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**Oral bound-morpheme skills of school-age, language-learning  
disabled and normal language children**

Daily, Stacy Lynn, M.S.

The University of Arizona, 1993

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ORAL BOUND-MORPHEME SKILLS OF SCHOOL-AGE,  
LANGUAGE-LEARNING DISABLED AND NORMAL LANGUAGE CHILDREN

by

Stacy Lynn Daily

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A Thesis Submitted to the Faculty of the  
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This thesis has been approved on the date shown below:

Linda Swisher  
L. Swisher, Ph.D.  
Professor of Childhood  
Language Disorders

Oct. 28, 1992  
Date

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### Abstract

This study tested the hypothesis that oral bound-morpheme impairment is a characteristic of school-age children with a language-based learning disorder. Ten school-age children (Mean age: 10:3) classified as language-learning disabled and ten controls (Mean age: 9:9) classified as "normal language" were presented with four tasks that assessed oral bound-morpheme skills. A two-way analysis of variance revealed significant group and task differences. Fisher a priori tests indicated significant group differences on three tasks: a measure of English bound-morpheme skill levels, a measure of ability to generalize English bound morphemes, and a measure of ability to learn novel bound morphemes. The findings suggest that the core deficit underlying the oral bound-morpheme impairment does not resolve with maturation and experience.

"A common profile in English-speaking specifically language-impaired (SLI) children is a moderate deficit across a broad range of linguistic features and a more marked, selective impairment in using bound morphemes and components of the verb system" (Leonard, Sabbadini, Leonard, & Volterra, 1987). This profile exists in the presence of relatively normal development in other areas (Lahey, p. 49-50; Stark & Tallal, 1981). The profile is well documented in preschool-age children referred to as SLI and is characteristic of school-age children referred to as language-learning disabled (LLD).

Several investigators (e.g. Leonard, et al., 1987; Loeb & Leonard, 1991; Menyuk, 1964; Roseberry & Connell, 1991) have documented that an oral bound-morpheme impairment is characteristic of preschool-age, SLI children. Elicited and spontaneous oral language samples reveal that preschool-age, SLI children produce less well-formed utterances, have limited skills with specific syntactic structures (e.g. Morehead & Ingram, 1973), and frequently omit bound morphemes compared with MLU-matched (Loeb & Leonard, 1991) and age-matched (Menyuk, 1964) controls. The findings of Connell and Roseberry (1991) who utilized a non-English invented bound-morpheme learning task to differentiate between preschool-age, limited English proficiency, Spanish-speaking, SLI children and controls suggest that the oral bound-morpheme

impairment reflects a persistent deficit. The use of a bound-morpheme learning measure provided greater control over the influence of past language-learning experiences on the results than the skill-level measures used in previous studies.

An oral bound-morpheme impairment has also been documented in school-age, language-learning disabled (LLD) children (Gopnick & Crago, 1991; Menyuk, 1964; Moran & Byrne, 1977; Semel & Wiig, 1975; Wiig, Semel, & Crouse, 1973). Semel and Wiig (1975), for example, documented that school-age, LLD children performed poorly relative to age-matched controls on the expressive subtest of the Northwestern Syntax Screening Test (Lee, 1969), which assesses expression of morpho-syntactic structures. In picture-elicited language samples, differences in the skill levels and error patterns of verb past tense markers distinguished school-age, LLD children from NL controls (Moran & Byrne, 1977). In another study, school-age, LLD children gave significantly fewer correct responses than NL children on Berko's experimental test of morphology (Wiig, Semel, & Crouse, 1973). The investigators hypothesized that the poor generalization skills of the LLD children reflected difficulties in morphological rule development (Wiig, et al., 1973).

The purpose of the present investigation is (a) to obtain corroborating evidence of the oral bound-morpheme impairment observed in school-age, LLD children on two measures of

current skill level and ability to generalize English bound morphemes and (b) to extend documentation of the oral bound-morpheme impairment to include two measures of ability to learn bound morphemes: a learning measure and a posttest. The age range of the subjects was chosen because the majority of normally developing children have mastered English grammatical morphemes by nine years of age.

## Methods

### Subjects

Twenty monolingual, English-speaking boys and girls between the ages of 9:0 (years:months) and 10:11, with a mean age of 10:3 for LLD children and 9:9 for NL children, were recruited from three private schools. Ten subjects (6 males, 4 females) were classified as LLD: 10 gender-matched controls (6 males, 4 females) were classified as NL. All LLD subjects attended a private school for children with learning disabilities. School enrollment criteria included a Wechsler Intelligence Scale for Children (WISC-R) (Wechsler, 1974) score above 90 that was discrepant from the score on the reading, writing, or academic achievement sections of the Woodcock-Johnson Psycho-Educational Battery-Revised (Woodcock & Johnson, 1989). Teachers were asked to refer the children with a language-based learning disability and no report of mental retardation. NL subjects attended a private school for children whose academic abilities are within the normal range. They were described by their teachers as "normally developing," with no reported concern regarding language development. All subjects passed a hearing screening at 30 dB HL at 500, 1000, 2000, and 4000 Hz. Unmeasured ambient noise present at the schools required higher than normal hearing level criteria.

Six subtests of the Clinical Evaluation of Language

Fundamentals-Revised (CELF-R) (Semel, Wiig, & Secord, 1987), which provide expressive language, receptive language, and total language scores for school-age children, were administered to determine subject classification of LLD and NL. The CELF-R subtests were selected because of their sensitivity to language impairment in 9- and 10-year old LLD children. Subtests included were Oral Directions, Word Classes, Semantic Relationships, Formulated Sentences, Recalling Sentences, and Sentence Assembly. To participate, LLD children had to score below -1.0 standard deviation on the total language score; NL children had to score above -1.0 standard deviation. One child referred as LLD did not meet this criterion and was disqualified from the study. Means and standard deviations for performance on the CELF-R are provided in Table 1.

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Insert Table 1 about here

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### Materials

The materials and procedures included a norm-referenced test, language-learning stories, and posttests. The Word Structure subtest of the CELF-R was administered to establish current English grammatical morpheme performance level. This subtest is not used to calculate receptive, expressive, or total language scores for 9- and 10-year-old children. The

Generalization of English Morphemes (GEM) test (Daily, 1992) assessed the generalization of English bound morphemes to novel lexical items. Vocabulary learning stories trained novel lexical items; bound-morpheme stories trained novel bound morphemes attached to the novel vocabulary items. A vocabulary posttest assessed immediate retention of novel vocabulary items. A bound-morpheme posttest assessed retention and generalization of novel bound morphemes. The vocabulary and bound-morpheme learning stories and posttests were adapted from those utilized in two previous novel bound-morpheme learning studies (Nakamura, Plante, & Swisher, 1990; Restrepo, Swisher, Plante, & Vance, 1992). The stories, posttests, and GEM test are described in detail below.

Novel vocabulary learning stories and posttest. The vocabulary stories (see Appendix) taught each subject four novel, CVC vocabulary items to which the novel bound morphemes could later be attached. The construction of the novel vocabulary items and novel bound morphemes were identical to those utilized in previous studies (Nakamura, et al., 1990; Restrepo, et al., 1992). The vocabulary items consisted of two nouns, one animate and one inanimate, referring to a small figure and object, and two verbs, referring to actions performed by the animate figure on the inanimate object. One of two sets of novel lexical items was used with each subject during the vocabulary and bound-morpheme learning stories.

The second set was reserved to test for generalization of novel bound morphemes to untrained items.

Each story contained 10 presentations of each of the four vocabulary items and five opportunities for the subject to respond to each item. After a standard number of presentations of an item within the story, the subject was requested to identify the item. Identification requests did not directly follow a presentation of the item. For example:

Here is a bepp.

It is a toy.

What is this?

A retention posttest was given to measure immediate retention of vocabulary items. Two opportunities to identify each item were provided to each subject for a total of eight possible responses.

Novel bound-morpheme learning stories and posttest. A bound-morpheme story was presented to teach two novel suffixes, /u/ and / /, to be attached to the novel noun and verb items. The novel bound morphemes used have been documented to be difficult for preschool-age SLI children (Restrepo, et al., 1992). The noun bound morpheme referred to the larger version of a figure or object. The verb bound morpheme referred to an increased range of motion for actions presented in the vocabulary stories. These concepts were chosen to be represented by novel word endings because size is

not coded with an affix attached to nouns or verbs in English.

For example:

Here is a pag.

And here is a paga. (larger version)

They are friends.

What is he? (paga [affixed])

And what is he? (pag [unaffixed])

The bound-morpheme stories contained both the previously learned vocabulary items in their affixed and unaffixed forms. Each story contained 10 presentations of each item, six in the affixed and four in the unaffixed form. The bound-morpheme stories followed the same format as the vocabulary stories. The subject was given three opportunities to respond to each affixed item and two opportunities to respond to each unaffixed item.

A posttest to measure retention of trained bound morphemes affixed to trained lexical items and generalization of trained bound morphemes to novel lexical items was administered following the bound-morpheme stories. The subject was shown the figure, object, or action corresponding to a vocabulary item while the presenter provided the item. The larger object or action was then presented, and the subject was asked to identify the affixed form (e.g., "This is a teeg. What is this? [teega-affixed form]). Two opportunities to identify each of the four affixed items were provided to each

subject. In addition, four unfamiliar novel items were presented to assess generalization of the novel bound morphemes. Two opportunities to affix each unfamiliar item were provided during the generalization probe.

GEM test. The GEM test was presented in a format similar to that of the Word Structure subtest of the CELF-R and the Wug test by Berko (1958). The GEM test was administered to assess generalization of English bound morphemes to novel lexical items. The five English bound morphemes assessed were regular plurals, noun possessives, third person singular, regular past tense, and formation of comparatives and superlatives. There were two opportunities to attach the correct English grammatical morpheme to the novel lexical items. Bound morphemes documented to be difficult for SLI children dictated the selection of the GEM test's items (Gopnick & Crago, 1991). Test items that elicited carryover responses from previous tasks were dropped during the pilot phase of this study.

### Procedures

Five undergraduate, speech-language pathology students who were blind to the purpose of the experiment administered all tasks. For each subject, the CELF-R and experimental tasks were administered by two different presenters to insure that those administering the experimental tasks were blind to

the results of language testing. The hearing screening and the CELF-R subtests were administered on the first day. On Day 2, presenters administered one vocabulary training story followed by the vocabulary posttest. The vocabulary posttest was followed by one novel bound-morpheme learning story and the bound-morpheme posttest. The GEM test was presented last to minimize the possibility that prior experience with the GEM test would inflate subjects' scores on the bound-morpheme stories and posttest. Subjects received stickers for their cooperation and participation following each session.

During story presentations and posttests, the presenter was seated across a table from the subject in a room at the subject's school. The figures and objects were manipulated within the boundaries of a piece of colored construction paper taped to the center of the table to focus the subject's attention. To introduce the novel vocabulary, presenters explained that the subject needed to listen carefully to some sentences about creatures from another planet. During the vocabulary stories, subjects received feedback regarding the accuracy of their responses. The presenter repeated the vocabulary item within the feedback context to control the number of item presentations (e.g., "yes, he's a pag"). No differential feedback was provided during any of the remaining experimental phases. Responses were scored either as correct or incorrect for all stories and posttests.

### Counterbalancing

Two sets of novel, CVC vocabulary items and two sets of figures were developed for counterbalancing across subjects to minimize specific word and bound morpheme effects as well as the effects of possible object or action saliency. Bound morphemes were counterbalanced across nouns and verbs (e.g., 5 LLD and 5 NL subjects received the /u/ bound morpheme as the noun suffix and the / / as the verb suffix, and the remaining subjects received the reverse).

Sets of vocabulary items were counterbalanced across story presentations and the bound-morpheme posttest. Presenters used one of the vocabulary sets in the story presentations and the other vocabulary set in the bound-morpheme posttest for 1/2 of the subjects trained; the remaining subjects received the reverse. In addition, the animate figures and inanimate objects were counterbalanced across story presentations and bound-morpheme posttest. Three of the presenters used one set of figures and objects in the story presentations and the second set of figures and objects in the bound-morpheme posttest; the remaining two presenters did the reverse.

### Reliability

Procedural reliability was estimated independently for each presenter. The story presentations for 30% of the

subjects, 6 subjects total, were randomly selected and audiotaped. The sessions for these presenters were checked by a trained observer for accuracy of item presentation on a sentence-by-sentence basis. In addition, all scored responses to standardized tests, story items, posttests, and GEM tests were simultaneously double scored by a trained observer to estimate point-to-point reliability between response scoring of each presenter.

The stories were presented with an average of 99.8% accuracy, ranging from 99.3% to 100%. Point-to point reliability for the scoring of vocabulary stories and vocabulary posttests ranged from 88.0% to 100%, with an average of 97.9%. Similarly, reliability for scoring of bound-morpheme stories and bound-morpheme posttests ranged from 88.0% to 100%, with an average of 97.9%. Reliabilities for GEM tests and CELF-R subtests averaged 93.4%, ranging from 80% to 100% and 96.6%, ranging from 94.0% to 100% respectively.

## Results

Mean scores and standard deviations of performance on the four levels of the dependent variable are presented in Table 2. A two-way mixed analysis of variance (ANOVA) revealed

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Insert Table 2 about here

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significant group,  $F(1,18) = 10.26, p < .004$ , and task effects,  $F(3,54) = 47.75, p < .0001$ ). The group by task interaction was not significant,  $F(3,79) = 0.82, p > .01$ . Fisher a priori tests were utilized to test for between group differences on each task. Results revealed significant group differences on the Word Structure subtest of the CELF-R, the novel bound-morpheme learning task, and the GEM test ( $p < .05$ ).

### Analysis of Errors

Pattern of errors on the four levels of the dependent variable were analyzed descriptively for each subject group. Error analysis revealed quantitatively and qualitatively different error patterns for all tasks except the novel bound-morpheme posttest.

LLD children made a total of 49 grammatical morpheme errors ( $M = 4.9$ , range = 0-10) on the Word Structure subtest of the CELF-R. NL children made a total of 11 grammatical morpheme errors ( $M = 1.1$ , range = 0-4). The type and number of errors made by LLD and NL children are presented in Table

3. LLD children made a total of 33 errors ( $\underline{M}$  = 3.3, range = 0-9) on the GEM test. NL children made a total of 11 errors ( $\underline{M}$  = 1.1, range = 0-7). The type and number of errors made by LLD and NL children are also presented in Table 3.

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Insert Table 3 about here

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LLD children made a total of 49 errors ( $\underline{M}$  = 4.9, range = 2-7). NL children made a total of 24 errors ( $\underline{M}$  = 2.4, range = 0-4) on the novel bound-morpheme learning story. The type and number of errors made by LLD and NL children are presented in Table 4. LLD children made a total of 87 errors ( $\underline{M}$  = 8.7, range = 5-14) on the novel bound-morpheme posttest. NL children made a total of 67 errors ( $\underline{M}$  = 6.7, range = 1-13). The type and number of errors made by LLD and NL children are also presented in Table 4.

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Insert Table 4 about here

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### Discussion

The present results indicate that oral bound-morpheme impairment, a characteristic of preschool-age children referred to as SLI, is also characteristic of school-age children with a language-based learning disorder. The results of a measure of English bound-morpheme skill levels and a measure of ability to generalize English bound morphemes to novel vocabulary items corroborated previous reports of oral bound-morpheme impairment in school-age, LLD children (Bishop & Edmundson, 1987; Gopnick & Crago, 1991; Moran & Byrne, 1977; Rubin, Patterson, & Kantor, 1991; Scarborough & Dobrich, 1990). Learning measures intended to exercise control over past biological and behavioral disadvantages, were also administered. The results of the experimental measure of novel bound-morpheme learning suggest that a deficit in the ability to learn new bound morphemes underlies the oral bound-morpheme impairment of LLD children. This result extends the findings of Roseberry and Connell (1991) for Spanish-speaking, SLI children to English-speaking, LLD children.

Viewed in relation to longitudinal studies (Bishop & Edmundson, 1987; Scarborough & Dobrich, 1990), the present findings suggest that maturation and increased exposure to language do not remediate the core deficit underlying the oral bound-morpheme impairment. This proposal is consistent with neuroanatomical findings of atypical perisylvian

configurations associated with the behavioral constellation of SLI and LLD children across a range of ages (Plante, 1991; Plante, Swisher, Vance, & Rapsack, 1991). Thus, both behavioral and neuroanatomical findings suggest that progress made by SLI and LLD children in the expression of oral bound morphemes is largely attributed to practice with a closed set of language units - bound morphemes - rather than remediation of a core deficit which affects learning of these units.

Plante (in press) and Snyder (1984) have indicated that children diagnosed as SLI during their preschool years typically are reclassified as learning disabled or dyslexic during their school years. Although the subject selection criteria for this study did not require LLD subjects to have poor oral bound-morpheme skills or to have been diagnosed as SLI during their preschool years, they were found to have both poor oral bound-morpheme skill levels and poor learning ability. The findings draw attention to oral bound-morpheme impairment as a stable component of one type of language disorder. Viewed in relation to what is known about the underlying biological substrate (Plante, 1991; Plante, et al., 1991) of SLI and LLD children, the results further suggest that shifts in their behavioral constellation may occur in the presence of the same core deficit. More specifically, maturation and learning experiences may interact to reveal the bound-morpheme impairment first in oral expression, then in

reading (Bishop & Adams, 1990; Scarborough & Dobrich, 1990) and later in writing (Rubin, et al., 1991).

Two views exist regarding the way in which the behavioral constellation of SLI children differs from that of NL children. Leonard (1989; 1991) has proposed that language-impaired children with characteristics similar to those studied here are similar to NL children except that their behavioral constellation includes some "low-normal" skills. Conversely, Restrepo, et al. (1992) have proposed that patterns of results indicate that the cognitive systems of SLI and NL children differed qualitatively. This "qualitative differences" model predicts the results of the descriptive analysis of the oral bound-morpheme errors made by the LLD and NL children studied here. The earlier, rather than later, developing grammatical morphemes were disproportionately harder for the LLD children.

In conclusion, this study indicates that the oral bound-morpheme impairment that characterizes preschool-age children diagnosed as SLI also characterizes school-age children with a language-based learning disability. This finding occurred without a subject selection criterion that required the LLD children to have poor oral bound-morpheme skills or a history of diagnosis as SLI. The results, consistent with those of longitudinal studies (Bishop & Edmundson, 1987; Scarborough & Dobrich, 1990) and what is known about the biological

substrate of SLI and LLD (Plante, 1991; Plante, et al., 1991), indicate that a deficit in the learning of oral bound morphemes can persist into the school years despite maturation and learning experiences.

Table 1.

Means and Standard Deviations of Performance on the CELF-R  
by School-Age Language-Learning Disabled and Normal Language  
Children.

CELF-R	Language-learning disabled		Normal language	
	Mean	S.D.	Mean	S.D.
Receptive	75.7	6.56	99.5	10.4
Expressive	70.9	7.90	103.0	10.1
Total Language	71.7	6.56	101.0	10.8

Table 2.

Means and Standard Deviations of Performance by School-Age  
Language-Learning Disabled and Normal Language Children on the  
Four Bound-Morpheme Measures.

Dependent Variable Level	Language-learning disabled		Normal language		T
	Mean	S.D.	Mean	S.D.	
Word Structure subtest of CELF-R	31.1	2.50	34.9	0.94	36
Novel bound-morpheme learning story	15.1	1.54	17.6	1.24	20
Novel bound- morpheme posttest	7.5	2.10	8.4	2.48	16
GEM test	11.7	2.96	13.9	1.36	12

T = Total number of items

Table 3.

Type and Number of Total Errors Made by School-Age Language-Learning Disabled and Normal Language Children on the Word Structure Subtest and GEM Test.

Grammatical morpheme error	Language-learning disabled		Normal language	
	WS	GEM	WS	GEM
Regular plurals	5	NA	0	NA
Irregular plurals	3	NA	0	NA
Noun possessives	5	5	0	0
Personal pronouns	3	NA	0	NA
Third person singular	0	10	1	4
Regular past tense	14	4	1	1
Auxiliary + ing	2	NA	1	NA
Derivation of nouns				
from verbs	1	NA	0	NA
Adjective derivation	2	NA	1	NA
Formation of comparative and superlative				
and superlative	6	14	2	6
Demonstratives	8	NA	5	NA

WS = Word Structure subtest of CELF-R / 36 items

GEM =GEM test / 12 items

Table 4.

Type and Number of Total Errors Made by School-Age Language-Learning Disabled and Normal Language Children on the Novel Bound-Morpheme Learning Story and Posttest.

Bound-morpheme error	Language-learning disabled		Normal language	
	NBMLS	PT	NBMLS	PT
No response	2	7	1	3
No bound morpheme				
correct vocabulary item	3	13	1	1
Correct bound morpheme				
incorrect vocabulary item	3	3	2	2
Incorrect bound morpheme				
correct vocabulary item	15	39	8	44
Incorrect/no bound morpheme				
incorrect vocabulary item	26	25	12	17

NBMLS = Novel Bound-Morpheme Learning Story / 20 items

PT = Posttest / 16 items

## Appendix

Excerpts from Training Stories

Today, I'm going to read you some sentences about some creatures from a far away planet. These sentences will show me how you learn. Listen carefully. (Instructions and response feedback were only used with the novel vocabulary story presentation.)

Novel Vocabulary Learning Story	Novel Bound Morpheme Learning Story
<p>Here is a bep. It is a toy.     <b>What is this? (bep)</b> Here is a pag. It is his bep.     <b>What is he? (pag)</b> The pag likes to play on his bep. The pag likes his toy.     <b>What is this? (bep)</b>     <b>What is he? (pag)</b> The pag is having fun. He can teeg. Watch him.     <b>What can he do? (teeg)</b></p> <p>He can teeg on his toy. Look at him go.</p> <p>The pag likes to teeg. He is playing on his bep.     <b>What does he like to do? (teeg)</b>     <b>What is he? (pag)</b> He is on his bep.</p> <p>Look, now he can ...</p>	<p>Here is a bep. It's a toy.     <b>What is this? (bep)</b> Here is a beppa. It's a toy too.     <b>What is this? (beppa)</b> Whose toys are these? He is a pag. They are his toys.     <b>What is he? (pag)</b> He is a paga. Look at him.     <b>What is he? (paga)</b> The paga says, "Can I play?" "OK," says the pag. "You can play with my toys." The pag gets his toys. The paga watches him.     <b>What is he? (pag)</b>     <b>And what is he? (paga)</b> "Here are my favorite toys." Here is a bep...</p>

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