleave, 1995, for a similar finding and a formalist explanation of SLI). Early in their use of expressive language, the children with SLI used more auxiliary tokens than their MLU-matched counterparts (MLU 1.2-2.0); however, the data support the idea that the children with SLI may be using rote-learned or frozen phrases (e.g., "don't know," "I can't"). The children with

SLI in this study were much older than the MLU control children and could therefore have had many more opportunities to learn the aforementioned phrases as conversational responses for maintaining an interaction. At later MLUs, children with SLI fall considerably behind in overall auxiliary use.

We would like to suggest, along with Marchman and Bates (1994) in their work with typically developing children, that the problems that children with SLI have with developing the verb lexicon and system may affect their general morphological development. Marchman and Bates have suggested that morphosyntactic development is predicted by lexical level, most noticeably once the number of items in a child's vocabulary reaches a "critical mass." More specifically, they showed that the critical mass hypothesis was most powerful when applied to verbs, since verb vocabulary size was the strongest and most consistent predictor of morphological development (e.g., in productive use of past tense morphology). On the one hand, the children with SLI in this study had small verb lexicons, and therefore may not have had enough raw material to reach a "critical mass" that allowed for the relevant generalizations to be made. On the other hand, children with SLI may require a *higher* number of exemplars (i.e., larger vocabularies) in order to reach a "critical verbal mass" than do normal language learners. We refer to the latter explanation as the "SLI critical mass" hypothesis. Future research should examine both possible explanations.

### **Parental Input and Verb Use**

Although the measures used in this study to address the question of the possible "input dependency" of children with SLI were broad in scope, there appeared to be greater "input dependency" in children with SLI's production of expressive language. The data on children with SLI's use of verbs and the relationship to the input were not comparative in nature but descriptive; therefore, we are not able to conclude that children with SLI are more dependent on the input in their use of verbs than normal children of the same language stage, but this too is an interesting question for future research involving a larger dataset of verbs than was available in this study. Nonetheless, it is likely that the observed overlap in the use of verbs by the mother-child with SLI dyads was at least partly responsible for our finding that children with SLI are more "input dependent" in their use of expressive language.

How should this finding be interpreted? If we take a capacity limitation view of children with SLI (Johnston, 1994) it may be the case that, given the demands of conversational interaction, children with SLI find it easier to anchor their talk on "words" provided by the input language. It could then be argued that children with

SLI are using parental input to bootstrap themselves into conversational interaction. In fact, this may be a particularly important mechanism for children with SLI who are at the early stages of verbal multiword speech. However, it is important to note that the 3 children in this study were all receiving regular (and in two cases) intensive speech-language treatment and might therefore be more sensitive to the input anyway. Although we did not examine their intervention, it is well known that therapeutic input to children with SLI often includes delayed imitation, and crucially involves drawing the child's attention to the input language. Thus, our children with SLI may have simply been "trained" to repeat more. On the other hand, a more positive interpretation may be that child utterances that contain a word used in the prior adult utterances may be examples of topic continuations (as opposed to topic changes). This possibility needs to be explored further in a more in-depth conversational analysis of overlap.

Moreover, if we take into consideration recent work on parental input to children with SLI, especially the work with recasts (Conti-Ramsden, 1990; Conti-Ramsden, Hutcheson, & Grove, 1995; Nelson, Welsh, Camarata, Butkovsky, & Camarata, 1995), we find a rather bleak picture. In these studies, it was established not only that children with SLI receive fewer simple and complex recasts at different stages of development, but when the parents chose to recast they often provided new noun-phrase information for their children, but much less frequently provided new verb-phrase information. Conti-Ramsden et al. (1995) suggested that the fact that children with SLI may have difficulties learning and using verbs in conversation could provide some explanation for this. The problem then may be exacerbated by "input dependency." Children with SLI have difficulties learning verbs and verb-related phenomena, and therefore they use fewer verbs in their spontaneous speech. This, in turn, affects the frequency with which parents recast new verb-phrase information for their children, which, in turn, provides fewer examples or opportunities from the input for children to bootstrap themselves to use verbs in conversation. Although this scenario is highly speculative at present, there is obviously a need for future studies on the verb development of children with SLI in relation to the input so a better understanding of the language development and difficulties of children with SLI can be achieved.

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### Appendix. GAP verbs used by the children in the study.

COME, comes, coming	MAKE
DO, done, doing, doed	OPEN
GET, getting	PLAY, playing
GIVE	PUT, putting
GO, going, gone, goes	SEE
GOT	SAW
HAVE, had, having	TAKE
KNOW	WANT, wanted, wants
LOOK, looked, looks	

Rice and Bode (1993) and Kelly (in press) also include BRING, WENT, CHANGE, MOVE, LEAVE, and NEED but there were no instances of these verbs in our sample.