Morphological Analysis and the Acquisition of Morphology and Syntax in Specifically-Language-Impaired Children

Karen M. Smith-Lock†

In order to find out whether specifically-language impaired (SLI) children show a deficit in the acquisition of inflectional morphology but not syntax, SLI children (mean age 6;2) were compared with language-matched (mean age 4;9) and age-matched controls on their production of passives. Passives were elicited from all groups, with no syntactic errors. Morphological errors were frequent and involved overgeneralization. Morphological skills were further investigated with a series of morphological analysis tasks. The SLI children performed significantly worse than their age-matched peers and were indistinguishable from their language-matched peers. It is concluded that SLI children show proficiency in syntax and deficits in morphology and that morphological analysis skills develop hand in hand with oral language.

The language of specifically-language impaired (SLI) children has been the issue of much recent debate. The debate has focussed on which components of language structure and/or processes are impaired, and in what manner (Clahsen, 1989; Gopnik & Crago, 1991; Guilfoyle, Allen & Moss, 1991; Leonard, 1989; Leonard, Bortolini, Caselli, McGregor, & Sabbadini, 1992; Leonard, Sabbadini, Volterra, & Leonard, 1988; Rice & Oetting, 1991). These questions are of interest, not only with respect to clinical issues of identification and remediation of SLI, but also with respect to furthering our understanding of language acquisition in general. The goals of this paper are to examine the relative strengths and weaknesses of SLI children in the domains of syntax and morphology, to explore a possible account of their deficits and to consider the implications for normal language acquisition.

"Specifically language-impaired" (SLI) children, have linguistic deficits in spite of normal non-verbal intelligence, adequate environmental stimulation, normal hearing and lack of identifiable neurological deficits. Specific language impairment is generally diagnosed by comparing a child's level of oral language development to linguistic norms for children her age, as well as to the child's own development in other areas. If a child's linguistic development is not what would be expected for her age, (i.e., if the child's performance falls more than one standard deviation below the mean on standardized tests (McCauley & Swisher, 1984)) and if other areas of development are proceeding normally, a diagnosis of SLI is given.

SLI children typically begin to talk later than normal children and have a low mean length of utterance (MLU) for their age. SLI children acquire grammatical morphemes in the same order as normal children (Johnston & Schery, 1976). However, they typically omit grammatical morphemes at a higher level of language
development (measured in MLU) than do normal children (Johnston & Schery, 1976; Steckol & Leonard, 1979). In spite of this, SLI children do appear to use such morphemes at the early language levels (Johnston & Schery, 1976). Thus, for SLI children, there appears to be a greater delay in the time from first appearance of a morpheme to consistent use of the morpheme.

The fact that SLI children begin to use inflectional morphemes consistently at a higher MLU than normal children suggests that some components of their grammar develop at a more normal rate than others. MLU is not a detailed enough measure to indicate which components are developing ahead of others. Nevertheless, if inflectional morphology is not being used consistently, it may be that the development of more lengthy and complex syntactic structures is responsible for the increase in MLU. This might indicate that SLI children have difficulty with inflectional morphology, but not syntax.

There is some preliminary evidence that syntax is a relative strength for SLI children (Clahsen, 1989; Smith, 1992). Clahsen (1989) proposed that German-speaking SLI children's syntax was intact and that apparent difficulties with syntax could be attributed to morphological deficits. In English, Smith (1992) elicited complex wh-questions (e.g., What do you think is under the box? Who do you think ate the french fries? How do you think the lady caught the bug?) from normal children (aged 2;10 to 4;6) and SLI children (aged 3;1 to 5;10). She found that SLI children were able to produce long distance wh-questions at the same age as normal children, as young as 3 years 1 month. Unlike the normal children, some of the SLI children who produced these questions had not yet fully mastered verbal inflections, auxiliary and copula verbs, and do-support, suggesting that their syntactic knowledge was more advanced than their morphological knowledge.

There appear to be (at least) two different phenomena to account for in SLI: the overall delay in language development (and thus, a delay in the first use of inflectional morphemes) and the protracted period of time between first use and consistent use of a particular inflection. The first implies a delay in the acquisition of grammatical competence, the second, a further delay in grammatical performance.

Possible Explanations of SLI

In attempting to explain SLI, several researchers have suggested that SLI children suffer a deficit in their innate linguistic knowledge (Clahsen, 1989; Gopnik, 1990a; Gopnik, 1990b; Gopnik & Crago, 1991; Guilfoyle, Allen, & Moss, 1991; Rice & Oetting, 1991).

Gopnik (1990a, 1990b) and Gopnik and Crago (1991) argued that the grammars of SLI individuals lack features such as aspect, number, gender and the mass/count distinction. In normal speakers, these features, with their phonological representations, are stored separately in the lexicon and added to words when appropriate. Gopnik argues that SLI individuals have no such features, and thus, must store both cat and cats, with no labelling of the -s as a plural marker. She argues that they learn morphologically complex items as unanalysed wholes on an item-by-item basis.

This view predicts that SLI children should not overgeneralize regular endings to irregular forms as normal children do (e.g., mans for men, drived for drove) since such a generalisation requires the knowledge of a number or tense feature and the productive application of a rule to new words. Furthermore, SLI children should not be able to comprehend inflections on nonsense words, since they would be unable to recognize the inflectional morpheme representing the feature plural and use a general morphological rule to comprehend the word. Gopnik's proposal implies that SLI children and adults have a deviant grammar due to a deficit in their innate linguistic endowment; they lack morphological features.

An alternative view, proposed by Leonard (1989) and Leonard, Sabbadini, Volterra & Leonard (1988), is that a deficit in the SLI children's perception of the speech signal causes the linguistic input to be filtered or distorted. They found that Italian SLI children showed better ability with several inflectional morphemes than comparable English SLI children and claim that this difference is due to the fact that, in Italian but not English, the inflections are stressed, syllabic, and end in a vowel. Thus, they propose that SLI children have difficulty in perceiving “low phonetic-substance morphemes” (the “surface account”). Low phonetic substance morphemes are “nonsyllabic consonant segments and unstressed syllables, characterized by shorter duration than adjacent morphemes, and, often, lower fundamental frequency and amplitude,” such as the tense markers /s/ and /d/ in English. Leonard (1989) and Leonard et al. (1988) propose that this perceptual deficit, combined with the difficulty of building grammatical paradigms (such as those necessary for tense marking), results in the delayed acquisition of grammatical morphemes in English SLI children. The “surface account” offers
an account of cross-linguistic data as well as an explanation of SLI children's difficulty with a variety of unstressed grammatical markers.

A perceptual deficit must necessarily affect the perception of non-morphophonemic low-phonetic substance elements as well. Leonard proposes that this can account for production difficulties such as final consonant deletion and weak syllable deletion which appear to occur more frequently in the speech of SLI children than in normal children matched for articulation ability (Ingram, 1981). A perceptual deficit account, however, must be able to explain how SLI children are nevertheless capable of speech perception in general, since much of the speech signal is unstressed and non-syllabic.

The surface account predicts that SLI children will have difficulty with the acquisition of passive structures. Pinker (1984) proposes that children acquire these structures by using grammatical markers (i.e., by) as structural cues. If such grammatical markers are low-phonetic substance morphemes, Leonard points out, the acquisition of the passive will be problematic for SLI children as they will be unable to correctly parse the structure. Although there is some evidence that passives are difficult for SLI children (Menyuk & Looney, 1972), such a finding is not consistent with the observations made above that syntax is a relative strength for SLI children.

**Linguistic Analysis Hypothesis**

The purpose of this paper is to explore another possible account of the acquisition profile of SLI children, specifically, the Linguistic Analysis Hypothesis. This suggests that SLI children receive adequate linguistic input and have an intact grammatical mechanism but have difficulty analysing the input so that it is available to the grammatical mechanisms. According to this view, the difficulty with inflectional morphology could be due to difficulty analysing morphological structure.

A deficit in linguistic analysis, specifically morphological analysis, could lead to two apparently different difficulties, both of which occur in the SLI population: delayed "first use" (competence) and delayed consistent use (performance) of an inflectional morpheme. In order to learn an inflectional system, the child must first analyse words into morphemes. Once the child has analysed the morphological elements and has learned the relevant grammatical system, she has attained competence with that particular grammatical structure. Without adequate morphological analysis skills, the attainment of competence could be delayed. Grammatical competence, however, does not lead immediately (if ever) to perfection in performance. In order to produce the morpheme in question correctly 100% of the time, the child must monitor her output, note when she has made an error, and correct the error (see Bowey, 1988; Clark, 1978; Marshall & Morton, 1978 for examples of young children's spontaneous repairs and arguments that such repairs involve linguistic awareness/analysis). This is the second role of linguistic analysis. A deficit in morphological analysis would make the attainment of consistently correct morphological performance more difficult.

These two roles of linguistic analysis both require the analysis of words into morphemes; first, as an automatic process of language acquisition, then as an on-line means of comparing productions to the internal grammar to check for accuracy. These skills can be considered primary linguistic activities, in the sense of Mattingly (1972). Such skills gradually become available to conscious introspection, providing the child with more and more explicit insights into grammatical structure. These same skills that allow the child to analyse linguistic input and monitor her own production can be applied to the speech of others, leading to more overt, more meta-linguistic analysis. Such overt analysis abilities develop into the skills necessary to do tasks less directly related to primary linguistic activities which can then be applied to secondary activities such as reading and writing and, arguably, experimental tasks. The application of linguistic analysis skills to secondary tasks might be fostered by exposure to and instruction in such tasks, as in, for example, reading and writing instruction.

Why might a child have difficulty in morphological analysis? Morphological systems are clearly specific to particular languages. While some linguistic properties might indicate generally what type of morphological system exists in a language, the actual items must be learned by the child. It is difficult to imagine linguistic universals that would guide language-specific morphological analysis; no general linguistic principle will tell a child to look for final /s/ in English as a morphological marker. In contrast, it has been proposed that innate universal principles do guide the acquisition of syntax (Chomsky, 1981). Morphological analysis of linguistic input might thus be more difficult than syntactic analysis guided by the principles and
parameters of a Universal Grammar (such as outlined by Chomsky, 1981, for example). Thus, SLI children with linguistic analysis difficulties might be expected to have difficulty with the acquisition of idiosyncratic language-specific information, information that is stored in the lexicon.

Thus, it is hypothesized, first, that SLI children have more difficulty in the acquisition of language-specific information than with the acquisition of structures subject to universal linguistic principles; and second, that the difficulty with language specific structures is due to a deficit in linguistic analysis skills. If this is true, then SLI children should demonstrate normal facility in the acquisition of a structure subject to universal principles but demonstrate deficits in tasks requiring analysis of morphological structure.

**Question 1: Development of Universal and Language-Specific Structures**

In order to address question (1) and explore more fully the possible difference between the acquisition of structures involving innate universal principles (e.g., syntax) and the acquisition of more language-specific properties (e.g., morphology), an investigation of the acquisition of a grammatical structure with both complex syntax and complex morphology would be helpful. The passive structure in English meets this requirement.

In the principles and parameters framework (Chomsky, 1981), the syntax of the passive requires knowledge of the universal principles of case theory, theta-theory and the formation of argument chains (A-chains) (see Baker, Johnston, & Roberts, 1989; Borer & Wexler, 1987 for detailed analyses). It will be assumed here that the subject noun phrase originates in object position, where it receives a theta-role, which identifies which grammatical relation it plays in the sentence. The noun phrase also needs case, but cannot receive it in object position (because of the presence of the passive morphology, which is said to absorb case). As a result, it must move to subject position where it can receive case, thereby forming a passive sentence. Thus, in order to produce a passive sentence, the child must know the requirements of case assignment, theta-role assignment and be able to move noun phrases from one argument position to another (argument- or A-movement).

Passives can be formed with *get* as well as *be*. While it has been argued that *get* passives have a different syntactic structure than *be* passives, *get* passives still require the knowledge of theta-theory, case theory and A-chains (Fox & Grodzinsky, 1992; Haegeman, 1985; Hoshi, 1991; Lasnik & Fiengo, 1974) and as such, are of interest in this study.

Passive constructions can be either verbal or adjectival in nature. It is the verbal, not the adjectival form of the passive which is of interest in this study, since only the verbal passive requires the syntactic operation of A-movement (Borer & Wexler, 1987; Wasow 1977). The presence of a by-phrase is one indicator of a verbal rather than an adjectival passive. However, verbal passives may have, but do not have to have, a by-phrase.

The morphological complexity of the passive involves the multiple forms of the passive inflection (*ed* or *en*) and possible vowel changes in the stem (e.g., *bite-bitten*).

There has been some debate as to young children's ability to produce passives. Truncated passives (i.e., passives without by-phrases) have been noted to occur more frequently than full passives (i.e., those with by-phrases) in the elicited and spontaneous speech of young children (Baldie, 1976, Horgan, 1977), leading some to claim that full verbal passives are not produced by young children (Borer & Wexler, 1987). However, other researchers report full passives produced by 3 to 5 year-olds in elicited production tasks (Crain, Thornton and Murasugi (1987) and Crain and Fodor (1993)).

The exploration of the passive in SLI children has also indicated difficulty with the structure. The literature reveals few examples of passives in the speech of SLI children. Leonard (1989) suggests that this is not due to the low frequency of occurrence of passives, given that they do appear in the speech of normal children at an early age (Pinker, Lebeaux, & Frost, 1987). Menyuk and Looney (1972) found that SLI children performed more poorly on the repetition of passive sentences than a group of normal children matched on receptive vocabulary and tended to omit grammatical morphemes such as *is* and *by* in their repetitions.

Given the results of the above studies, an elicited production paradigm is the most appropriate technique for this study. It is most practical to study the child's expression rather than comprehension, since it would be difficult to differentiate between the comprehension of the passive morphology versus the passive syntax. Elicited production avoids the difficulty of the low fre-
frequency of passive constructions in spontaneous speech and allows for the collection of an adequate amount of data for analysis. Furthermore, it reduces the difficulty of distinguishing between the verbal or adjectival nature of the children's productions. In order to be confident that the children are producing true verbal passives, full passives with by-phrases should be elicited whenever possible. In the event that by-phrases are not always elicited, a carefully constructed elicitation protocol will aid in the analysis. A truncated passive can be interpreted as a verbal passive if it is produced in response to a situation in which a verbal passive and not an adjectival passive is the appropriate response. The proposal that SLI children suffer deficits only in the acquisition of language-specific information will be supported if the SLI children demonstrate proficiency with the syntax of verbal passives, implying the presence of a syntactic form of the passive inflection, while they continue to have difficulty with the morphological properties of the passive.

**Question 2: Development of Linguistic Analysis Skills**

In order to address question (2) and investigate the hypothesis that SLI children suffer from a deficit in linguistic (morphological) analysis skills a thorough investigation of morphological analysis tasks with a range of difficulty is required. Previous research has indicated that normal children develop linguistic analysis skills at a young age and that these continue to develop as the child grows older (Clark, 1978). Normal children have been shown to be able to analyse phonological and morphological structure in grammatical judgement tasks as early as 3 to 5 years of age (Smith-Lock & Rubin, 1993). SLI children have shown varying success, performing the same as language-matched peers in some studies (Rubin, Kantor, & Macnab, 1990) and differently from language-matched peers in others (Kamhi & Koenig, 1985).

Standard metalinguistic analysis tasks, such as the judgment task, require explicit understanding of linguistic form. However, tasks with less explicit analysis requirements must be developed in order to tap skills that are more closely related to the analysis required in the initial learning of inflectional systems. The linguistic analysis associated with primary language acquisition appears to occur in a very automatic fashion. Thus, tasks which allow the child to use the primary language system automatically should be the easiest. Tasks should increase in difficulty to the extent that they require explicit analysis of the primary linguistic system.

**The Normal Control Group: Language Matching**

The syntactic and morphological skills of normal and SLI children should be compared in groups matched for language abilities. While a difference in performance between SLI and age-matched peers would be of interest, indicating that linguistic analysis skills are tied to expressive language ability rather than non-linguistic cognitive development, the comparison of most interest is SLI versus normal children of the same language level. Only by comparing language-matched groups can it be determined whether the SLI children have a deficit in morphological analysis abilities over and above what would be expected on the basis of their primary language deficit. As well, language-matching will allow for the comparison of the development of various components of the grammar in children matched on one of the components.

The method of language matching is critical to the study. Matching on the basis of expressive rather than receptive language seems most appropriate, since the ability to manipulate morphological structure consciously would likely require expressive knowledge of the structure. The children should be matched on their spontaneous speech, since formal testing removes the child from the realm of spontaneous and automatic output, and therefore, might introduce linguistic analysis skills into the task. Mean length of utterance (MLU) is one possible measure of language development using spontaneous speech. However, MLU does not provide information regarding what type of structures are used, thus it is not possible to distinguish between an MLU based on grammatically simple but lengthy utterances and one based on grammatically complex utterances. Therefore, the possibility of matching children with different linguistic skills is significant. Furthermore, the correlation of MLU with grammatical development decreases in the later stages of language acquisition (Scarborough, Rescorla, Tager-Flusberg, Fowler, & Sudhalter, 1991). Thus, MLU is not the most appropriate matching technique.

Given the relatively consistent order of acquisition of grammatical morphemes noted by Brown (1973), children who have acquired a particular morpheme can be assumed to have attained the same level of grammatical (morphological) development. Thus, if only children who use the regular
past tense (-ed) consistently are included in the study, the subjects will have acquired most other
inflectional morphemes. This will establish a minimum level of development. Further, all chil-
dren go through a stage in which they overgeneral-
ize regular endings to irregular stems (as in
goed for went). This stage coincides with the use of
the regular -ed form (Marcus, Pinker, Ullman,
Holland, Rosen, & Xu, 1992). If only children
who are in the stage of overgeneralization are in-
cluded, a minimum and maximum level of gram-
matical development will be established. All sub-
jects will have acquired the regular past tense, but
they still will not have acquired the irregular past
tense forms. In this way, subjects can be matched
on expressive language without reliance on MLU
and without the confounds of linguistic analysis
abilities required by formal testing.

EXPERIMENT 1

In order to address the experimental questions
of whether SLI children show normal facility in
syntax and a deficit in morphology, and whether
their morphological deficits could be attributed
to poor morphological analysis skills, language-
matched groups of normal and specifically-
language-impaired children were compared in the
following study.

Method

Subjects. Sixteen normal and seventeen specifi-
cally language-impaired (SLI) children were in-
cluded in the study. All of the children had normal
vision and no known hearing loss, were monolin-
gual speakers of English, demonstrated non-ver-
bal intelligence within the average range on the
Block Design and Geometric Design subtests of
the Wechsler Preschool and Primary Scale of
Intelligence-Revised (WPPSI-R) (Wechsler, 1989)
and met the language and screening criteria out-
lined below. All of the children were attending
preschool or elementary school in Southern
Ontario, Canada. The SLI children had been pre-
viously identified as SLI in their elementary
schools by certified speech-language pathologists.
The SLI children ranged in age from 5;4 to 7;3,
with a mean age of 6;2. The language-matched
group ranged in age from 3;3 to 4;3, with a mean
age of 4;0.

Language screening

Ten verbs, which in the adult language have ir-
regular past tense forms, and six verbs with regu-
lar past tense forms (two verbs for each allomorph
of the past tense morpheme) were elicited from
the children in a story telling task. Stories were
acted out with the child using toys. The child was
then asked to tell the experiment what had
happened so the experimenter could write the
story down, thus eliciting the past tense. Children
who had not yet acquired the correct irregular
form of at least five out of ten of the irregular
verbs, but who did use the /d/ and /t/ allomorphs
on the regular verbs, were included in the study. The
screening stimuli can be found in Appendix A.

Articulation screening

Children were asked to repeat words containing
final /s/, /z/, /t/ and /d/ which were not inflectional
morphemes (e.g., act, collapse). All of the final
consonant clusters found in the experimental
tasks were included in this task. Real words were
used wherever possible. Because the addition of
morphemes sometimes creates consonant clusters
which would not otherwise be permitted, it was
not always possible to use real words. In such
cases, non-words were used. Only children who
could produce these consonant clusters were in-
cluded in the study. This ensured that any omis-
sions of inflectional morphemes in the experimen-
tal tasks were due to the nature of the task and
not to articulatory difficulties.

Words containing later-developing speech
sounds such as /ʃ/, /θ/ and /ʒ/ were also elicited
in order to establish the current articulatory pattern
of the child. No children were excluded on this
basis. However, the information was considered in
the scoring of the experimental tasks, so that
children would not be erroneously assumed to be
making explicit changes in sound structure when
they were actually making a developmental
articulation error.

Subject referral and selection

Normal children were selected from those chil-
dren for whom parental permission was obtained
and who fell roughly within the age range of 3;6 to
4;6. A total of 37 children were screened for the
LM group. 21 did not meet the language screening
criteria.

Referrals of SLI children were obtained by ask-
ing school speech-language pathologists to refer
children who met the following criteria: specifi-
cally language impaired, normal non-verbal skills,
monolingual English speakers, no history of hear-
ing loss, 6 - 7 years old, speech intelligible enough
for reliable data collection. These criteria were
used as a guideline only. The speech-language
pathologists were encouraged to refer anyone they
thought might be appropriate. A total of 76 SLI
children were referred. 17 of those were included
in the study. Of those who were excluded, 34 did
not meet the language screening criteria, 11 had a history of hearing loss (including fluctuating conductive loss), eight did not pass the articulation screening, four scored below average on the assessment of non-verbal performance (WPPSI-R) and one had no available non-verbal intelligence information. 85% of the children excluded on the basis of the language screening used overgeneralizations in the screening task. The remaining 15% (5 children) used the correct irregular forms, as expected for their age. Only one child who met the screening criteria on irregular verbs was dropped from the study due to inconsistent use of the regular past tense. The subjects' performance on the screening task can be seen in Appendix B.

Experimental tasks: Real word sentence completion

In this task, the child was told that the experimenter would start a story and that the child was to finish it, with just one word about the picture. For example, the child was shown a picture of a woman at a grocery store with a cart full of groceries. The experimenter stated, “This woman is shopping. Every day, she ______.” The child was expected to respond “shops.” Two training trials were provided, with feedback. No feedback was provided to experimental trials.

The stimulus sentences required the manipulation of the morphemes for regular past tense, third person singular present tense, and the present progressive tense. Each of these inflectional morphemes occurred in five stimulus sentences and five responses. For the past and present tense morphemes, the stimuli and responses contained two instances of the voiced and voiceless allomorphs and one instance of the shwa + consonant allomorph.

This task was intended to be very similar to spontaneous speech, with only a minimal reduction of automaticity, since the addition of the inflection should be fairly automatic, given the correct stem. However, the task required some morphological analysis in that it required the subject to analyze the verb into stem + inflection and to replace one inflection with another. This task could be distinguished from spontaneous speech in that the child had to complete a sentence with a particular single word and perform the appropriate morphological manipulation, thus going beyond the automatic nature of spontaneous speech.

Non-word sentence completion

This task was similar to task (1) except that nonsense words were used instead of real words (e.g., “This guy linged yesterday. Every day he ______”). The child was provided with the following instructions. “These pictures are just like the first ones. I’ll start a story and you finish it. The only difference is that these are silly pictures, with silly names you probably haven’t heard before.” No training trials were included in this task. Instead, if the child responded with a word other than the nonsense word, she was told “You use the same word I use. So if I use sput, you use sput too.” The stimulus sentence was not re-administered following the cue. The same morphemes and allomorphs were used, with the same frequency as task (1).

This task was believed to require slightly more morphological analysis than the real-word sentence completion. The child had to apply her morphological knowledge to a word she had not encountered before, further increasing the skills needed in addition to those required for spontaneous speech.

Comprehension of inflected non-words.

In this task, the children were shown a page divided into two sections. One section contained the picture of a novel item. The other section contained two of the same item. The task was introduced as follows. “I’m going to show you some funny pictures with some funny names. All you need to do is listen carefully and point to the picture I tell you to. OK?” With each new page, the experimenter said the following, changing the name of each nonsense item as appropriate. “This page has pushas on it. There are two in this part [pointing] and one in this part [pointing]. Point to the part that has the push.” The child then had to choose one of the sections of the page.

Six training trials were provided, which consisted of three nonsense items, with both the plural and singular tested. All of the training stimuli took the /az/ allomorph because it was believed that its syllable status might make it the easiest. Feedback followed the training trials but not the experimental trials. The experimental trials consisted of ten nonsense items. Each was tested in the singular and the plural form, for a total of 20 test items. All three allomorphs were tested.

This task required morphological analysis in order to analyse a non-word into morphemes and explicitly understand that the /s/ ending marked plural. It can be distinguished from spontaneous speech because the child had only morphological information on which to base her response. The words were all unknown and no contextual information was available to cue the child, unlike ordinary conversation.
Judgment and correction of morphological errors

This task involved the use of a puppet who made morphological errors in his speech. Children were asked to judge, identify and repair these errors. A semantic judgment task was used as an introduction in order to familiarize the child with judgment tasks. This task also offered a means of highlighting the distinction between semantic and morphological judgments so as to reduce the likelihood that the children would make semantic judgments in the morphological task.

In the semantic task, the child was told that Ernie was a funny puppet and that he said silly things, things that just weren't true. Examples were provided in which the puppet called the experimenter by the wrong name and the experimenter identified the error and corrected the puppet. The puppet then called the child by the wrong name and the child was invited to correct the puppet. The child and the experimenter then acted out a story, agreed on a verbal description of what had happened, then asked the puppet to comment. The puppet’s comment involved the substitution of an object noun (e.g., “Barbie ate a cookie” for “Barbie ate a pizza”), a subject noun (e.g., “The man went for a run” for “The lady went for a run”) or a verb (e.g., “The man drank the french fries” for “The man ate the french fries”) in a sentence. The same judgment, identification and repair protocol was used for the semantic and morphological tasks, and is outlined below.

In the morphological task, a different puppet, Bert, was introduced as a puppet who was not silly, unlike Ernie. It was explained that everything Bert said was true but that he said things the wrong way sometimes and that he wanted help to say things the right way. The child and the experimenter then acted out a story, agreed on a verbal description of what had happened, then asked the puppet to comment. The puppet’s comments varied for each child.

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The morphological judgment task required much more than the automaticity of spontaneous speech. It required the child to examine an utterance and consider the appropriateness of the linguistic form outside of the communicative intent. It required explicit knowledge of the grammatical constructions involved and the conditions for their use.

Child-generated errors

This task was identical to the judgment tasks outlined above, except that the child was asked to be the puppet. In the semantic task, the child was told to talk silly like Ernie. In the morphological task, she was told to say things wrong, like Bert. The experimenter then acted out a story and commented on it, providing a phrase or sentence for the child to manipulate. In the semantic task, the child was asked to manipulate the sentence The man walked home. In the morphological task, the child was asked to make errors on two plural phrases, two possessive phrases and two past tense verbs.

The errors consisted of the omission of plural, possessive or past tense morphemes. For each of these inflectional morphemes, two phrases and one full sentence were included, for a total of nine items with errors. Nine parallel constructions without errors were included. All of the stems taking inflections ended in vowels so that when they were inflected the word ended in a single consonant, the voiced allomorph ([z] or [d]). This was done in order to simplify the phonological demands of analysing consonant clusters. In addition, two verbs which the child overgeneralized in the language screening were included. These verbs varied for each child.

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This task had the highest morphological analysis demands. In the morphological task, the child had to explicitly understand the morphological structure of the word. She had to know exactly what a morpheme was and exactly how it was manipulated in the judgment task in order to be successful in this task.

**Elicitation of passive sentences**

This task was included to investigate the dissociation of the acquisition of morphology and syntax, in order to determine whether the syntactic components of the passive were acquired before the morphological components.

Passive sentences were elicited from the children using a story-telling task, similar to the elicited production technique used by Crain, Thornton, and Murasugi (1987). A story, in which two agents acted upon two patients, was acted out with toys (e.g., a dog chased a pig and a cat chased a horse). The child was asked what happened to one of the characters in the story (e.g., "what happened to the pig?", "what happened to the horse?"). The expected response was a passive structure (e.g., "the pig was chased by the dog", "the horse was chased by the cat"). Ten such stories were used, each with two different passive-eliciting questions. Passives were elicited for the following verbs: lick, bite, fly, ride, eat, take, chase, drive, chop, throw. Prompting was sometimes necessary to elicit the passive. In such a case, the experimenter started the sentence with the passive subject and then stopped (e.g., "What happened to the pig? The pig... "). This strategy indicated to the child that she was to start the sentence with the passive subject and was frequently, but not always, successful in eliciting a passive construction.

**Procedures.** Each child was tested individually in a quiet room in their preschool or elementary school. They were seen for a total of three or four sessions approximately 30 to 45 minutes in length. The language screening was administered first. At each session, an attempt was made to elicit the passive. If no passive structures were elicited with the first three items, the task was discontinued, other tasks administered and the task was then attempted again at the next session. If no passives had been elicited after three sessions, no further attempts were made. The remaining tasks were administered in varying order (depending on the time available) except that the picture tasks were always administered in one session, in the order real word expression, comprehension, non-word expression. All of the tasks, with the exception of the comprehension task, were recorded on audiotape and later transcribed.

**Results**

**Sentence completion tasks**

Responses in both the sentence completion tasks were scored as correct or incorrect. In order to be considered correct, the response had to contain both the correct verb and the correct inflection. Use of a different verb with the correct inflection was considered an error in this scoring system. Scoring the data by crediting all correct inflections, regardless of verb, improved scores in both groups, but the relationship between the groups remained the same. Therefore, the original scoring system was maintained. Incorrect responses were further classified as omission of the correct inflection, a repetition of the inflection used in the stimulus sentence, or as another incorrect inflection. In the real word task, the mean score for the SLI group was 6.48 out of 15 $(S = 3.11)$, and for the LM group, 6.69 $(S = 3.03)$. Performance on the non-word task was lower: 4.29 out of 15 $(S = 3.04)$ for the SLI group and 4.56 $(S = 3.31)$ for the LM group.

A two-way analysis of variance with one between groups factor (diagnosis: SLI and language-matched (LM)) and one repeated measure (task: real word, non-word) showed no significant difference between the groups $(F < 1)$, a significant difference between tasks $(F(1,31) = 28.49, p < .001)$ and no interaction $(F < 1)$. Thus, the SLI group performed the same as their language-matched peers. The real word sentence completion task was significantly easier than the non-word task.

The results of the error analysis can be seen in Table 1. A two-way analysis of variance with one between group factor (diagnosis: SLI, LM) and one repeated measure (task: real word, non-word) was performed for both repetition and omission errors. There was a significant difference in the number of repetition errors between the real and non-word tasks $(F(1,31) = 45.34, p < 0.001)$ but no significant group difference $(F < 1)$ and no significant interaction $(F(1,31) = 3.69, p > .05)$. With omission errors, there was no significant task effect $(F(1,31) = 0.94, p > .05)$, no significant group effect $(F(1,31) = 2.9, p > .05)$ and no significant interaction $(F(1,31) = 0.01, p > .05)$. Thus, the LM and SLI children made the same number and type of errors, with more repetition errors occurring in the non-word task than the real word task.
Table 1. Real word and non-word sentence completion. Mean number of repetition and omission errors (standard deviation in brackets).

<table>
<thead>
<tr>
<th>Repetition</th>
<th>Omission</th>
</tr>
</thead>
<tbody>
<tr>
<td>real word</td>
<td>non-word</td>
</tr>
<tr>
<td>LM group</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>(2.18)</td>
</tr>
<tr>
<td>SLI group</td>
<td>2.23</td>
</tr>
<tr>
<td></td>
<td>(2.31)</td>
</tr>
</tbody>
</table>

Comprehension of Inflected Non-Words

The comprehension task had a maximum score of 10. Since the response required a choice between two options, a score of five indicated chance performance. The LM group received a mean score of 5.69 (S = 1.58) and the SLI group, 6.29 (S = 1.9). A one-group t-test indicated that the performance of LM group did not differ significantly from chance (t(15) = 1.74, p > .05) while the performance of the SLI children did (t(16) = 2.81, p < .05). Nevertheless, a comparison of the two groups showed no significant difference in performance between the SLI and LM children (t(31) = -0.10, p > .05).

Subjective data from the test administration indicated that performance on this task was “all or none.” In other words, the children either figured it out or they guessed. Those children who figured it out generally did so during the training sessions and often spontaneously commented on their discovery of how to do the task (e.g., “I heard you say pash and that’s one pash”). When asked afterwards how they decided the right answer, some of the children who had done well explained that the examiner had told them to point to one or two (e.g., “I just heard 2-2-1-2”), while most of the unsuccessful children said they had guessed, or alternated between the top and bottom picture.

If those children who received a score of 8 or higher are considered to have understood the task, (the majority of children received a score within 2 points of the chance score (5 ± 2)), one child in the LM group (SW, 4;0) and four children in the SLI group (MQ, 5;10, kindergarten; MD, 6;8, grade 1; BE, 6;5, grade 1 and TK, 6;9, grade 1) could do the task. It is interesting to note that three of the four SLI children who could do the task were in grade one and, therefore, had had reading and writing instruction.

Judgment Task

Children received a score on the basis of the number of incorrect stimulus items identified as incorrect. The nine test items yielded a maximum score of nine for each of judgments, identifications and repairs, for each of the three trials. Scoring was cumulative, so that if a child scored correctly on trial 1 and therefore did not receive trials 2 and 3, she received credit for the correct response in the score of trials 2 and 3. Thus, a score of 7 out of 9 correct judgments on trial 3 indicates that, by trial 3, the child had made 7 correct judgments. She may have responded correctly to 2 items on trial 1 (yielding a trial 1 score of 2), 3 items on trial 2 (yielding a trial 2 score of 5) and 2 items on trial 3 (yielding a trial 3 score of 7). In order to preserve this type of information each trial was analysed separately, rather than examining only trial 3, or creating a composite score based on all 3 trials. Judgments of correct items were not included.

A correct judgment was considered a response of “wrong” to the question “Did Bert say it right or wrong?” A correct identification was considered the repetition of the entire phrase or sentence, with the error, or the repetition of the erroneous word. A correct repair was considered the repetition of the erroneous word, phrase or sentence, with the error corrected. An example of a typical response can be seen below.

stimulus: “The lady dress is white.”
judgment: wrong
identification: “The lady dress is white” or “the lady dress.”
repair: “The lady’s dress is white” or “the lady’s dress.”

The results can be seen in Table 2 and Figure 1. In order to compare the performance of the SLI and LM groups, a two-way analysis of variance was performed, with one between-groups factor (diagnosis: SLI, LM) and one repeated measure (task: judgment, identification, repair). There was no significant effect for group on any of the trials (trial 1: F < 1; trial 2: F < 1; trial 3: F < 1). There was a significant effect of task, for all three trials (trial 1: F(2,31) = 47.5, p < 0.001; trial 2: F(2,31) = 30.94, p < 0.001; trial 3: F(2,31) = 32.54, p < 0.001). There were no interactions (trial 1: F < 1; trial 2: F < 1; trial 3: F(2,62) = 1.79, p > .05). Thus, the SLI group performed in the same way as their language-matched peers.
To determine the extent of improvement over the three trials, a two-way analysis of variance was performed, with one between-groups factor (diagnosis) and one within-groups factor (trial), for judgments, identifications and repairs. There was a significant improvement over trials for judgments (F(2,31) = 63.15, p < 0.001), identifications (F(2,31) = 60.85, p < 0.001) and repairs (F(2,31) = 66.19, p < 0.001). There were no significant interactions between group and trial for judgments (F(2,62) = 1.86, p > .05) or identifications (F < 1). There was a significant interaction for repairs (F(2,62) = 4.80, p < 0.01). Thus, both the normal and the SLI groups improved over trials. For repairs, the SLI group improved more over trials than the normal group.

The children had two opportunities to judge their own overgeneralizations. Examination of their responses indicated that children almost always accepted their own production as correct. 92% of overgeneralizations were accepted by the LM group and 82% were accepted by the SLI group. No one was able to correct her own overgeneralization error.

**Child-generated errors**

A correct response to this task required the child to omit the inflectional morpheme from the stimulus item provided. For example, the correct response to “two eyes” was “two eye.” Phonological changes (“two byes”) and semantic changes (“one eye”) were considered incorrect. A child received one point for each correct response, for a possible total of 6. The SLI group received a mean score of 1.76 (S = 2.28). The LM group received a mean score of 0.69 (S = 1.35). The groups’ performance did not differ significantly (t(31) = -1.64, p > .05). This task was quite difficult for all the children. A qualitative analysis of the responses indicated that 57% of the LM and 34% of the SLI responses involved no change to the stimulus item, 24% of the LM and 22% of the SLI group’s responses were semantic changes, 6% of the LM and 14% of the SLI responses were phonological changes and 12% of the LM and 31% of the SLI responses were morphological changes. Thus, although non-significant, differences do exist, with the SLI children being more able to create morphological changes than the younger LM children. This may reflect the analytic ability gained through reading and writing instruction that the SLI, but not the LM children, have received (due to further years of schooling).

**Elicitation of Passive Sentences**

Passive constructions were elicited from the majority of the children in the study. All of the

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**Table 2. Judgment task. Mean correct (out of 9) (standard deviation in brackets).**

<table>
<thead>
<tr>
<th></th>
<th>judgment</th>
<th>identification</th>
<th>repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLI</td>
<td>LM</td>
<td>SLI</td>
</tr>
<tr>
<td>trial 1</td>
<td>5.29 (1.53)</td>
<td>5.88 (1.86)</td>
<td>2.94 (2.08)</td>
</tr>
<tr>
<td>trial 2</td>
<td>7.65 (1.41)</td>
<td>7.32 (1.62)</td>
<td>4.65 (2.74)</td>
</tr>
<tr>
<td>trial 3</td>
<td>8.12 (1.22)</td>
<td>8.19 (1.38)</td>
<td>5.41 (2.53)</td>
</tr>
</tbody>
</table>

Figure 1. Judgment task.
SLI children produced passives, with a mean of 15 per child. 59% of these children (10 out of 17) produced full passives with prepositional phrases. In the LM group, 12 out of 16 children produced passives, with a mean of 11 per child. 42% (5 out of 12) of the children produced full passives. Thus, both groups were able to productively generate syntactically correct passive structures. No syntactic errors were noted. If children failed to produce a passive sentence, they produced an active equivalent. Almost all of the passives elicited were got-passives, although some be-passives were elicited. Examples of the children's productions can be seen below.

(1) he got licked by a tiger (MK, 7;3, SLI)
(2) it got taken by the man (AG, 6;11, SLI)
(3) it got eaten by the big horse (SW, 4;1, LM)
(4) it got pushed down by the girl (MW, 4;2, LM)
(5) it's gonna be ride (JP, 4;1, LM)
(6) (the fries) was eated (JP, 4;1, LM)
(7) it got licked by the horse (AG, 6;11, SLI)
(8) it got chased by the dog (AG, 6;11, SLI)
(9) he got chopped off (AM, 3;11, LM)
(10) the two babies got licked (KM, 3;11, LM)

Prepositional errors occurred in both groups. *from* was substituted for *by* in 23 cases (28%) in the SLI group and 3 cases (9%) in the normal group. *with* was substituted for *by* in 3 cases in the SLI group.

(11) the tree got knocked over from the baby (IP, 6;0, SLI)
(12) he got eaten from Mickey (AM, 3;11, LM)
(13) he got licked with the pig (AP, 7;2, SLI)

Morphological errors were common in both groups. The errors took a variety of forms including the incorrect use of *-ed, -en*, both or neither, combined with either a present or past tense stem. The use of the present or irregular past form as the stem was not associated with whether or not the correct form contained a vowel change. Examples of the error types can be seen in Table 3. The frequency of each type of morphological response can be found in Table 4. All tokens of the passive were included in this calculation, including repeated productions. The SLI and LM groups, for the most part, used the various morphological forms with similar frequency. However, the LM children tended to use forms with the *past* stem more often than the SLI children.

### Table 3. Morphological error types in passive elicitation.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>he got chase around (JG, 5;9, SLI)</td>
<td>he got bited from the horse (MD, 6;8, SLI)</td>
<td>he got throweded and this one got throweded (JM, 6;7, SLI)</td>
<td>(he) got chasen by that (MW, 4;2, LM)</td>
<td>he got chaseden (BE, 6;5, SLI)</td>
<td>he got knocked over from the baby (!P, 6;0, SLI)</td>
<td>it got ated from the boy (HB, 5;4, SLI)</td>
<td>the ball got stoleden from the boy (KM, 6;5, SLI)</td>
<td>it got tookened from the boy (HB, 5;4, SLI)</td>
</tr>
<tr>
<td>(2)</td>
<td>it got ride by the baby (MW, 4;2, LM)</td>
<td>it got eated (SW, 4;0, LM)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got drive-en (BE, 6;5, SLI)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got chased by the girl (MW, 4;2, LM)</td>
<td>(the ball) gotted took (MK, 7;3, SLI)</td>
<td>the hotdog got atened up (IP, 6;0, SLI)</td>
<td>both of them got aten up (KH, 4;2, LM)</td>
</tr>
<tr>
<td>(3)</td>
<td>it's gonna be ride (JC, 5;4, SLI)</td>
<td>it got eated (SW, 4;0, LM)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got drive-en (BE, 6;5, SLI)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got chased by the girl (MW, 4;2, LM)</td>
<td>(the ball) gotted took (MK, 7;3, SLI)</td>
<td>it got atened up (IP, 6;0, SLI)</td>
<td>it got tookened from the boy (HB, 5;4, SLI)</td>
</tr>
<tr>
<td>(4)</td>
<td>(the fries) was eated (JP, 4;1, LM)</td>
<td>it got eated (SW, 4;0, LM)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got drive-en (BE, 6;5, SLI)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got chased by the girl (MW, 4;2, LM)</td>
<td>(the ball) gotted took (MK, 7;3, SLI)</td>
<td>it got atened up (IP, 6;0, SLI)</td>
<td>it got tookened from the boy (HB, 5;4, SLI)</td>
</tr>
<tr>
<td>(5)</td>
<td>it got chased by the dog (AG, 6;11, SLI)</td>
<td>it got eated (SW, 4;0, LM)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got drive-en (BE, 6;5, SLI)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got chased by the girl (MW, 4;2, LM)</td>
<td>(the ball) gotted took (MK, 7;3, SLI)</td>
<td>it got atened up (IP, 6;0, SLI)</td>
<td>it got tookened from the boy (HB, 5;4, SLI)</td>
</tr>
<tr>
<td>(6)</td>
<td>he got chopped off (AM, 3;11, LM)</td>
<td>it got eated (SW, 4;0, LM)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got drive-en (BE, 6;5, SLI)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got chased by the girl (MW, 4;2, LM)</td>
<td>(the ball) gotted took (MK, 7;3, SLI)</td>
<td>it got atened up (IP, 6;0, SLI)</td>
<td>it got tookened from the boy (HB, 5;4, SLI)</td>
</tr>
<tr>
<td>(7)</td>
<td>the two babies got licked (KM, 3;11, LM)</td>
<td>it got eated (SW, 4;0, LM)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got drive-en (BE, 6;5, SLI)</td>
<td>it got throwened (BE, 6;5, SLI)</td>
<td>it got chased by the girl (MW, 4;2, LM)</td>
<td>(the ball) gotted took (MK, 7;3, SLI)</td>
<td>it got atened up (IP, 6;0, SLI)</td>
<td>it got tookened from the boy (HB, 5;4, SLI)</td>
</tr>
</tbody>
</table>

### Table 4. Frequency of morphological responses (%) in passive elicitation.

<table>
<thead>
<tr>
<th>group</th>
<th>correct stem</th>
<th>stem</th>
<th>stem past</th>
<th>past past</th>
<th>other other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+$\theta$</td>
<td>+ed</td>
<td>+en</td>
<td>+$\theta$</td>
<td>+ed</td>
</tr>
<tr>
<td>LM</td>
<td>39.49</td>
<td>9.24</td>
<td>22.69</td>
<td>0.08</td>
<td>2.52</td>
</tr>
<tr>
<td>SLI</td>
<td>41.92</td>
<td>10.00</td>
<td>26.92</td>
<td>3.00</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Individual subject data demonstrated patterns of *-ed* and *-en* usage. The children could be classified as predominantly *ed*-users, predominantly *en*-users, or mixed *-ed* and *-en*. A child was considered a mixed *-ed* and *-en*-user if she used both endings more than once in the task. A child was
still considered an en-user if she produced the regular ed verbs correctly. In the SLI group, 9 children were ed-users and 5 children were mixed. That is, children either used -ed for all en verbs, or used a mixture of -ed and -en. None used -en on all the verbs requiring it. 3 children did not provide enough data for analysis. In the LM group, 4 children were ed-users and 3 children were mixed. Again, no children always used -en when appropriate. 8 children did not provide enough data for analysis. While the children used most regular -ed forms correctly, two of the 'mixed' children (one SLI and one LM) used -en in place of the correct -ed. Thus, both overgeneralization of -ed to -en verbs and overgeneralization of -en to -ed verbs occurred. In cases where both -en and -ed were added to a stem, they were not always added in the same order. Both -eden and -ened were produced by some children. Examples of each pattern can be seen in Table 5.

### Table 5. Patterns of passive morpheme use.

<table>
<thead>
<tr>
<th>ed-user (CG, 3;11, LM)</th>
<th>Mixed (BE, 6;5, SLI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) it got bite</td>
<td>(1) he got licked</td>
</tr>
<tr>
<td>(2) you got licked</td>
<td>(2) he got lick</td>
</tr>
<tr>
<td>(3) it got ained</td>
<td>(3) he got bitd</td>
</tr>
<tr>
<td>(4) it got tookeed</td>
<td>(4) it got flied over</td>
</tr>
<tr>
<td>(5) it got throwed</td>
<td>(5) it got squished</td>
</tr>
<tr>
<td>(6) it got droved</td>
<td>(6) it got ated... eaten</td>
</tr>
<tr>
<td>(7) it got knocked down</td>
<td>(7) it got eaten too</td>
</tr>
<tr>
<td>(8) it got chaseden</td>
<td>(8) he got chased</td>
</tr>
</tbody>
</table>

### Method

**Subjects.** Sixteen normal children were included in this experiment. They ranged in age from 5;7 to 6;5, with a mean age of 6;0. The children met all the same criteria outlined for the subjects in the first experiment, with the exception that only children who overgeneralized on less than 5 out of 10 of the verbs in the language screening were included. The children in this study did not differ significantly in age (t(31) = 0.872, p > .05) from the SLI group in Experiment 1.

**Tasks and procedures.** The same tasks and procedures were used in this study as were outlined for Experiment 1.

### Results

**Sentence completion tasks**

The same scoring procedure was used as was outlined for Experiment 1. The AM group received a score of 10. 25 out of 15 correct (S = 2.21) on the real word task and 6.5 (S = 2.56) on the non-word task, compared to the SLI performance of 6.48 (S = 3.11) on the real word task and 4.29 (S = 3.04) on the non-word task. A two-way analysis of variance with one between groups factor (diagnosis: SLI and age-matched (AM)) and one within groups factor (task: real word, non-word) indicated a significant difference in performance between the SLI and age-matched (AM) groups (F(1, 31) = 12.30, p < .001), a significant difference in performance on words versus non-words, (F(1, 31) = 43.87, p < .001) and no significant interaction (F(1, 31) = 3.14, p > .05). Thus, the SLI group performed significantly worse than their age-matched peers. The real word sentence completion task was significantly easier than the non-word task.

The results of the error analysis can be found in Table 6. In order to compare the number of repetition errors made by each group in the real word and non-word tasks, a two-way analysis of variance with one between groups factor (diagnosis: AM, SLI) and one within groups factor (task: real word, non-word) was performed. There was a significant effect for task (F(1,31) = 97.48, p < 0.001), but no effect for group (F(1,31) = 0.45, p > .05) and no significant interaction (F(1,31) = 1.61, p > .05). A similar analysis of the omission errors found a significant effect for group (F(1,31) = 9.58, p < 0.01), but no effect for task (F < 1) and no significant interaction (F(1,31) = 1.97, p > .05). Thus, the SLI children made the same number of repetition errors, but significantly more omission errors than their age-matched peers. There was no

### Summary of Results

The SLI and LM groups were both capable of producing passive syntax without error, but made many errors with passive morphology. The groups did not differ significantly on the morphological analysis tasks.

**EXPERIMENT 2**

The results of the first experiment indicated no difference in the performance of the SLI and language-matched normal groups. In order to compare the performance of the SLI children with age-matched peers and to confirm that they were performing at a lower level than might be expected for their age, a second experiment was conducted.
difference in the number of omission errors between the non-word and real word tasks. However, more repetition errors were made in the non-word task.

Table 6. Experiment 2: Real word and non-word sentence completion. Mean number of repetition and omission errors (standard deviation in brackets).

<table>
<thead>
<tr>
<th></th>
<th>Repetition</th>
<th>Omission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>real word</td>
<td>non-word</td>
</tr>
<tr>
<td>AM group</td>
<td>2.56</td>
<td>5.88</td>
</tr>
<tr>
<td>(1.55)</td>
<td>(2.25)</td>
<td>(0.72)</td>
</tr>
<tr>
<td>SLI group</td>
<td>2.23</td>
<td>6.47</td>
</tr>
<tr>
<td>(2.31)</td>
<td>(3.43)</td>
<td>(2.85)</td>
</tr>
</tbody>
</table>

Comprehension of Inflected Non-Words

As with Experiment 1, the comprehension task had a maximum score of 10. Since the response required a choice between two options, a score of five indicated chance performance. The AM group received a mean score of 7.56 (S = 2.03). A one-group t-test indicated that the performance of this group differed significantly from chance (t(15) = 5.04, p < 0.001). The mean score for the SLI group was 6.29 (S=1.9). A comparison of the SLI and the AM groups showed no significant difference in performance (t(31) = -1.86, p > .05). Nevertheless, 8 children in the AM group (compared to 4 in the SLI group) met the success criterion of eight correct responses. Some children provided interesting insight into the task through their spontaneous comments. For example, one child explained “mooz means one but moozes means two. So, you said moozes, so it’s two. This is by numbers.”

Judgment Task

The data were scored as in Experiment 1. The results can be found in Table 7 and are represented graphically in Figure 2. In order to compare the performance of the SLI and AM groups, a two-way analysis of variance was performed, with one between-groups factor (diagnosis: SLI, AM) and one repeated measure (task: judgment, identification, repair). The SLI group differed significantly from the AM group on all three trials (trial 1: F(1,31) = 26.45, p < 0.001; trial 2: F(1,31) = 16.47, p < 0.001; trial 3: F(1,31) = 13.86, p < 0.001). There was a significant effect of task on all three trials (trial 1: F(2,31) = 31.78, p < 0.001; trial 2: F(2,31) = 28.71, p < 0.001; trial 3: F(2,31) = 24.35, p < 0.001). There was no significant interaction for trial 1 (F < 1).

Table 7. Experiment 2: Judgment task. (Mean correct (out of 9) (standard deviation in brackets).

<table>
<thead>
<tr>
<th></th>
<th>Judgment</th>
<th>Identification</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLI</td>
<td>AM</td>
<td>SLI</td>
</tr>
<tr>
<td>trial 1</td>
<td>5.29</td>
<td>7.25</td>
<td>2.94</td>
</tr>
<tr>
<td></td>
<td>(1.53)</td>
<td>(0.93)</td>
<td>(2.28)</td>
</tr>
<tr>
<td>trial 2</td>
<td>7.65</td>
<td>8.69</td>
<td>4.65</td>
</tr>
<tr>
<td></td>
<td>(1.41)</td>
<td>(0.48)</td>
<td>(2.74)</td>
</tr>
<tr>
<td>trial 3</td>
<td>8.12</td>
<td>8.94</td>
<td>5.41</td>
</tr>
<tr>
<td></td>
<td>(1.22)</td>
<td>(0.25)</td>
<td>(2.53)</td>
</tr>
</tbody>
</table>

Figure 2. Experiment 2: Judgment task.
There were significant interactions for trials 2 and 3 (trial 2: F(2,62) = 4.19, p < .05; trial 3: F(2,62) = 5.97, p < 0.01). Thus, the SLI group performed worse than their age-matched peers on the judgment, identification and repair of errors, on all three trials. Furthermore, there was a difference in performance on judgments, identifications and repairs for both groups on trial 1, but only for the SLI group on trials 2 and 3.

To determine the extent of improvement over the three trials, a two-way analysis of variance was performed, with one between-groups factor (diagnosis) and one within-groups factor (trial), for judgments, identifications and repairs. There was a significant improvement over trials for judgments (F(2,31) = 82.44, p < 0.001), identifications (F(2,31) = 87.18, p < 0.001) and repairs (F(2,31) = 166.6, p < 0.001). There was a significant interaction between group and trial for judgments (F(2,62) = 5.01, p < 0.01) and repairs (F(2,62) = 3.34, p < .05). There was no significant interaction for identifications (F < 1). Thus, both the AM and SLI groups improved over trials. The AM group showed a ceiling effect for judgments and repairs.

Child-generated Errors

The AM group produced a mean of 1.6 (S = 2.09) self-generated errors, compared to 1.76 (S = 2.28) in the SLI group. This difference was not significant (t(30) = -0.38, p > .05). This task was quite difficult for all the children. A qualitative analysis of the responses in the AM group indicated that 35% of the responses involved no change to the stimulus item (compared to 34% in the SLI group), 26% were semantic changes (SLI group: 22%), 9% were phonological changes (SLI group: 14%) and 29% were morphological (SLI group: 31%). Thus, the AM and SLI groups performed similarly on this task.

Elicitation of passive sentences

All of the children in the age-matched group produced passive constructions, with a mean of 22 per child. 13 out of 15 (87%) of the AM children produced full passives. No syntactic or prepositional errors were noted. Morphological errors were common. As in Experiment 1, errors took on a variety of forms consisting of the present or irregular past as a stem, plus en, ed or both, including the overgeneralization of en.

Examples of Correct Productions

(14) the pig got chased by the tiger (KG, 6;5)
(15) he got licked by the dog (RB, 6;4)

| Table 8. Frequency of morphological responses (%) in passive elicitation |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| group           | correct stem    | stem             | past             | other           | correct stem    | stem             | past             |
| | +β              | -ed             | +en              | +β              | -ed             | +en              | +en              |
| AM              | 42.08           | 0.08             | 15.78            | 14.52           | 9.16            | 1.25            | 10.79            | 5.39            |
| SLI             | 41.92           | 10.00            | 26.92            | 3.00            | 1.15            | 3.85            | 2.31             | 10.39           |

<table>
<thead>
<tr>
<th>Table 9. Experiment 2: Patterns of passive morpheme use.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ed-user (KF, 6;5)</td>
</tr>
<tr>
<td>(1) he got licked by the tiger</td>
</tr>
<tr>
<td>(2) he got bit by the horse</td>
</tr>
<tr>
<td>(3) he got thrown by the horse</td>
</tr>
<tr>
<td>(4) the cat got chased by the dog</td>
</tr>
<tr>
<td>(5) the dog got chased by the cat</td>
</tr>
<tr>
<td>(6) it got eaten and the hotdog got eaten</td>
</tr>
<tr>
<td>mixed (RB, 6;4)</td>
</tr>
<tr>
<td>(12) he got licked by the dog</td>
</tr>
<tr>
<td>(13) he got hit by the dog</td>
</tr>
<tr>
<td>(14) he got eaten up</td>
</tr>
<tr>
<td>(15) it got chased by the girl</td>
</tr>
<tr>
<td>(16) it got taken down</td>
</tr>
<tr>
<td>en-user (RK, 5;9)</td>
</tr>
<tr>
<td>(21) the bear got licked by the tiger</td>
</tr>
<tr>
<td>(22) he got bitten by the horse</td>
</tr>
<tr>
<td>(23) he got thrown by the tiger</td>
</tr>
<tr>
<td>(24) they got thrown by the horse</td>
</tr>
<tr>
<td>(25) he got rode on by Mickey Mouse</td>
</tr>
<tr>
<td>(26) he got ridden on by Mickey Mouse</td>
</tr>
<tr>
<td>(27) Mickey got chased oops...Pluto got chased by Mickey Mouse</td>
</tr>
<tr>
<td>and Minnie Mouse got chased</td>
</tr>
<tr>
<td>(28) (the ball) got taken by the lady</td>
</tr>
<tr>
<td>(29) the ball got thrown by the lady</td>
</tr>
<tr>
<td>(30) it got driven by the man</td>
</tr>
<tr>
<td>(31) it got thrown down by me</td>
</tr>
<tr>
<td>(32) it got thrown by the lady</td>
</tr>
<tr>
<td>(33) it got eaten by the cat</td>
</tr>
</tbody>
</table>

The frequency of the morphological forms used can be seen in Table 8. All tokens of the passive were included in the calculations, including repeated attempts. The AM children used more forms with en, fewer forms with ed, fewer bare stems, and more past tense stems than the SLI children.

As in Experiment 1, children were classified as ed-users, en-users or mixed. Three children in the AM group were classified as ed-users, six as mixed and four as en-users. While all of the children produced some correct regular ed forms, three en-
users and three 'mixed' children overgeneralized en to the regular -ed verbs. Examples of the various patterns can be seen in Table 9.

Summary of Results

Experiment 2 indicated that SLI children show a deficit in morphological analysis skills when compared to their age-matched peers; the two groups' performance differed significantly on almost all tasks.

Discussion

The results of the two studies indicate that SLI children show no deficit in the acquisition of syntax, but do have difficulty with the acquisition of inflectional morphology. Furthermore, SLI children show a deficit in morphological analysis skills when compared to their age-matched peers, but not when compared to their language-matched peers. The results of each task will be discussed below, followed by a general discussion of the implications of the two studies.

Passive Elicitation

Consistent with children reported by Crain and Fodor (1993) and Crain, Thornton and Murasugi (1987), the majority of the children were able to produce syntactically correct passives in the elicitation task. Syntactic errors, such as the lack of movement, shown in (16) below, were not found in the data.

(16) * got licked the bear

The productions can be considered true verbal passives. The presence of a prepositional phrase confirmed this for many children. For those children who did not produce full passives, the elicitation procedure provided the appropriate context for their interpretation as verbal passives. Given the elicitation question "what happened to X?", an adjectival response was not an appropriate response. The children demonstrated their knowledge of this fact by responding in the active voice if a passive was not elicited. They did not provide an alternative description of the patient, as might be expected in place of an adjectival passive. They were clearly attending to action rather than to description.

The vast majority of the passives elicited contained the verb got rather than be, consistent with the findings reported by Crain et al. (1987) and Crain and Fodor (1993). Nevertheless, some of the children (normal and SLI) did produce be-passives. The predominance of get-over be-passives might be because get-passives could be considered somewhat easier, due to the simpler morphological paradigm of get compared to be. Alternatively, the fact that get in passives can be considered a main verb (Haegeman, 1985; Hoishi, 1991; Fox & Grodzinsky, 1992, Lasnik & Fieno, 1974) might make them easier for children, since auxiliary verbs are known to be a source of difficulty (Brown, 1973; Johnston & Schery, 1976).

In spite of the large number of passives elicited in this study, some children produced only active sentences. The failure to elicit passives from these children cannot be attributed to age. The children who failed to produce passives were scattered throughout the age range of the language-matched group and included the two oldest children in the sample. The lack of passive production cannot be interpreted to mean that the children could not produce passives, only that they did not. As outlined in the methods section, the elicitation procedure sometimes required numerous attempts before meeting with success. Each child was given three separate opportunities, on different days, to produce the passive. In many cases, all three sessions were necessary. Note that these sessions did not teach the child the passive. The experimenter never used the passive structure during the task. The repeated sessions merely offered more opportunities for the passive to be elicited. Perhaps the remaining children would have produced passives, if given additional opportunities.

The ability of the SLI children to produce syntactically correct passives is consistent with the earlier findings that SLI children are capable of producing complex syntactic structures (Smith, 1992) and with Cihlář's (1989) claim that German SLI children do not suffer from a syntactic deficit. In spite of obvious difficulties in the acquisition of language, these children were able to produce passive syntax as well as their peers. This finding clearly supports the proposal that SLI children have an intact UG.

The children's proficiency with passive syntax is in sharp contrast with their lack of proficiency with the idiosyncratic linguistic structures stored in the lexicon, specifically prepositions and passive morphology. Prepositional errors were not uncommon and very few of the verbs elicited in the passive structure contained the correct inflection. In several cases, no overt passive morphology was present although the rest of the structure was grammatically correct. Since the affixation of the passive morphology is said to create the conditions which require the syntactic movement to take place (i.e., absorption of case and theta-filled syntactic structures), the pattern of results suggests that the children were verifying the word order before assigning agreement.
and theta-roles), and since movement appears to have taken place, the inflection must have been added syntactically (perhaps as a null morpheme), but not realised morphologically. Such structures show clearly the distinction between (at least these) syntactic and morphological operations. As such, they offer support for a notion of syntactic inflection, realised in a separate part of the grammar from overt morphology.

In spite of the large number of errors, the morphology produced by all three groups of children showed impressive variety and creativity. Confusion with the two passive inflections, as well as the correct stem forms, was evident in the variety of irregular verb forms produced by all three groups of children. It is important to note that, in spite of the large number of errors, a form of passive morphology was always used. None of the children affixed a different inflection, such as \textit{chased}. This indicates that the children know which inflections affix to which categories. Further, it indicates knowledge of the special role of passive morphology and its effects on the syntax (i.e., manipulation of case and theta roles). The children do not attribute such characteristics to all inflections. This is consistent with the hypothesis of delay rather than deuiance in SLI grammar.

A developmental trend in the use of \textit{-ed} and \textit{-en} in the three groups of children can be inferred from the cross-sectional data. The children showed a trend from 1) the use of \textit{-ed} with overgeneralization to \textit{-en} verbs, 2) the introduction of \textit{-en} resulting in a variety of forms with either or both endings, plus occasional overgeneralization of \textit{-en} to the \textit{-ed} verbs, 3) appropriate use of \textit{-en} (thus, eliminating the overgeneralization of \textit{-ed}), with continued overgeneralization of \textit{-en} to \textit{-ed} verbs. Thus, there appears to be cross-sectional evidence for an overgeneralization paradigm, with both passive morphemes being over-used at times.

The frequency of overgeneralization in this study differs from the findings of Marcus, Pinker, Ullman, Hollander, Rosen, and Xu (1992) that overgeneralization occurs rarely in the speech of young children. Marcus et al. based their findings on the analysis of spontaneous speech transcripts collected as longitudinal studies of individual children over several years of their language development. The difference in the two studies' results might be attributed to the design differences. As Marcus et al. point out, it is possible that the use of an elicited production technique primes the children to produce overgeneralization. This may have happened in the current study due to the use in the elicitation protocols of the regular past tense (in the passive elicitation) or the bare stem (in the language screening). Nevertheless, priming cannot account entirely for the data, especially for the overgeneralization of \textit{-en}. Neither the use of \textit{-ed} nor a bare stem would be likely to prime a child to produce \textit{chasen} instead of \textit{chased}, a common error.

The cross-sectional group design of this study may contribute to the differences. This study examined the use of the same 20 verbs (ten in the past tense screening task and ten in the passive task) in 49 children, 33 of whom were at the same level of morphological development. Thus, the sampling error encountered by Marcus et al. in their attempts to examine productions of the same verbs at one period of time was diminished. This study provided more data of a comparable type than the longitudinal transcripts studied by Marcus et al.

The pattern of overgeneralization accompanied by the inconsistency and variability in the verb forms used by the children illustrates the many different rules the children can hypothesise and the very active, almost experimental, approach these children are taking to the acquisition of passive morphology. This contrasts sharply with the lack of error in their production of the passive syntax. Thus, the answer to question (1), "Do SLI children show greater ability with structures based on the principles of UG than with idiosyncratic structures specific to a particular language?", is clearly "yes." At least with the structures studied here, the principles of UG appear to be intact in SLI children.

Morphological Analysis Tasks

On almost every morphological analysis task, the SLI children performed significantly worse than their age-matched peers and exactly the same as their language-matched peers. Each task will be discussed below.

Sentence completion tasks

As outlined above, the SLI children performed the same as their LM peers on this task. While all of the children could correctly complete some of the sentences, the overall performance was somewhat lower than one might expect from a sentence completion task. This difficulty can be accounted for by the morphological analysis demands of the task. Most sentence completion tasks provide an uninflected form and require the child to complete the sentence with an inflected form. For example, in the following item from the
Berry-Talbott Language Test (Berry & Talbot, 1966), the nonsense word *ling* is introduced uninflected, is then inflected and then the child is required to inflect it in a different way. “This is a tass who knows how to *ling*. He is *linging*. He did the same thing yesterday. What did he do yesterday? Yesterday he ______.” The task used in this study provided only an inflected form of the non-word. The above item would have been presented in the following form: “This guy is *linging*. Yesterday he ______.” Thus, the child in this study had to note that the verb was inflected with *ing*, the stem was *ling* and that the correct inflection to add was /ed/.

The morphological analysis demands of the task are reflected in the type of errors the children made. The most common error was the repetition of the verb with the inflection used in the stimulus. The child making this error had adequate verbal memory skills to remember the exact form of the stimulus item but was unable to perform the morphological analysis necessary to separate the inflection from the stem. The lack of group differences on this error type indicated equal verbal memory skills on this task, in all three groups. Omission of the inflection also occurred, indicating adequate attention to the stem, but an inability to determine and add the correct inflection. The use of an incorrect inflection, another common error, reflected attention to the stem and the knowledge that an inflection was necessary, but an inability to analyse the grammatical context well enough to determine the appropriate inflection to be added.

**Comprehension of inflected non-words**

The comprehension task showed no differences between any of the groups on a straightforward comparison of mean scores. However, while only one child could be considered successful at the task in the LM group, four SLI and eight AM children could do the task. It appears that the ability to do this task begins to develop in normal children as they approach six years of age. This corresponds to the age at which children develop the ability to do many metalinguistic tasks (Liberman, Shankweiler, Fischer, & Carter, 1974). Most of the SLI children, on the other hand, were unable to do the task at age six. Most of those who were successful were in grade one and therefore had had some reading and writing instruction. While the direction of causation is not clear, reading and writing skills are correlated with morphological awareness (Carlisle, 1988; Rubin, 1988) and may have fostered awareness in these children. The comment made by one child (MD, SLI, 6;8) after a plural stimulus item, “it has an *s* at the end” is consistent with this hypothesis.

The difficulty that this task posed for these children deserves comment. One might have expected this to be a rather straightforward test of productivity of the plural inflection. Certainly, children both comprehend and use the plural marker consistently early in the acquisition sequence (Brown, 1973; Miller & Ervin, 1964). It is possible that the children in this study did not fully understand what was required of them. However, six training trials were provided, with feedback, in order to teach them the task. Further, the instructions emphasized that number was important, pointing out that one section contained one item, while the other contained two. Another possibility is that the children did not understand the question the way it was asked. However, a pilot study varied the instructions in many ways, with no effect. Finally, the training trials all contained the /s/ allomorph because it was believed to be the most salient, while the test items included /s/ and /x/ as well. It is possible that the children did not generalise the training with /x/ to the test items with /s/ and /x/. However, the children who were able to do the training trials correctly, (those who received a score of 6 out of 6) were also able to do the rest of the task, indicating that the training did generalise.

**Judgment Task**

The judgment task was very successful in eliciting judgments, identifications and repairs of morphological errors from very young children. It appears that normal 3-year-olds are quite capable of metalinguistic reflection of grammatical form.

The use of repetitive trials with feedback significantly increased performance in all three groups, particularly with respect to repairs in the SLI group. This increase in performance cannot be attributed solely to the children learning the procedure of the task. If the improvement were attributable to procedure learning, one would expect to see better performance on later items than on earlier items. This, however, was not the case. The improvement cannot be solely attributed to the scoring system either. A child was given credit for a response on trial 2 and 3 if she was correct on trial 1, possibly artificially inflating the scores on later trials. Nevertheless, an increase in scores across trials would only occur if children who were incorrect on earlier trials were correct on later trials. Thus, it appears that the children improved in their ability to detect and repair errors. This improvement over trials indicates that it is possible to teach children to do
metalinguistic tasks. In this study, even minimal training improved performance, within the constraints of the child’s language level. This is consistent with the findings of more extensive training studies of phonological awareness (Ball & Blachman, 1988; Bradley & Bryant, 1983, 1985; Lundberg, Frost, & Peterson, 1988; Warrick, Rubin, & Rowe-Walsh, 1993). This improvement with training has clinical and academic implications, given the relationship between morphological awareness and good reading and writing skills (Carlisle, 1988; Rubin, 1988). If normal and SLI children can be taught these skills, perhaps their reading and writing would benefit.

It is noteworthy that the SLI children benefited as much from the training as the LM children, and at times more. One might have expected the SLI children to be less receptive to teaching of language skills. Nevertheless, it appears that they benefit from training, at least within the limits of their expressive language abilities. Here again, the added reading and writing instruction the SLI children have received might have played a role.

The significant difference between performance on judgment, identification and repair is consistent with the findings of previous research (Smith-Lock & Rubin, 1993; Warrick et al., 1993; Warrick & Rubin, 1992). It appears that difficulty increases from judgments, to repairs to identifications, particularly by trial 3. All three groups demonstrated this pattern, although the AM group reached a ceiling on the second and third trials. One might expect the judgment task to be the easiest for several reasons. First, it required only a yes or no response. Chance alone would allow the correct answer 50% of the time. Second, it required minimum metalinguistic reflection. The child had only to determine if the sentence matched what she would say (i.e., did it match the output of her grammar?)

Repairing the error was somewhat more difficult. One might think that the repair of an error would simply involve the child spontaneously generating the correct sentence. In this task, that would mean commenting on the situation reflected in the toys still in front of the child. This may contribute somewhat to the relatively easy nature of this task. However, many children did make errors on the repairs. The difference in performance on judgments and repairs indicates that children sometimes correctly rejected the sentence, but were unable to repair the error. While some of these incorrect responses were no responses (“I don’t know”), many of the errors involved a repetition of what the puppet had said, rather than a correction (again demonstrating good verbal memory abilities). This type of response reflects the metalinguistic demands of the task and the inability of the child to manipulate consciously what she has heard to produce a grammatical alternative.

The identification of the error was clearly the most difficult for the children. While judgment required a global comparison of the stimulus sentence to the child’s grammatical output, and repair required the generation of such output, identification required the child to analyze each component of the sentence, identify which grammatical requirements were not met and then say the erroneous word/phrase aloud. As such, it was the most removed from an automatic speech task and involved a high amount of metalinguistic skill.

More difficult than any of the levels in the judgment task was the generation of morphological errors. The lack of a significant difference in the performance of the three groups reflects the low scores obtained by all. This task clearly demanded most of the children. In order to be successful, they had to understand how the puppet had been grammatically manipulating the stimuli, and be able to identify and omit the inflectional morpheme themselves. The types of errors the children made shed light on their perception of the task. Many made no change at all, clearly lacking enough insight to even attempt a response. Semantic errors, of the sort one eye instead of two eye, demonstrated that the children were aware of the semantic implications of the change, but did not associate them solely with the inflectional morpheme. Phonological changes, most frequently substitutions of the initial phoneme, indicated that the children understood that a single segment was being manipulated. However, they did not comprehend the morphological significance of the segment or were unable to identify the inflectional morpheme in the stimulus.

GENERAL DISCUSSION

The answer to question (1), “Do SLI children show greater ability with structures based on the principles of UG than with idiosyncratic structures specific to a particular language?” is clearly “yes.” The SLI children showed proficiency with the principles of theta-theory, case theory, and A-chains. In sharp contrast with this, they made many errors with passive morphology, producing
few correct passive participles and overgeneralising -ed and -en. It can be concluded that, at least with respect to these grammatical principles, SLI children do not show a grammatical deficit. Furthermore, their morphological errors are not qualitatively different from those made by normal children. Thus, their language cannot be considered deviant in any way.

With respect to question (2), ‘Can SLI children’s difficulty with inflectional morphology be attributed to a deficit in morphological analysis skills?’; the answer appears to be ‘yes’ and ‘no’. SLI children do demonstrate a deficit in morphological analysis skills with respect to their age-matched peers. However, they do not demonstrate a deficit in morphological analysis skills with respect to their peers matched on the basis of linguistic performance.

There are many possible reasons that the performance of the LM and SLI groups did not differ significantly. First, it is possible that the children in the SLI group were not truly SLI and, therefore, not representative of the population the study meant to tap. While all the SLI children had been referred by certified speech-language pathologists, due to the large number of sources from which the children were drawn, the same formal measures were not available for each child. However, data from this study do confirm their SLI status. The range of ages in the SLI and LM groups did not overlap and the mean ages of the groups differed by 2 years, 2 months. Thus, the SLI children showed a two-year delay in language level. Further, Experiment 2 confirmed that the SLI children performed significantly worse than children of the same age. These facts support the language-impaired diagnosis. That their deficit is specific to language is supported by their normal performance on a test of non-verbal intelligence. Thus, consistent with their independent diagnosis, the SLI group showed approximately a two-year delay in linguistic development, coupled with normal non-verbal skills, meeting the criteria for SLI.

Another possible explanation of the lack of differences is that the children were not adequately matched for language. If the SLI children were actually at a higher language level than the normal children, but still suffered a deficit in morphological analysis, they might have performed the same as the LM group, but below what would be expected for their language level. Nevertheless, there is little reason to believe that the language-matching was inadequate. To the contrary, the procedure appears to have been extremely successful. On the basis of ten verbs, two groups of children of differing ages and educational levels, drawn from six separate sources, were so well matched that they performed the same on all of the tasks.

The lack of differences between language-matched groups has been found by other researchers. Rubin, Kantor and Macnab (1991) found that SLI children aged 8;2 to 12;4 performed the same on grammatical analysis tasks as younger children matched on the basis of formal language testing. The lack of differences is also consistent with the findings of a study which matched children on the basis of written language (reading) level (Bryant & Impey, 1986). Bryant and Impey (1986) found that when dyslexic children were compared to normal children of the same reading level, the apparently deviant characteristics of the dyslexics disappeared. Normal readers were found to make the same errors with the same frequency as dyslexic children of a comparable reading level.

Another possible explanation of the data is that the tasks used in this study do not adequately assess morphological analysis skills. Thus, SLI children might suffer a deficit in morphological analysis which was not tapped in this study. The children’s performance on these tasks argues against this, however. As discussed earlier, the sentence completion tasks differed from spontaneous speech in their analytic demands and reduced automaticity. This was supported by the preponderance of repetition errors in the data. The comprehension task clearly tapped morphological analysis skills, as reflected by its difficulty, by the spontaneous comments of the children and by the age (6 years) at which the children were able to do the task. The judgment task, a commonly used metalinguistic task, asked children to comment overtly on language, and the self-generated errors asked them to manipulate language in play. It appears that the tasks were successful in tapping morphological analysis skills. Thus, there must be another explanation of the results.

The level of language development of the children in the study may have contributed to the results. The children were specifically selected so that they had acquired the inflectional morphology system. Thus, only those children who had enough analysis skills to learn the morphological system and use it consistently were included. Perhaps the use of “first use” as the criterion for acquisition (as suggested independently by Stromswold, 1990, for normal children) would have produced different results. If
children who demonstrated grammatical competence with the past tense (by the "first use" criterion) but not consistent grammatical performance, were studied, a difference might be found. In such a study, SLI children might show a deficit in morphological analysis skills at the time of "first use" of an inflection when compared to LM peers. A difference in analysis skills at that level of language development would lead to a protracted time to reach adequate performance levels on the part of the SLI children. Thus, the normal children would be expected to achieve consistent performance earlier than the SLI children. The attainment of adequate performance skills would coincide with the development of the necessary morphological analysis skills, leading to the results obtained in this study.

The equality of morphological analysis skills in children with the same oral language development indicates that the levels of linguistic analysis skills are closely associated with expressive language level, as defined by consistent performance. Rather than being a secondary skill which develops after primary language development, linguistic analysis appears to develop hand in hand with expressive language and is measurable in children as young as three years of age.

The role of linguistic analysis skills in primary language acquisition, as measured by the tasks in this study, must now be re-considered. Given the results, it is possible that linguistic analysis skills play no role in language development and, as such, language acquisition and linguistic analysis can be viewed as completely independent skills. However, the evidence does indicate that a close association between primary language skills and linguistic analysis skills exists. While it is possible that linguistic analysis skills as defined here play no role in the acquisition of grammatical competence, the possibility remains that these skills play a role in the attainment of consistent performance. Such a role, in a sense, reinforces the original view of linguistic analysis/awareness as a secondary skill which can be applied to the primary linguistic system (as outlined by Mattingly, 1972). However, in this view, the primary system could be considered the system involved in the acquisition of grammatical competence, while linguistic analysis skills come into play after the attainment of competence in order to aid in attainment of consistent performance.

The fact that SLI children develop linguistic analysis skills as they develop expressive language, just as normal children do, coupled with the passive data, where the SLI children made the same morphological errors as normal controls, paints a clear picture of language delay rather than deviance in SLI. Not only do SLI children appear to have the same language as younger children, but they seem to have the same secondary mechanisms, such as linguistic analysis ability.

The study's findings provide counter-evidence for Gopnik's (1991a, 1991b) and Gopnik and Crago's (1991) proposal that a grammatical deficit in the form of absent morpho-syntactic features can account for the language of SLI individuals. Contrary to her predictions, these SLI children showed evidence of the use of features through extensive overgeneralization of both the past tense and passive inflections. Furthermore, although there were no group differences on the task of comprehension of inflected non-words, four children in the SLI group were successful at the task, again implying the presence of features in their grammar.

The ability of the SLI children to produce passive syntax as well as the AM children is not consistent with Leonard (1989) and Leonard et al.'s (1988) "surface account", which predicted that the SLI children would have particular difficulty with passives. The clearest evidence against the surface account of passives is the mastery of the passive syntax in the absence of passive morphology. This occurred in 10% of the LM and SLI productions. However, in most cases, the children showed use of both passive syntax and morphology, albeit incorrect morphology, making the issue less clear. Nevertheless, the SLI children's success with passive syntax in contrast to its morphology suggests that, to the extent that perception of low-phonetic-substance morphemes is necessary for the acquisition of passive, SLI children show the same perception of the linguistic input as normal children. The surface account would still hold, however, if it turned out that passive could be acquired without adequate perception of low-phonetic substance morphemes. An interesting test case for the surface account would be the acquisition of nominal forms such as the destruction of Rome by the Barbarians. Such forms involve the application of passive within a noun phrase, triggered by the addition of the derivational, syllabic morpheme -ion. The surface account would predict that the acquisition of such nominal forms would be easier than the acquisition of verbal passives, given that the critical morpheme in the nominals is not a low phonetic substance morpheme.
It must be noted that, due to the exclusionary criteria for the diagnosis of SLI, the SLI population might be a heterogeneous group. Such heterogeneity might account for the contradictory findings of the various studies of SLI. Nevertheless, the SLI children in this study did not appear to differ qualitatively from the SLI children referred for but not included in the study, at least to the extent of their screening performance. The lack of difference between the SLI and the normal controls in this study as opposed to others might be attributed to the use of a more accurate language matching procedure. However, the generalisation of findings based on a language-matched rather than a randomly selected sample, must be made with caution.

CONCLUSION

The results of these studies indicate that SLI children suffer from a selective delay in the acquisition of inflectional morphology. They demonstrated no difficulty in the acquisition of a complex syntactic structure, but made many errors with the complex morphology of the same structure. The principles of Universal Grammar examined in these studies (case theory, theta-theory and morphological analysis) could not be distinguished across children on elicited production and on tasks of morphological analysis could not be distinguished from that of younger normal children. It appears that linguistic analysis skills develop hand in hand with primary language skills, both in normal and SLI children. The finding that children with equal performance abilities have equal analysis skills is consistent with the proposal that linguistic analysis skills play a role in the attainment of consistent linguistic performance (through on-line monitoring of production), if not in the attainment of grammatical competence.

REFERENCES


FOOTNOTES

1. Also University of Connecticut

2. Mean length of utterance is calculated by counting the number of morphemes in a spontaneous speech sample and dividing by the number of utterances, to determine the average number of morphemes per utterance. It is a rough indicator of linguistic development (Brown, 1973).

3. This child used plural, possessive, present (third person singular) and past tense inconsistently in spontaneous speech. In spite of his inconsistent use of the regular past tense, he overgeneralised on two out of the ten screening verbs, indicating that "first use" might be a more appropriate measure of acquisition than "consistent use".

4. One child was unable for testing on the passive task.

5. I am grateful to Ignatius Mattingly for this suggestion.

6. I am grateful to Mamoru Saito for this suggestion.
APPENDIX A

Screening Stimuli

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<tr>
<td>sat</td>
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*Age at which 80% of children have acquired irregular past tense (Shipley, Maddox, & Driver, 1991)
APPENDIX B

Characteristics of SLI Children Included in the Study

The screening score is the number of incorrect irregular verb forms the child used in the screening task. Repeated attempts that resulted in use of both correct and incorrect forms were omitted from this score. Repeated attempts have, however, been included in the calculation of the number of overgeneralized and uninflected stems. Thus, the total of the overgeneralizations plus uninflected stems might be higher than the screening score. Spontaneous productions of irregular verbs not in the screening protocol were not included.

<table>
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Characteristics of LM Children

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