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Development of Morphological Forms in Four-Year-Old Children

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The purpose of this study was to investigate morphological development in 4-year-old children. Two tests were utilized and compared to see if there was a significant difference between the expression of meaningful and nonmeaningful words. The first test, a modified version of the Test for Examining Expressive Morphology (TEEM), used meaningful words to assess allomorphic variations of six bound morphemes. The second test, a modified version of Berko's

Test of English Morphology (BTEM), assessed the same allomorphic variations, but it used nonmeaningful words.

Participants in this study were 26 4-year-old children from the greater Portland area. Each subject passed a screening for hearing acuity, articulation, speech intelligibility, and receptive vocabulary.

A two-tailed *t*-test for dependent means was computed to determine if there was a statistically significant difference between scores on the tests using meaningful and nonmeaningful stimuli. Results indicated the difference between the TEEM ($\bar{x}$ = 13.23) and the BTEM ($\bar{x}$ = 8.84) was significant beyond the .001 level of confidence. With the exception of the /z/ allomorphic variation of the possessive morpheme, all subjects obtained better scores on the meaningful stimuli than on the nonmeaningful stimuli.

Chi-square analyses were computed to determine if there was a significant difference between the number of subjects correctly producing meaningful and nonmeaningful allomorphs. Results revealed a significant difference beyond the .001 level for the /əd/ allomorphic variation of the past tense morpheme, the comparative /ɚ/, and superlative /əst/ forms of the adjective, and the /əz/ allomorphic variation for the plural, possessive, and third person singular morphemes. Statistical analysis resulted in a significant difference that approached the .05 level of confidence for the /t/ and /d/ allomorphic variations of the past tense morpheme. Chi-square analysis could not be computed for the other

allomorphic variations due to the high degree of accuracy on both the meaningful and nonmeaningful test items.

Results of chi-square analysis at the morpheme level showed a significant difference beyond the .001 level of confidence for past tense and comparative and superlative forms of the adjective. Statistical analysis was not computed for the plural, possessive, or third person singular morphemes because visual inspection showed the difference to be at the allomorphic level rather than at the morpheme level. No statistical analysis was computed for the present progressive morpheme due to inappropriate data resulting from a high accuracy rate.

Results of this study indicated the subjects performed better on the test using meaningful words than on the test using nonmeaningful words. Better scores were obtained on test items that used more common allomorphic variations than on test items that used less common allomorphic variations. Findings of this study are consistent with other research.

DEVELOPMENT OF MORPHOLOGICAL FORMS IN FOUR-YEAR-OLD CHILDREN

by

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CHAPTER I

INTRODUCTION

Children learn the patterns or rules of language during the process of normal language development. Rules are essential in understanding and producing sentences by combining words meaningfully (Dale, 1976). As sentence length increases and sentence structure becomes more complex, the use of grammatical morphemes (the smallest unit of meaning) becomes necessary. The acquisition of grammatical morphemes progresses in developmental stages (Wood, 1981). Brown (1973) substantiated and described a general order to the learning of morphemes which applies to expressive language development.

Effective communication by children is dependent upon the development of morphology (Shipley and Banis, 1981). As Shipley and Banis noted, the appropriate or deficient use of morphemes is a measure of language ability. One way of assessing language ability and the use of morphemes is through the use of standardized tests. Morphological development can be assessed by the Test for Evaluating Expressive Morphology (TEEM) (Shipley, Stone, and Sue, 1983). Allomorphic variations of six bound morphemes are evaluated in this test utilizing meaningful words. Berko's Test of

English Morphology (BTEM) (1958) is another test of morphological development, but it uses nonmeaningful words as the testing stimuli.

The use of meaningful, as well as nonmeaningful words to assess morpheme development has been investigated as is evident in the literature. In a study conducted by Newfield and Schlanger (1968), both normal and mentally retarded children obtained significantly better scores on tests using meaningful words. By testing mentally retarded children, Dever (1972) found that tests using both meaningful and nonmeaningful words were not valid for predicting the ability of the child to use correct inflected morphemes in conversational speech. Because of these and other studies, questions have been raised as to the validity of using nonsense words to assess a child's acquisition of morphological rules (Peterson and Marquardt, 1981).

Conversely, Berko (1958) contended that a morphological test using real words will only indicate that a child knows a particular word, but will not indicate knowledge of the morphological rule. Through the use of nonsense words, Berko looked at the internalization of a working system of morphological rules. If a child can generalize the plural allomorph to a nonmeaningful word, there is evidence that the child has indeed internalized the rule for pluralization (Berko, 1958). More information about morphological development can be obtained by comparing how children perform on tests using meaningful and nonmeaningful words.

STATEMENT OF PURPOSE

The purpose of this study was to compare the performance of 4-year-old children's usage of meaningful words with their usage of nonmeaningful words for assessment of the expression of allomorphic variations of six bound morphemes. The specific research question posed was: Is there a significant difference in 4-year-olds between the scores on test items using meaningful words and on test items using nonmeaningful words for allomorphic variations of the selected bound morphemes of plural /s/, /z/, /əz/; possessives /s/, /z/, /əz/; past tense /t/, /d/, /əd/; present progressive /ɪŋ/; and comparative/superlative adjectives /ð/, /əst/?

DEFINITIONS

1. Allomorph. A variant of a morpheme, e.g., /s/, /z/, and /əz/ are allomorphs of the plural morpheme (Fromkin and Rodman, 1978).

2. Bound morpheme. A morpheme which cannot stand alone and must occur with at least one free morpheme, e.g., the "s" in "cats" (Gleason, 1985).

3. Derivational morpheme. A morpheme which changes the category or grammatical class of words, e.g., "ful" in "helpful" (Fromkin and Rodman, 1978).

4. Free morpheme. A morpheme which can stand alone, e.g., "table" or "chair" (Gleason, 1985).

5. Inflectional morpheme. A morpheme which does not change the word or category of the word or morpheme to which it is attached, e.g,, by adding an "s" to the word "dog," it remains a noun (Fromkin and Rodman, 1978).

6. Irregular allomorph. An allomorph which does not follow any rules and must be learned separately, e.g., the plural of "child" is "children" or the plural of "man" is "men" (Menn, 1985).

7. Lexical. Referral to the vocabulary or words used in a language (Wiig and Semel, 1980).

8. Mean length of utterance (MLU). The average length of a sentence or utterance. MLU is measured in morphemes rather than in words (Brown, 1973).

9. Morpheme. The smallest unit of language that has meaning (Perkins, 1977).

10. Morphology. The study of the rules of word formation (Perkins, 1977).

11. Morphophonemic rules. The rules which indicate which allomorphic variation must be used (Francis, 1958).

12. Phonology. The study of sounds found in language and the rules for combining sound in words (Weiss, Gordon, and Lillywhite, 1987).

13. Zero allomorph. An allomorph which does not change from one form to another, e.g., the plural form of "deer" is "deer."

CHAPTER II

REVIEW OF THE LITERATURE

The acquisition of language is quite predictable in most children. Language development follows general patterns with certain structures emerging before others (Wood, 1981). In order to study normal language development of children, it is necessary to understand grammatical morphemes, one component of language. A morpheme is defined as the smallest unit of meaning which cannot be further analyzed. All words are composed of one or more morphemes (Fromkin and Rodman, 1978).

Morphemes can be categorized as free or bound. The type of morpheme which can be used in isolation (such as "book") is known as a free morpheme; whereas, a bound morpheme (such as "-s" or "-ing") must be attached to another morpheme even though it does have meaning (McLean and Snyder-McLean, 1978). Morphemes can also be divided into categories dependent upon location within a word. A morpheme which occurs before another one is known as a prefix and one which occurs after another morpheme is called a suffix. Finally, morphemes can be classified as derivational or inflectional. A derivational morpheme, when added to another morpheme, changes the grammatical class of the word and a new word is derived. For example, by adding the suffix "er" to the word

"teach," the new word "teacher" is derived, which changes the class of the word from a verb to a noun. If a suffix never changes the class of the word, it is called an inflectional morpheme. For example, by adding the morpheme "s" to the noun "cat," the new word "cats" remains a noun (Fromkin and Rodman, 1978). Inflectional morphemes denote meanings such as plurality, verb tense, or possession (McLean and Snyder-McLean, 1978).

Within some inflectional morphemes, there are subgroups known as allomorphs (Shipley, Stone, and Sue, 1983) which vary depending on the final sound of the word to which they are attached (Menn, 1985). For example, there are three different variations of the plural morpheme. The first one sounds like /s/ when following most unvoiced stops (e.g., cats and rocks). The second allomorph sounds like /z/ following a vowel or most voiced stops (e.g., bees and dogs). Another regular allomorph sounds like /əz/ when the preceding sound is a sibilant fricative or affricate sound such as /s/, /z/, /ʃ/, /ʒ/, /ʧ/, or /ʤ/ (e.g., buses, sneezes, wishes, garages, witches, and badges) (Menn, 1985). Some plural morphemes require an irregular allomorph (e.g., mice) and still others use the zero allomorph (e.g., sheep) and are unchanged from the singular form of the word (Shipley, Stone, and Sue, 1983). Possessives and third person singular verbs use the same allomorphic variations as do the plural morphemes (Kenyon and Knott, 1953).

Similarly, the past tense morpheme includes three allomorphic variations (Berko, 1958). If the final sound in a word is /t/ or /d/, the /ə d/ sound is used (e.g., painted). Words ending in a voiceless sound use the /t/ sound to denote past tense (e.g., walked). A /d/ sound follows words ending in vowel sounds and voiced consonant sounds, with the exception of /d/ (e.g., cried and hugged) (Berko, 1958).

Comparative and superlative forms of adjectives and the present progressive form of the verb have no allomorphic variations. All regular forms of the comparative adjective use an "er" ending and all regular forms of the superlative adjective use an "est" ending (Berko, 1958). Present progressive forms of the verb all require an "ing" ending (Menn, 1985).

STUDIES CONCERNING MORPHOLOGICAL DEVELOPMENT

Children's language development can be evaluated by comparing one child's language production to what is known about the language of other children (Bloom and Lahey, 1978). Investigating children with comparable mean length of utterances (MLU) is usually more appropriate than looking at children of similar chronological ages, but Bloom and Lahey (1978) caution MLU should be used only as a gross index of language development. A study by Cazden (1968) found that children using the same MLU can vary greatly in the complexity of the grammatical structure of their utterances. There will, however, also be many similarities in the language of

children using approximately the same MLU and it is with this assumption that studies have been conducted to investigate morphological development (Brown and Fraser, 1964; Menyuk, 1963; Miller and Ervin, 1964).

Observational studies have been conducted to investigate the order of normal acquisition of grammatical morphemes. Brown (1973) studied the emergence of 14 grammatical morphemes (Table I). He examined bound morphemes which modify free morphemes or make the content morphemes more precise. He concluded children learn these 14 grammatical morphemes in essentially the same order. From this study, Brown identified five stages of development which correspond to MLU (Table II).

TABLE I

MEAN ORDER OF ACQUISITION OF 14 MORPHEMES

	Morpheme	Average Rank
1.	Present progressive	2.33
2-3.	in, on	2.50
4.	Plural	3.00
5.	Past irregular	6.00
6.	Possessive	6.33
7.	Uncontractible copula	6.50
8.	Articles	7.00
9.	Past regular	9.00
10.	Third person regular	9.66
11.	Third person irregular	10.83
12.	Uncontractible auxiliary	11.66
13.	Contractible copula	12.66
14.	Contractible auxiliary	14.00

SOURCE: R. Brown, A First Language (Cambridge, MA: Harvard University Press, 1973), 274.

TABLE II

BROWN'S STAGES OF LANGUAGE DEVELOPMENT

Stages	MLU	Morpheme Development	Brown's Description
I	to 2.0	inflections virtually absent	appearance of first multiword utterances
II	2.0-2.5	development of inflections	modulation
III	2.5-3.0	development of interrogation, negation, and the imperative	modalities of the simple sentence
IV	3.0-4.0	use of transitive verbs to embed one sentence within another	embedding of one simple sentence within another
V	4.0	use of conjunctions to combine complete sentences	coordination of simple sentences and propositional relations

SOURCE: R. Brown, A First Language (Cambridge, MA: Harvard University Press, 1973).

The MLU of a child has been found by Brown (1973) to correlate .92 with that child's order of morpheme acquisition. Brown's stages not only represent increased number of morphemes, but progressive stages in the development of language. From this, he concluded the MLU of a child's speech is indicative of morpheme development and by evaluating MLU, it is possible to predict the presence of certain morphemes.

Another study, which was conducted by deVilliers and deVilliers (1973), shows a high degree of correspondence with

Brown's (1973) study. Although the two studies show a discrepancy in the order of acquisition of four of the morphemes (i.e., contractible and uncontractible copula, and contractible and uncontractible auxiliary), the overall results suggest a strong relationship between MLU and grammatical morpheme development.

Results of a study conducted by Bloom, Lifter, and Hafitz (1980) did not support the findings of Brown (1973) and deVilliers and deVilliers (1973) that MLU is a predictor of morpheme development and that grammatical morphemes are learned in a sequential order. Bloom et al. (1980) found no support for sequential order of morpheme acquisition and did not relate MLU to morpheme development. Instead, results of this study indicated the semantics or meaning of the verb was of great importance in the learning of the verb inflection. Determination of which inflection was used, if any, was directly related to the connection between the particular verb used and the item which was the focus as the subject. Another observation of Bloom et al. was that different and selective use of inflections is directly related to the verb aspect. As defined in this study, verb aspect deals with the temporal element of an event that is momentary in time (e.g., "hit" or "jump"). The learning of rules for inflection was also addressed in this study. The findings were that the aspect of the verb and the syntax of the sentence were the critical factors in determination of verb inflection. Over time, the appropriate use of inflections

develops as the child becomes more aware of the relationship between the event being described and the speaker.

Opinions vary as to the acceptability of using MLU in determining grammatical development. Results of a study by Klee and Fitzgerald (1985) indicate that a 100-utterance sample may not be an accurate representation of a child's actual linguistic ability. The value of MLU to predict grammatical development beyond Brown's (1973) Stage II was found to be limited. The usefulness of expecting MLU to predict grammatical development was questioned. Conant (1987) criticized the results of the Klee and Fitzgerald study. By examining the data published by them, Conant reported Klee and Fitzgerald were too hasty in reporting that their findings applied to the 2- to 4-year-old age group when the evidence only supports the 2-year-old age group.

Brown (1973), deVilliers and deVilliers (1973), and other authors studied language development by taking language samples and analyzing the use of inflected morphemes. Another way to study the acquisition of grammatical morphemes is to test children by presenting a stimulus to elicit the desired inflected morpheme. Several tests have been devised to do this and provide more information about the development of morphemes.

TESTS OF DEVELOPMENT OF MORPHOLOGICAL RULES

Berko (1958) wanted to examine children's development and internalization of morphological rules. She hypothesized

that if a child uses morphological rules with nonsense words, then one could conclude that the child had indeed internalized them. To test her hypothesis, she developed a test which utilizes nonsense words, coupled with lead statements that require the child to supply a modified form of the nonsense word.

To find which morphological features to test, Berko (1958) examined the vocabulary of first-graders. The morphemes chosen for her study were plural, possessive, third person singular, present progressive verbs, regular past tense verbs, and comparative and superlative adjective forms. Some derivational morphemes were included as well as compound words. It was deemed too confusing to use nonsense compound words and so lexical compound words were introduced in the test.

After studying children's vocabularies, Berko (1958) devised a test using nonsense words to examine children's knowledge of morphological rules. In the test, the testees were to inflect, derive, and compound words, as well as analyze compound words. To accomplish this task, Berko devised new words which followed rules for possible sound combinations in the English language. Pictures were drawn to represent the nonsense words. Each of the 27 brightly-colored pictures were put on individual cards.

Since children's use of morphological rules had never been tested in this manner before, Berko devised lead statements to elicit the desired inflections. Similar lead

statements are now used in many tests which examine children's abilities to use inflectional and derivational morphemes (Brown, 1973).

The subjects for Berko's 1958 study were 18 girls and 15 boys at the preschool level, ranging in age from 4 to 5 years. Also included were 26 boys and 35 girls in the first grade, ranging in age from 5-1/2 to 7 years. From this study, Berko concluded that children were consistent in their answers and showed definite use of morphological rules. Results also showed that children of this age range do not yet use all the allomorphic variations of the morphemes examined in this test. The children had more success inflecting nonsense words with the allomorphic variations that were more common in lexical words and had more difficulty with allomorphs that were used infrequently in lexical words. From these results, Berko concluded that the children in her study performed better on the morphemes which had the fewest variations and could be considered the most regular.

Other tests have been developed to assess the development of morphological rules by using meaningful words. The Grammatic Closure subtest of the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, McCarthy, and Kirk, 1968) and the Bankson Language Screening Test (BLST) (Bankson, 1977) both use a sentence completion task in response to visual stimuli. A sentence completion task with no visual stimuli is utilized in the Grammatic Completion subtest of the Test of Language Development: Primary (TOLD) (Newcomer and

Hammill, 1982). The Structured Photographic Expressive Language Test-II (SPELT-II) (Werner and Kresheck, 1983) uses questions in response to photographs to assess the development of different morphemes.

Shipley, Stone, and Sue (1983) developed The Test for Examining English Morphology (TEEM) "to help clinicians evaluate expressive morpheme development" (p. 1). The test provides normative data for children ages 3 to 8 years. The TEEM was developed to examine a child's development and use of morphemes and allomorphic variations. A sentence completion format with lexical stimuli is utilized.

The TEEM was developed with the assumption that a nonsense paradigm such as Berko's (1958) will not yield as accurate results as the use of lexical stimuli. Another consideration was that a test of morphological development should include a large sample of allomorphic variations. The test should be highly valid and reliable. Administration time should be short enough to be clinically feasible.

With these considerations in mind, the TEEM was developed to examine allomorphic variations of many morphemes using a sentence completion model of lexical stimuli. The test was designed to be administered efficiently and to detect differences among age levels.

The criteria for the stimulus words chosen for the TEEM were words that were familiar to children, easily drawn, and suitable for a sentence completion task. In addition, the word endings had to include a variety of allomorphic

variations. Validity and reliability of the TEEM, established by administering the test to 40 normally developing children, was found to be high. This test was standardized on 500 children, 100 in each age level from 3 through 7. Ages by which 75% and 90% of the children tested responded correctly to each test item are printed on the test protocol.

Morphemes tested by the TEEM are present progressive verbs, plurals, possessives, third person singular, past tense, and derived adjectives. While this test was standardized on normal-developing children, the manual states the populations of children which can be administered this test are normal-developing preschool age children, language delayed or language disordered children, hearing-impaired children, and children who are learning English as a second language.

STUDIES OF ALLOMORPHIC VARIATIONS OF MORPHEMES

A study by Anisfeld and Tucker (1967) investigated the productive and receptive use of pluralization rules in 6-year-old children. The portion of this study which has relevance for this review of the literature concerns the allomorphic variations of the production of /s/, /z/, and /əz/ of the plural morpheme using nonsense words. Findings on the production portion of this study indicate the subjects made more errors on the /əz/ allomorph than on the /s/ and /z/ allomorphs. One explanation given for these results is that children use relatively few words that require the /əz/

form of the plural and are more familiar with the /s/ and /z/ forms of the plural morpheme. This study was patterned after Berko's (1958) study and the results were similar in that the subjects made fewer errors on the /s/ and /z/ allomorphs than on the /ə z/ allomorph.

Berko's research was the model for another study of first, second, and third graders conducted by Graves and Koziol (1971). Meaningful and nonsense words were used to study allomorphic variations of the plural morpheme. One result of this study was that the /s/ and /z/ allomorphic variations of the plural were mastered before the /ə z/ allomorphic variation. Another finding was that the subjects performed better on the meaningful words than on the nonsense words.

The studies cited in this review of the literature investigated the development of allomorphic variations of bound morphemes. Tests utilizing both meaningful and non-meaningful stimuli have been examined and compared for effectiveness in assessing morphological development.

CHAPTER III

METHODS AND PROCEDURES

SUBJECTS

The subjects for this study were 26 children attending preschools in the greater Portland area. The age range was 4 years, 0 months to 5 years, 0 months. All subjects met the following criteria:

1. obtained parent or guardian permission to be included in this study (see Appendix A);
2. used standard English as the primary language as reported by the preschool teacher and/or parent;
3. passed a unilateral pure tone audiometric screening at 25dB for the frequencies of 500, 1000, 2000, and 4000 Hz;
4. obtained a score on the true score confidence band within the average range on the Peabody Picture Vocabulary Test - Revised (PPVT-R), Form L, (Dunn and Dunn, 1981);
5. had at least 80% speech intelligibility as determined by the examiner in a short speech sample while conversing with the examiner;
6. had not received previous nor were currently receiving speech-language intervention;

7. were able to train to the experimental task;
8. passed an articulation screening test consisting of the sounds in the final position that are necessary to produce the allomorphic variations present in the bound morphemes tested in this study, i.e., /s, z, t, d, ŋ, ʃ/. Developmental substitutions and distortions were acceptable; omissions were not. Acceptable substitutions and distortions had the same voicing features as the target sound. (See Appendix B for the articulation test items and acceptable substitutions.)

INSTRUMENTATION

TEEM

The Test for Examining Expressive Morphology (TEEM) (Shipley, Stone, and Sue, 1983) is an expressive sentence completion test for morphological forms which consists of 54 items. Testees are required to complete a target utterance in response to visual stimuli (e.g., "Here is a dog, here are two ____"). Each item is scored correct or incorrect and a raw score is attained for the complete test. The six bound morphemes examined by this test are present progressive, plural, possessive, third person singular, past tense, and comparative/superlative adjectives.

For the purposes of this study, a modified version was developed, consisting of 15 items chosen from the 54 items on the TEEM to represent the allomorphic variations of the

six bound morphemes. Appendix C lists the test items by morpheme and Appendix D shows a score sheet with all test items and practice items for the TEEM and the BTEM. Appendix E contains the verbal stimulus for each test item on the TEEM. The selected items were the lowest age at which 90% of the children responded correctly for each morpheme. If all items listed for a morpheme were the same age at which 90% of the children responded correctly, one item was randomly selected.

BTEM

Berko's Test of English Morphology (BTEM) (Berko, 1958) contains 27 items. The format of this test is essentially the same as the TEEM, except nonmeaningful words are used rather than meaningful words. The testee responds verbally to visual stimuli by completing a target utterance (e.g., "Here is a wug, here are two ____"). All items are scored as correct or incorrect. The BTEM uses allomorphic variations of the same six bound morphemes as the TEEM to assess the application of morphological rules to nonmeaningful stimuli. A modified version of the BTEM was used in this study.

For this study, stimulus items representing 12 of the same allomorphic variations were chosen from the BTEM. Since three allomorphic variations included in the TEEM did not exist in the BTEM, this investigator created nonmeaningful words and had pictures drawn to represent the missing allomorphic variations (see Appendices C and D). The test items selected were items with the highest percentage of correct

responses in Berko's (1958) study. Berko stated the pictures in the BTEM are to be brightly colored and printed on cards along with the text. In contrast, pictures in the TEEM are black line drawings with no text printed on the page. In order for these two tests to be as similar as possible for this study, pictures from the BTEM were drawn in accordance with Berko's descriptions except as black line drawings with no text appearing on the page. Verbal stimulus and line drawings for the BTEM are shown in Appendices F and G.

PROCEDURES

Testing Environment

Testing took place in a quiet room with no other children present. A short speech sample was obtained with the examiner sitting around the table corner from the child. During the hearing screening the child's back was to the examiner so that the child could not see the dials being manipulated on the audiometer. The other tests were administered at a small table with the examiner sitting next to the child. Since all of the testing took place at one time, the child was allowed to walk around between tests in order to avoid fatigue.

Screening

Children with returned parental permission forms were screened for participation in this study. First, a short conversational sample was elicited to determine speech intelligibility. If intelligibility was judged to be at least

80%, screening continued. Secondly, a pure-tone hearing screening was administered and criteria had to be met in one ear by potential subjects. An articulation screening was the third screening instrument administered. The children passed this screening by correctly producing the target sounds in the final position or producing acceptable distortions or substitutions. Following passage of the articulation screening, they were administered the PPVT-R, Form L as the final screening instrument. While the examiner was scoring the PPVT-R, the children were allowed to stretch or walk around. Children meeting all criteria for inclusion in this study then continued participation with the experimental testing.

Test Administration

After meeting criteria for participation in this study, the child was seated at a small table around the corner from the examiner. On an alternating basis, one-half of the children were given the modified version of the TEEM first, followed by the modified version of the BTEM, while the other half were given the tests in the reverse order.

Instructions presented to each child for both tests were:

> I am going to show you some pictures. I will tell you about the picture, but I will leave off the last word. I want you to finish what I say. Let's do one.

Five practice items for each test were given before the actual testing began. When a child responded incorrectly to any practice item, the examiner immediately explained the

correct response. Practice items did not exist for the BTEM and were created to match the allomorphic variations of the practice items of the TEEM (Appendices E and F).

DATA MEASUREMENT AND ANALYSIS

Tests were scored and mean test scores and standard deviations were obtained for each test. A two-tailed *t*-test for dependent means was used to determine if significant differences existed between the performance on the two tests, i.e., meaningful and nonmeaningful stimuli. Chi-square (X^2) analysis was used to compare the number of subjects who were correct on meaningful stimuli versus the number of subjects correct on nonmeaningful stimuli for each allomorphic variation. Individual test items were grouped by morpheme and analyzed by X^2 analysis. Descriptive analysis was used to compare morpheme groups and allomorphic variations of morphemes.

CHAPTER IV

RESULTS AND DISCUSSION

RESULTS

The purpose of this study was to compare the performance of 4-year-old children's expressive usage of morphemes using meaningful words and nonmeaningful words. Allomorphic variations of six bound morphemes were examined in this study. Subjects completed a modified version of 15 items from the TEEM (Shipley, Stone, and Sue, 1983) which assesses bound morpheme usage with meaningful words. A modified version consisting of 15 items from BTEM (Berko, 1958) was used to assess bound morpheme usage with nonmeaningful words. Each modified test used the same allomorphic variations of the six bound morphemes.

The research question posed was: Is there a significant difference in 4-year-olds between the scores on test items using meaningful and nonmeaningful words for allomorphic variations of the selected bound morphemes of plural, possessives, third person singular, past tense, present progressive, and comparative/superlative adjectives? Since half of the subjects were administered the TEEM first and the other half were administered the BTEM first, it was necessary to determine if the order of test administration

had any effect. To determine the order effect, a two-tailed *t*-test for dependent means was performed to compare the mean score of the first test ($\bar{x}$ = 10.84; SD = 2.93) administered with the mean score of the second test ($\bar{x}$ = 11.23; SD = 2.73) administered. A *t*-test value of .41 indicated a difference was not proven to be statistically significant at the .05 level of confidence (see Table III). The result of this statistical analysis indicates that the order of test administration had no significant effect on the test scores.

TABLE III

MEAN SCORES, STANDARD DEVIATIONS, AND *t*-VALUES FOR ORDER EFFECT

Test Order	Mean	SD	df	*t*
First	10.84	2.93	25	.41
Second	11.23	2.73		

Following the preliminary analysis, a two-tailed *t*-test for dependent means was performed to determine if there was a statistically significant difference between scores on the TEEM and the BTEM. A *t*-test value of 15.19 indicated there was a statistically significant difference beyond the .001 level of confidence between the mean score of 13.23 (SD = 1.79) on the TEEM and the mean score of 8.84 (SD = 1.71) on the BTEM (see Table IV). Thus the subjects in this study performed better on producing morphemes in meaningful contexts as compared with nonmeaningful contexts.

TABLE IV

MEAN SCORES, STANDARD DEVIATIONS, AND *t*-VALUES FOR THE TEEM AND BTEM

Test	Mean	SD	df	*t*
TEEM	13.23	1.79	25	15.19*
BTEM	8.84	1.71		

*Significant beyond .001 level of confidence.

Analysis of Individual Allomorphs

The number of subjects correctly expressing each meaningful allomorph was compared to the number of subjects correctly expressing the corresponding nonmeaningful allomorph. Raw data are displayed in Table V and Figure 1. Results of observed data indicated the subjects performed as well or better on all items of the TEEM than on the BTEM with the exception of the /z/ allomorphic variation of the possessive morpheme (item #8).

TABLE V

NUMBER OF SUBJECTS OBTAINING CORRECT SCORES FOR EACH TEST ITEM

Item	(Allomorph)	TEEM	BTEM
1	(possessive /ə z/)	19	5
2	(plural /s/)	26	25
3	(third person singular /s/)	25	22
4	(third person singular /z/)	22	22
5	(past tense /d/)	23	16
6	(possessive /s/)	25	21
7	(plural /z/)	26	26
8	(possessive /z/)	25	26
9	(third person singular /ə z/)	23	7
10	(plural /ə z/)	26	9
11	(past tense /t/)	25	19
12	(present progressive /ɪŋ/)	26	23
13	(past tense /ə d/)	17	3
14	(comparative /ɚ/)	18	1
15	(superlative /ə st/)	18	5

N = 26

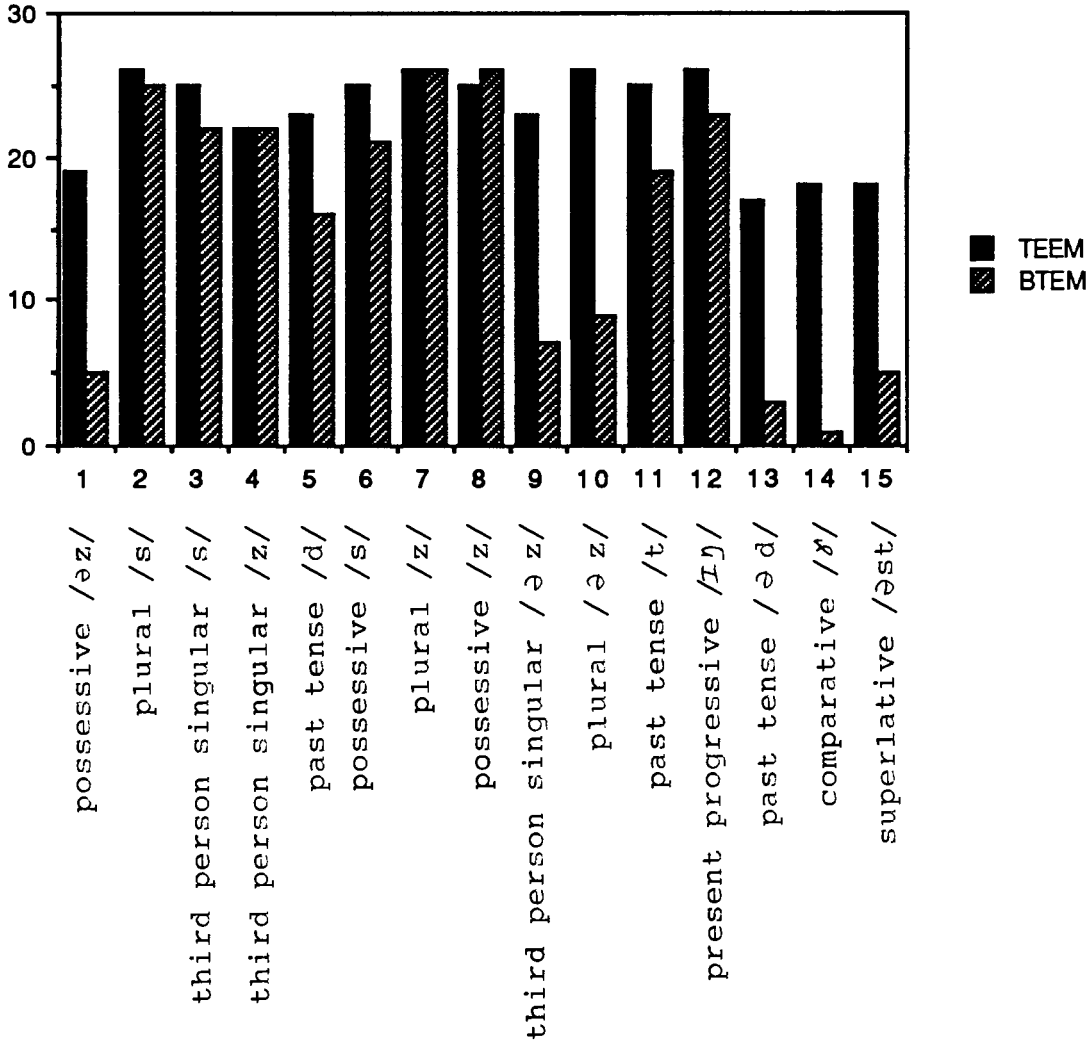

Figure 1. Number of subjects obtaining correct scores for allomorphic variations of total test (N = 26).

Chi-square analysis was performed on individual test items to determine if there was a significant difference between meaningful and nonmeaningful allomorphs (see Table VI). Due to a high accuracy rate, the data were inappropriate for chi-square analysis for the present progressive morpheme /ɪŋ/ and the /s/ and /z/ allomorphic variations of the plural, possessive, and third person singular morphemes. Results of chi-square analysis of the /t/ and /d/ allomorphic variations of the past tense morpheme did not prove to be statistically significant, but the chi-square value of 3.69 for both allomorphs approached the .05 level of confidence (x^2 = 3.84). A significant difference beyond the .001 level of confidence was found for the /ə z/ allomorphic variation of the plural, possessive, and third person singular morphemes, the /ə d/ allomorphic variation of past tense, the comparative adjective / ɚ /, and the superlative adjective /ə st/.

TABLE VI

CHI-SQUARE VALUE OF TEST ITEMS

Test Item	x^2	Level of Significance
Possessive /ə z/	13.08	.001*
Past Tense /d/	3.69	.05
Third Person Singular /ə z/	17.72	.001*
Plural /ə z/	22.37	.001*
Past Tense /t/	3.69	.05
Past Tense /ə d/	13.73	.001*
Comparative Adjective /ɚ/	21.23	.001*
Superlative adjective /ə st/	11.23	.001*

*Statistically significant.

Analysis of Morphemes

Individual test items were grouped together by morpheme and analyzed for a comparison of performance on meaningful words and nonmeaningful words. Raw data are shown in Table VII and Figures 2, 3, 4, 5, 6, and 7.

TABLE VII

NUMBER OF SUBJECTS OBTAINING CORRECT SCORES FOR MORPHEMES AND ALLOMORPHIC VARIATIONS

Morpheme		TEEM	BTEM
Plural	/s/	26	25
	/z/	26	26
	/ə z/	26	9
Possessive	/s/	25	21
	/z/	25	26
	/ə z/	19	5
Third person singular	/s/	25	22
	/z/	22	22
	/ə z/	23	7
Past tense	/t/	25	19
	/d/	23	16
	/ə d/	17	3
Present progressive	/ɪŋ/	26	23
Adjectives - Comparative	/ɚ/	18	1
Superlative	/ə st/	18	5

N = 26

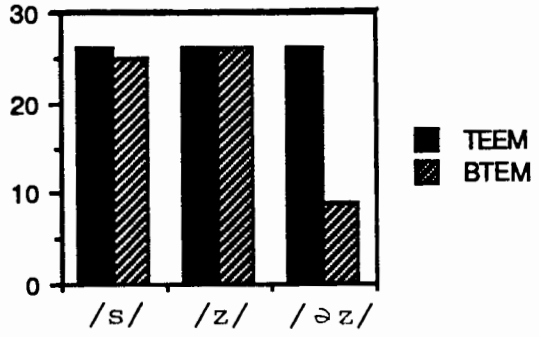

Figure 2. Number of subjects obtaining correct scores for the plural morpheme (N = 26).

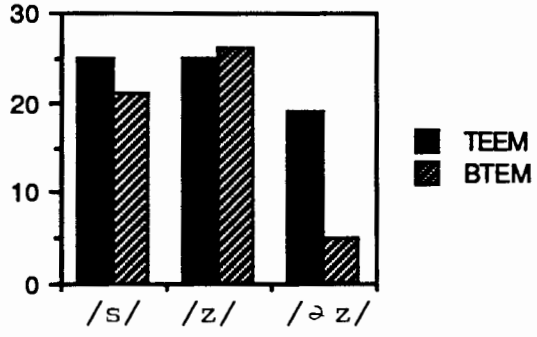

Figure 3. Number of subjects obtaining correct scores for the possessive morpheme (N = 26).

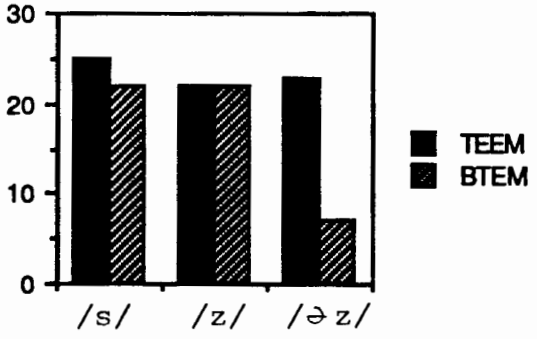

Figure 4. Number of subjects obtaining correct scores for the third person singular morpheme (N = 26).

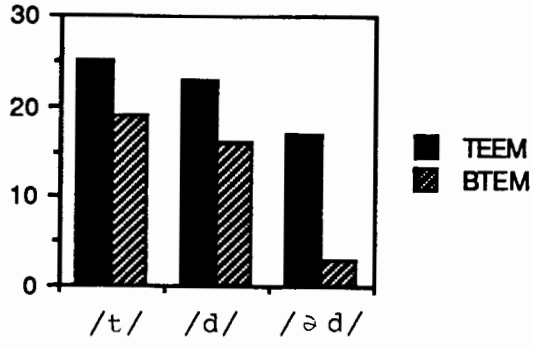

Figure 5. Number of subjects obtaining correct scores for the past tense morpheme (N = 26).

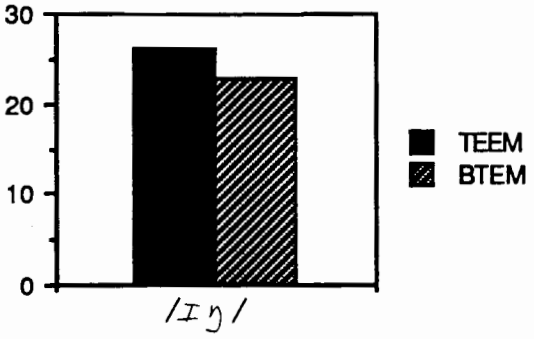

Figure 6. Number of subjects obtaining correct scores for the present progressive morpheme (N = 26).

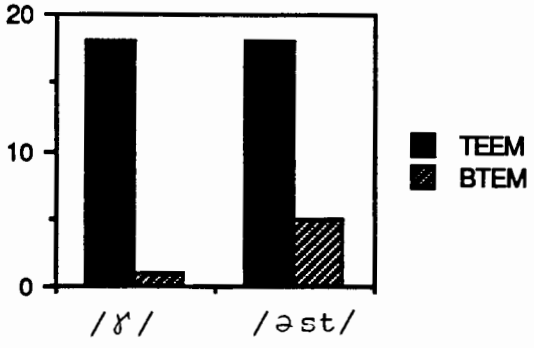

Figure 7. Number of subjects obtaining correct scores for the comparative and superlative adjectives (N = 26).

Chi-square statistical analysis was used to compare meaningful with nonmeaningful words for the morphemes of past tense and comparative and superlative adjectives. The chi-square value of 19.57 proved to be statistically significant beyond the .001 level of confidence for the past tense morpheme. A significant difference beyond the .001 level of confidence was also found for the comparative and superlative adjectives with a chi-square value of 24.16.

Visual inspection of the data for the plural, possessive, and third person singular morphemes indicated the difference in performance of meaningful and nonmeaningful words was related to the allomorphic variation of /əz/. Data for the plural, possessive, third person singular, and present progressive morphemes were inappropriate for statistical analysis.

DISCUSSION

Test results indicate there is a statistically significant difference between performance on the TEEM and the BTEM. The 4-year-old children participating in this study were better able to produce meaningful forms than nonmeaningful forms.

Findings in this study support those of Berko (1958), Anisfeld and Tucker (1967), and Graves and Koziol (1971). Children did better on allomorphic variations that are more commonly occurring and had more difficulty with allomorphic variations that are used infrequently. Subjects obtained

better scores on the more common /s/ and /z/ allomorphic variations of the plural, possessive, and third person singular morphemes than on the less common /ə z/ allomorphic variation of the same morphemes. The same phenomenon can be observed with the past tense morpheme in which the subjects obtained better scores on the more common /t/ and /d/ allomorphic variations than on the less common /ə d/ allomorphic variation. An observation of these data can lead to the prediction that as language develops over time, children will be able to inflect meaningful and nonmeaningful words with the same proficiency.

Berko (1958) also found that children performed better on morphemes that had the fewest variations. The present progressive form of the verb has only one variation (/ɪŋ/); whereas, the past tense form of the verb has three allomorphic variations (/t/, /d/, and /ə d/). Results of this study did support this finding. Scores were higher on the present progressive morpheme than on the allomorphic variations of the past tense morpheme.

Subjects of this study performed as well or better on all meaningful test items than on the nonmeaningful test items with the exception of the /z/ allomorphic variation of the possessive morpheme. This supports the findings of Shipley, Stone, and Sue (1983) and Graves and Koziol (1971) that lexical items yield more accurate results than nonsense stimuli.

Descriptive analysis of the data of this study indicated the differences of performances on meaningful and nonmeaningful stimuli varied according to allomorphic variations of the morphemes. The plural, possessive, and the third person singular morphemes showed the greatest difference to be on the /ə z/ allomorphic variation, rather than a difference of the entire morpheme. Statistically significant differences occurred only on the /ə d/ allomorph of the past tense morpheme. Both the comparative and superlative forms of adjectives showed great differences between meaningful and nonmeaningful stimuli. Only slight differences occurred between meaningful and nonmeaningful stimuli for the present progressive morpheme. These observations suggest that morpheme development is gradual and expressive use of all allomorphic variations of morphemes do not all emerge at the same time.

The allomorphic variations which resulted in the greatest difference in performance between the meaningful and nonmeaningful stimuli were the comparative and superlative forms of the adjective. Poor performance on these allomorphs may have been a function of the nonmeaningful test item. The words "quirkier" /kwɝkɪɚ/ and "quirkiest" /kwɝkɪəst/ may have been difficult to articulate. Another consideration may have been that the subjects did not understand the meaning of the word "quirky" /kwɝkɪ/ as used in the BTEM. In contrast, the meaningful item "big" as used in the TEEM was easy to articulate and the meaning was understood.

Subjects in this study had a variety of responses to the nonmeaningful stimuli. Some children inflected the nonsense words with as much ease as the meaningful words. Other children showed great difficulty with the nonsense words and at first substituted real words according to their interpretation of the picture. Even though the statistical analysis for the order of test administration showed no significant statistical difference for test presentation, the administration time was usually longer when the nonmeaningful words were presented first. A few children with good receptive vocabularies were very confused by the nonsense words and seemed relieved to find out upon completion of the testing that the test stimuli were nonsense words.

The hypothesis of Berko's (1958) study was that the internalization of morphological rules could be assumed if the child correctly inflected nonmeaningful words. An observation of this researcher is that the incorrect inflection of nonmeaningful words does not necessarily indicate that morphological rules have not been internalized. Children may have obtained lower scores on nonmeaningful words due to the anxiety of being asked to inflect a word that they had never before heard. Some children in this study attempted to use real words and seemed reluctant to use nonmeaningful words. Another consideration may have been that children made errors in inflecting nonmeaningful words due to the combination of the final sound of the word and the sounds of the inflection. An example is the possessive

inflection /əz/ when added to the word "niz" /nɪz/, may have been difficult to articulate. Children may have made fewer errors if the nonmeaningful word had ended in a different sound.

Speech-language pathologists can evaluate morphological development using a spontaneous language sample or formal testing consisting of meaningful or nonmeaningful words. In order to assess fully a child's morphological development, a combination of testing procedures is recommended. Results of only one form of testing without the other should be viewed with caution and may prove to be inconclusive. In a spontaneous language sample, a child may have no opportunity to use certain inflected morphemes. Conversely, errors in inflecting morphemes in formal testing do not necessarily indicate a lack of internalization of morphological rules. These factors should be taken into consideration in evaluating children's morphological development in clinical practice.

CHAPTER V

SUMMARY AND IMPLICATIONS

SUMMARY

The purpose of this study was to investigate morphological development in 4-year-old children. Two tests were utilized and compared to see if there was a significant difference between the expression of meaningful and nonmeaningful words. The first test, a modified version of the Test for Examining Expressive Morphology (TEEM) (Shipley, Stone, and Sue, 1983) used meaningful words to assess allomorphic variations of six bound morphemes. The second test, a modified version of Berko's Test of English Morphology (BTEM) (Berko, 1958) assessed the same allomorphic variations but it used nonmeaningful words.

Participants in this study were 26 4-year-old children from the greater Portland area. Each subject passed a screening for hearing acuity, articulation, speech intelligibility, and receptive vocabulary.

A two-tailed *t*-test for dependent means was computed to determine if there was a statistically significant difference between scores on the tests using meaningful and nonmeaningful stimuli. Results indicated the difference betweem the TEEM ($\bar{x}$ = 13.23) and the BTEM ($\bar{x}$ = 8.84) was

significant beyond the .001 level of confidence. With the exception of the /z/ allomorphic variation of the possessive morpheme, all subjects obtained better scores on the meaningful stimuli than on the nonmeaningful stimuli.

Chi-square analyses were computed to determine if there was a significant difference between the number of subjects correctly producing meaningful and nonmeaningful allomorphs. Results revealed a significant difference beyond the .001 level for the /ə d/ allomorphic variation of the past tense morpheme, the comparative /ɚ/ and superlative /ə st/ forms of the adjective, and the /ə z/ allomorphic variation for the plural, possessive, and third person singular morphemes. Statistical analysis resulted in a significant difference that approached the .05 level of confidence for the /t/ and /d/ allomorphic variations of the past tense morpheme. Chi-square analysis could not be computed for the other allomorphic variations due to the high degree of accuracy on both the meaningful and nonmeaningful test items.

Results of chi-square analysis at the morpheme level showed a significant difference beyond the .001 level of confidence for past tense and comparative and superlative forms of the adjective. Statistical analysis was not computed for the plural, possessive, or third person singular morphemes because visual inspection showed the difference to be at the allomorphic level rather than at the morpheme

level. No statistical analysis was computed for the present progressive morpheme due to inappropriate data resulting from a high accuracy rate.

Results of this study indicated the subjects performed better on the test using meaningful words than on the test using nonmeaningful words. Better scores were obtained on test items that used more common allomorphic variations than on test items that used less common allomorphic variations. Findings of this study are consistent with other research (Anisfeld and Tucker, 1967; Berko, 1958; Graves and Koziol, 1971; Shipley, Stone, and Sue, 1983).

IMPLICATIONS

Clinical

Results of this study showed a difference in performance of 4-year-old children between meaningful and nonmeaningful stimuli. According to Berko (1958), correct responses to nonmeaningful stimuli imply a knowledge of the rules of grammatical inflections. The clinical implications of Berko's contention is that nonmeaningful stimuli could be useful in determining knowledge of rules for allomorphic variations of bound morphemes. In the clinical setting, information is gathered about a child's use of language form. The utilization of nonsense stimuli has been shown to be one way of testing for knowledge of inflecting bound morphemes. In clinical practice, a more comprehensive evaluation of the use

of morphological rules may be obtained by testing with both meaningful and nonmeaningful stimuli.

Another clinical implication is the use of nonmeaningful stimuli with older language-disordered children. After teaching grammatical inflections using meaningful stimuli, nonmeaningful stimuli could be used to reinforce morphological rules. Nonmeaningful stimuli may also be helpful in showing language-disordered students the importance of learning to use correct morphological rules to improve language form.

Research

Further research implications include conducting a study of the use of meaningful and nonmeaningful stimuli with both younger and older children. An investigation with younger children could be used to determine at what age level there exists a difference in performance between meaningful and nonmeaningful stimuli for the /s/ and /z/ allomorphic variations of the plural, possessive, and third person singular morphemes. The results of a study with older children may suggest at what age level there exists no difference between performance on meaningful and nonmeaningful stimuli.

Another research consideration may be to replicate this study with older children with normal language development and children with disordered language development. This type of study could supply information helpful in remediating language in children with language disorders. By identifying the lack of knowledge of specific morphological rules,

intervention strategies could be planned to meet the needs of the children with language disorders.

This study examined only one example of each allomorphic variation of the morphemes. Research could be conducted using additional examples of each allomorphic variation. This would provide more reliable results than only one item for each allomorph.

Meaningful and nonmeaningful stimuli were examined in this study by using the same test format for items on both tests. Another research possibility would be to compare nonmeaningful stimuli in response to carrier phrases with meaningful stimuli solicited without the use of carrier phrases. A test such as the Structured Photographic Expressive Language Test-II (SPELT-II) (Werner and Kresheck, 1983) could be used. Since no carrier phrases are used and fewer clues are given to the child in the SPELT-II, knowledge of morphological rules may be necessary to answer correctly each test item. This may result in little or no difference in comparing these two tests.

This study examined the use of nonmeaningful words in a sentence completion task. Further research could be conducted using nonmeaningful words in a story format. The same morphemes and allomorphic variations could be examined. Putting nonmeaningful words into a meaningful context may increase the accuracy of morphological inflections in nonmeaningful words.

The meaningful stimuli used in this study were thought to be in the vocabulary of most 4-year-old children. Another research possibility would be to compare the same meaningful words used in this study with later developing meaningful words that may not be included in the expressive vocabulary of 4-year-old children. A greater accuracy rate may occur because the children may have heard the stimuli inflected correctly by older children and adults.

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APPENDIX A

INFORMED CONSENT LETTER

Dear Parents:

I am a graduate student at Portland State University under the direction of Associate Professor Mary E. Gordon and I am conducting a study relating to the language development of four-year-old children. I am comparing two tests which measure children's language development. Although your child may not directly benefit from this study, the results of this study should help speech clinicians learn more about normal language development.

This study will include a short conversation with your child, a hearing screening, and a test of how your child produces certain speech sounds. In addition, your child will be given a test of receptive vocabulary and the two study tests which measure spoken language grammar. One of the study tests uses real words and the other test uses nonsense words.

The time your child will spend with me is approximately 30 to 40 minutes. There will be no cost to you for your child's participation. In no way will your child's name be used in reporting the results of this study. You may withdraw your child from this study at any time without any consequences to his/her preschool or Portland State University activities.

Please sign below indicating your approval and return this form as soon as possible. If you have any questions, please call me at 761-6041 any evening.

Thank you for your help.

Catherine Thompson
Graduate Student, Speech and
Hearing Science Program
Portland State University

Parent Signature:_____Phone No:_____

Child's Name:_____Birthdate:_____

Has your child received speech/language therapy?_____

APPENDIX B

ARTICULATION SCREENING TEST

Final Sound		Acceptable Response	Unacceptable Response
/s/		/s/ /θ/ /t/	
	bus	_____	_____
	house	_____	_____
	mouse	_____	_____
/z/		/z/ /ð/ /d/	
	cheese	_____	_____
	nose	_____	_____
	hose	_____	_____
/t/		/t/ /k/	
	hat	_____	_____
	boat	_____	_____
	cat	_____	_____
/d/		/d/ /g/	
	red	_____	_____
	bed	_____	_____
	bird	_____	_____
/ŋ/		/ɪŋ/ /ɪn/	
	running	_____	_____
	swimming	_____	_____
	coloring	_____	_____
/ɚ/		/ɚ/ /vowel/	
	hammer	_____	_____
	feather	_____	_____
	flower	_____	_____

APPENDIX C

TEST ITEMS BY MORPHEME

Morpheme		TEEM	BTEM
Plural	/s/	cakes	fapes*
	/z/	dogs	wugs
	/ə z/	houses	tasses
Possessive	/s/	cat's	bik's
	/z/	monkey's	wug's
	/ə z/	witch's	niz's
3rd Person Singular	/s/	eats	ops*
	/z/	climbs	pags*
	/ə z/	washes	loodges
Past Tense	/t/	dropped	ricked
	/d/	combed	spowed
	/ə d/	planted	boded
Present Progressive	/ɪŋ/	reading	zibbing
Comparative/ Superlative	/ɚ/	bigger	quirkier
	/ə st/	biggest	quirkiest

* These items were not present on the BTEM and were created by this examiner.

APPENDIX D

SCORE SHEET

Subject Number _____

Circle the test administered first.

	TEEM		BTEM	
Examples				
a.	boats_____	/s/	ips_____	/s/
b.	cars_____	/z/	tors_____	/z/
c.	teacher's_____	/z/	lun's_____	/z/
d.	smiling_____	/ɪŋ/	noding_____	/ɪŋ/
e.	zipped_____	/t/	mafed_____	/t/
Items				
1.	witch's_____	/ə z/	niz's_____	/ə z/
2.	cakes_____	/s/	fapes_____	/s/
3.	eats_____	/s/	ops_____	/s/
4.	climbs_____	/z/	pags_____	/z/
5.	combed_____	/d/	spowed_____	/d/
6.	cat's_____	/s/	bik's_____	/s/
7.	dogs_____	/z/	wugs_____	/z/
8.	monkey's_____	/z/	wug's_____	/z/
9.	washes_____	/ə z/	loodges_____	/ə z/
10.	houses_____	/ə z/	tasses_____	/ə z/
11.	dropped_____	/t/	ricked_____	/t/

12. reading_____ /ɪŋ/ zibbing_____ /ɪŋ/

13. planted_____ /ə d/ bodded_____ /ə d/

14. bigger_____ /ɚ/ quirkier_____ /ɚ/

15. biggest_____ /ə st/ quirkiest_____ /ə st/

APPENDIX E

TEST FOR EXAMINING EXPRESSIVE MORPHOLOGY

(Modified Version)

Practice Items

A. Here is a boat.
Here are two _____. /s/

B. Here is one car.
Here are two _____. /z/

C. The teacher has a ruler.
Whose rule is it?
It's the _____. /z/

D. These kids like to smile.
Here they are _____. /ɪŋ/

E. The boy is zipping his coat.
Here the coat has been _____. /t/

Test Items

1. This witch has a broom.
Whose broom is it?
It's the _____. /ə z/

2. Here is a cake.
Here are three _____. /s/

3. This dog likes to eat.
Every day he _____. /s/

4. This boy likes to climb.
Every day he _____. /z/

5. This girl is combing her hair.
Here her hair has been _____. /d/

6. This cat has some string.
Whose string is it?
It's the _____. /s/

7. Here is a dog.
   Here are two _____. /z/

8. This monkey has a banana.
   Whose banana is it?
   It's the _____. /z/

9. This man is washing the car.
   He likes to wash his car.
   Every day he _____. /əz/

10. Here is a house.
    Here are four _____. /əz/

11. This boy is dropping the ball.
    Here the ball has been _____. /t/

12. This boy likes to read.
    Here he is _____. /ɪŋ/

13. This woman is planting a flower.
    Here the flower has been _____. /əd/

14. This apple is big.
    This apple is even _____. /ɚ/
15. And this apple is the very _____. /əst/

APPENDIX F

BERKO'S TEST OF ENGLISH MORPHOLOGY
(Modified Version)

Practice Items

A. Here is an ip /ɪp/ .*
Here are two _____. /s/

B. Here is a tor /tor/.
Here are two _____. /z/

C. This is a lun /lʌn/ who owns a hat.
Whose hat is it?
It is the _____ hat. /z/

D. This is a man who knows how to node /nod/.*
What is he doing?
He is _____. /ɪŋ/

E. This is a man who knows to to mafe /mef/.*
He did the same thing yesterday.
Yesterday he _____. /t/

Test Items

1. This is a niz /nɪz/ who owns a hat.
Whose hat is it?
It is the _____ hat. /əz/

2. Here is a fape /fep/.*
Here are two _____. /s/

3. This man likes to op /ɔp/.*
He is opping.
Every day he _____. /s/

4. This man likes to pag /pæg/.*
Every day he _____. /z/

5. This is a man who knows how to spow /spo/.
He is spowing.
He did the same thing yesterday.
What did he do yesterday?
Yesterday he _____. /d/

6. This is a bik /bɪk/ who owns a hat.
   Whose hat is it?
   It is the _____. /s/

7. Here is a wug /wʌg/.
   Now there is another one.
   There are two of them.
   There are two _____. /z/

8. This is a wug /wʌg/ who owns a hat.
   Whose hat is it?
   It is the _____. /z/

9. This is a man who knows how to loodge /luʤ/.
   He is loodging.
   He does it every day.
   Every day he _____. /əz/

10. This is a tass /tæs/.
    Now there is another one.
    There are two of them.
    There are two _____. /əz/

11. This is a man who knows how to rick /rɪk/.
    He is ricking.
    He did the same thing yesterday.
    What did he do yesterday?
    Yesterday he _____. /t/

12. This is a man who knows how to zib /zɪb/.
    What is he doing?
    He is _____. /ɪŋ/

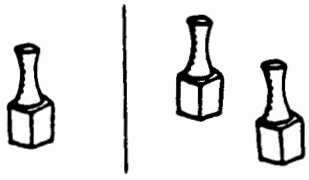
13. This is a man who knows how to bod /bɔd/.
    He is bodding.
    He did the same thing yesterday.
    What did he do yesterday?
    He _____. /əd/

14. This dog has quirks /kwɝks/ on him.
    This dog has more quirks on him.
    This dog has even more quirks on him.
    This dog is quirky.
    This dog is _____. /ɤ/
15. And this dog is the _____. /əst/

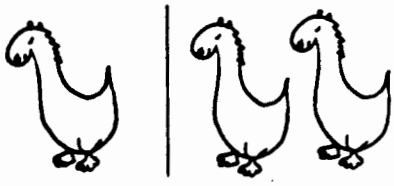
* These items were not present on the BTEM and were created by this examiner.

APPENDIX G

BTEM PICTURES



a. ips /ɪps/



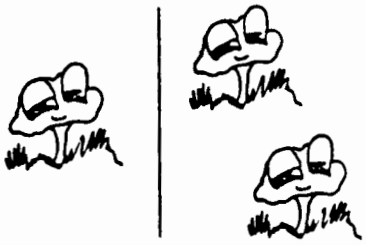
b. tors /torz/

c. lun's /lʌnz/

d. noding /nodɪŋ/

e. mafed /meft/

1. niz's /nɪzəz/



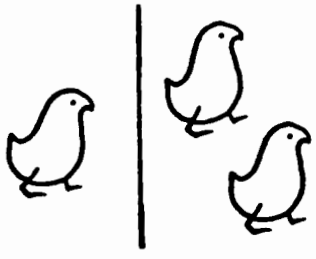
2. fapes /feps/

3. ops /ɔps/

4. pags /pægz/

5. spowed /spod/

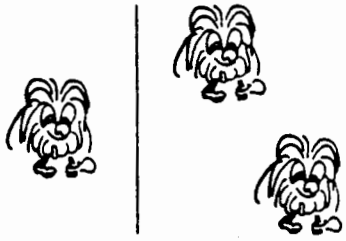
6. bik's /bɪks/



7. wugs /wʌgz/

8. wug's /wʌgz/

9. loodges /luʤəz/



10. tasses /tæsəz/

11. ricked /rɪkt/

12. zibbing /zɪbɪŋ/

13. bodded /bɔdəd/

14. quirkier /kwɝkɪɚ/

15. quirkiest /kwɝkɪəst/