# Children's Development of Irregular Past Tense Verb Forms 

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#### Abstract

In Brown's (1973) classic studies of language development, he found that irregular past tense verbs developed rather early in the developmental sequence. Several other researchers have also noted this early development of irregular verb forms. However, other researchers and clinicians have suggested that irregular verbs continue developing much later into the school-age years. The purpose of this study was to gain a preliminary view of children's development of 49 irregular verbs. One hundred and twenty children between 3:0 and 9:0 were examined as they responded to a picture of the target verb with a sentencecompletion task. It was found that some irregular verbs (e.g., hit) were correctly produced by the three year olds, but other irregulars (e.g., bent) were still not mastered by age 9. A preliminary order of development of the irregular verbs and possible clinical implications are offered.


KEY WORDS: language development, irregular past tenses, morphologic development

A considerable amount of our knowledge about children's morphologic development is derived from Brown's (1973) classic longitudinal study of Adam, Eve, and Sarah. Based on the data from these three children, Brown developed the sequence of development for 14 grammatical morphemes seen in Table 1. The impact of this sequence has been considerable, as evidenced by the number of our major textbooks in language development, assessment, and treatment that present and discuss these findings (e.g., Berko Gleason, 1989; Bloom \& Lahey, 1978; Dale, 1976; deVilliers \& deVilliers, 1978; Lund \& Duchan, 1988; McLean \& Snyder-McLean, 1978; Muma, 1978; Owens, 1988; Reed, 1986; Wiig \& Semel, 1980; Wood, 1981). Muma, Pierce, and Muma (1983) have also reported that 65 of the 76 speech-language pathology training programs that responded to their survey used-

Table 1. Brown's order of development of 14 grammatical 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 |
| 1. Third person irregular | 10.83 |
| 12. Uncontractible auxiliary | 11.66 |
| 13. Contractible copula | 12.66 |
| 14. Contractible auxiliary | 14.00 |

Note: From Brown's A first language: The early stages, p. 274. Copyright 1973 by the President and Fellows of Harvard College. (Reprinted by permission).

Brown's order of morphologic development in their instruction of language acquisition.

There are approximately 200 irregular verb forms in the English language, but many of these are archaic or used very infrequently (Bybee \& Slobin, 1982). However, irregular past tense verbs are an important part of the English morphologic system and are among the most frequently used verbs in the language (Bybee \& Slobin, 1982; Shipley \& Banis, 1989).

Brown (1973) found that irregular past tenses were the 5 th of the 14 grammatical morphemes to develop, and that this acquisition occurred before age three. deVilliers and deVilliers (1973) also studied children's morphologic development using language samples from 21 subjects between 1:4 and 3:4 years of age. They also observed that
irregular past tense verbs occurred early in the developmental sequence. These studies have been extremely important to our knowledge of language development; however, questions remain regarding when and how specific morphemes such as the irregular past tense develop. For example, while Brown (1973) found that irregular past tense develops by three years of age, Shipley and Banis (1989) have suggested that the mastery of these irregular forms may be a much longer process that extends into the elementary school years. Shipley and Sue (1981) presented a preliminary report of the development of six major morphemes. Their data were gathered from 500 subjects aged 3:0 to 8:0 years, and, although irregular forms were not tested extensively, many of the irregular items were not mastered by 8 years of age.

Other researchers and authors (Kuczaj, 1977; Menyuk, 1971; Moran, 1975; Owens, 1988; Reed, 1986; TagerFlusberg, 1989) have also suggested that irregular past tense forms continue to develop during the preschool and elementary school years. Thus, there is some question whether irregular past tense verbs-or at least all of these irregular forms-develop quite as early as has sometimes been noted.

In addition to the question of when irregular past tensing develops, there is some uncertainty whether all irregular forms develop in a similar fashion. It is generally felt that most learning of irregular forms occurs by rote-learning rather than by learning and applying a rule-system per se (Bybee \& Slobin, 1982; Shipley \& Banis, 1989). In effect, children tend to learn irregular forms as individual vocabulary words rather than by applying specific phonologic or morphologic rules to the different base morphemes.

However, several researchers (MacWhinney, 1978; Slobin, 1971; Solomon, 1972) have indicated that the phonologic environment of the base word (i.e., the free morpheme) is an important factor in learning the correct use of certain allomorphic forms. These researchers have suggested that the ending sounds of the base morpheme influences the development of the correct bound or irregular morphologic form.

Using a nonsense-word paradigm, Solomon (1972) studied the development of regular pluralization with a sentence-completion task. She found that children tend to treat words that end with fricatives and affricates as if they had already been pluralized. For example, when asked to pluralize these forms, her subjects did not inflect words like house and church. Solomon concluded that the order of acquisition for plural allomorphs was dependent upon the phonologic environment of the base work endings. MacWhinney (1978) reviewed a number of studies pertaining to morphologic development and supported Solomon's conclusions. He hypothesized that children resist adding allomorphs to base words that already appear to contain the desired allomorphic ending.

The phenomenon of overgeneralization has been discussed by a number of authorities (Cazden, 1968; Derwing \& Baker, 1979; Kuczaj, 1977; Moskowitz, 1978). Slobin (1971) analyzed Miller and Ervin's (1964, cited in

Slobin, 1971) unpublished longitudinal data from 24 young children. He then categorized the children's irregular verbs according to their phonologic environments. These categories were words requiring:

1. An internal vowel change (such as fall-to-fell)
2. A vowel change plus a /d/ or $/ \mathrm{t} /$ (such as sweep-toswept)
3. A final consonant change from $/ \mathrm{d} /$ to $/ t /$ (such as build-to-built)
4. No change (such as cut-to-cut)
5. A total change (such as go-to-went)

Slobin found that not all verbs were equally subject to being overgeneralized, and that the phonologic environment of the base verb seemed to affect the acquisition of the correct irregular form. MacWhinney (1978) agreed with Slobin and stated that children avoid redundancies such as "boughted" and "lefted." Thus, various researchers (MacWhinney, 1978; Slobin, 1971; Solomon, 1972) have suggested that the phonologic environment of the base word plays a role in morphologic development. However, the complete effects of phonologic environment on irregular form development are not yet known.

## Purpose

The purpose of the present study was to investigate children's development of a variety of irregular past tense verbs. Because 49 irregulars were tested, a preliminary view of irregular form development by their phonologic categories was also possible.

## PROCEDURES

## Subjects

One hundred twenty normally developing children were studied. Ten children, 5 boys and 5 girls, were selected from each 6-month age interval between 3 and 9 years of age. Forty-seven of the subjects were enrolled in a preschool and 83 attended an elementary school. The students enrolled at these two sites were primarily middle to upper-middle class in socioeconomic status.

All subjects were monolingual English speakers with normal speech, language, and hearing abilities. None of the subjects had received any speech-language pathology or other type of remedial services.

## Screening

A Maico-20 portable audiometer calibrated to ANSI (1969) standards was used to screen each child's hearing at 20 dB for $1,000,2,000$ and $4,000 \mathrm{~Hz}$. Children who failed at any frequency in either ear were not included.

The preschool candidates were given the articulation and language sections of the Fluharty Preschool Speech and Language Screening Test (Fluharty, 1974). A brief spontaneous speech-language sample was also collected from each candidate to assess the presence of normally developing expressive language. School records were consulted for the elementary school children. Candidates who had passed a previous school speech and language screening were rescreened with the articulation section of the Fluharty Preschool Speech and Language Screening Test. A brief spontaneous speech-language samples was also collected with these children. Only children who consistently used the sounds which would be examined were included in the study. There were 127 children screened; 120 of whom were included in the study.

## Testing Irregular Form Development

Children who passed all of the screening tests were admitted into the study and their use of irregular forms examined. Subjects were seen individually at their school site. The irregular past tense stimulus cards from Shipley and Banis' (1981) Teaching Morphology Developmentally were used to elicit the target items. These items had been developed to include irregular forms that were still in use; were functional and common to most home, educational, or clinical environments; and were depictable. A sample stimulus item is found in Appendix A.

The research task involved presenting the 49 irregular verb pictures and having the subjects complete a sen-tence-completion stimulus phrase for each item. An example of the task is, "Here she is drinking some water. Now it's all gone. It's all gone because she [drank it]" The 49 irregular items tested are listed in Table 3. Before testing, practice with the sentence-completion task was provided using regular-form past tense items from Teaching Morphology Developmentally. During the testing, regular past tense items were interspersed among the irregular items tested to avoid any effects of presenting only irregular forms. Each testing session, including the training and practice, lasted approximately $15-20$ minutes per subject.

## RESULTS AND DISCUSSION

Subjects' responses to the irregular verbs tested were categorized into one of four categories: correct, uninflected, overgeneralized, and miscellaneous. Since there were only 10 children within each 6 -month age interval, the percentages of responses within these four categories are reflected by 1 -year intervals in Table 2.
As seen in Table 2, subjects' use of the correct irregular forms increased from $15 \%$ of their total responses with the 3 -year-olds to $86 \%$ correct responses with the 8 -year-olds. Conversely, uninflected and overgeneralized responses accounted for $82 \%$ of the 3 -year-olds' responses. These types of responses decreased across the age levels until

Table 2. The percentage of responses to the irregular past tense items within four categories. (Twenty subjects responded to 49 items at each age level. The percentages are based on 980 responses per age level.)

|  | Age |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Category | 3 | 4 | 5 | 6 | 7 | 8 |
| Correct | $15 \%$ | $32 \%$ | $45 \%$ | $71 \%$ | $75 \%$ | $86 \%$ |
| Uninflected | 42 | 23 | 17 | 4 | 4 | 1 |
| Overgeneralized | 40 | 42 | 36 | 22 | 18 | 10 |
| Miscellaneous | 2 | 2 | 2 | 4 | 3 | 3 |

only $11 \%$ of the 8 -year-olds' responses were uninflected or overgeneralized.
An analysis of variance was used to evaluate subjects' use of correct forms by age and sex. One-year intervals were used to ensure an adequate sample size for statistical purposes. Significant differences emerged for age, $F$ $(5,108)=69.9, p<.05$. Using $t$-tests at the .05 confidence level, significant differences were found between all age levels except the 6- and 7 -year-olds (see Appendix B). Significant differences did not emerge between males' and females' responses, $F(1,119)=.45, p>.05$.
Perhaps the major difference between Brown's (1973) findings and the present study is the ages at which irregular past tenses were "mastered." Part of the discrepancy between the two studies probably occurred because of the different research methods used. Brown analyzed three young childrens' ( $\mathrm{CA}=1: 6$ to $4: 0$ years) spontaneous speech longitudinally, whereas the irregular past tenses in the present study were elicited in a crosssectional manner with a sentence-completion task. Brown concluded that irregular verbs develop very early; however, his findings were based on language samples from subjects with a more limited word base. Because of his subjects' ages, it is unlikely that Adam, Eve, and Sarah used many of the base morphemes and irregular forms sampled in the present study. Thus, there may have been a greater range of irregulars studied in the present research. However, results from a sentence-completion task can also differ from spontaneous speech use. As Brown (1973) has commented, ". . .assessments of particular kinds of linguistic competencies [including grammatical morphemes] based on experimental findings 'date' the competencies in question later than do assessments based on naturalistic data" (p. 293). It seems likely that some of the irregular forms examined in the present study would have been produced correctly at an earlier age if a spontaneous speech sample task had been used.

## The Order of Development of Irregular Past-Tense Verbs

One of the primary findings of the present study is the differing profiles of development for the various irregular forms. Some irregulars were produced correctly at a rather early age, while other words were not mastered until much later. Using 6 -month age intervals in which
$80 \%$ or more of the children produced the irregular forms correctly, a rank order of irregular past tense verbs was developed. The subjects correctly produced 40 of the 49 irregulars at the $80 \%$ criterion by 8:6 through $8: 11$ years of age. These verbs, and their order of development, are found in Table 3. This order of development was of particular interest in that some words met criterion with the $3: 0$ through $3: 5$-year-olds, while other irregulars failed to achieve this $80 \%$ criterion even during the eighth year. These findings parallel Shipley and Banis' (1989) suggestion that some irregular forms develop very early, while others are not mastered until much later.

In the present study, different profiles of development emerged for the various irregular words. For example, the subjects tended to overgeneralize the words swept, dug, and shook. However, there were few instances of over-

Table 3. The order and age of development of the irregular past tense verbs using a sentence-completion task. ( $80 \%$ mastery level)

| Verbs | Rank Order | Age |
| :---: | :---: | :---: |
| hit | 1.0 | 3-0 thru 3.5 |
| hurt | 2.0 | 3-0 thru 3-5 |
| went | 3.0 | 3-6 thru 3-11 |
| saw | 4.0 | 4-0 thru 4-5 |
| gave | 5.0 | 4-6 thru 4-11 |
| ate | 6.0 | 4-6 thru 4-11 |
| took | 7.0 | 5-0 thru 5-5 |
| fell | 8.0 | 5-0 thru 5-5 |
| broke | 9.0 | 5-0 thru 5-5 |
| found | 10.0 | 5-0 thru 5-5 |
| came | 11.0 | 5-6 thru 5-11 |
| made | 12.0 | 5-6 thru 5-11 |
| threw | 13.5 | 5-6 thru 5-11 |
| sat | 13.5 | 5-6 thru 5-11 |
| ran | 15.0 | 6-0 thru 6-5 |
| flew | 17.0 | 6-0 thru 6-5 |
| wore | 17.0 | 6-0 thru 6-5 |
| wrote | 17.0 | 6-0 thru 6-5 |
| cut | 19.5 | 6-0 thru 6-5 |
| fed | 19.5 | 6-0 thru 6-5 |
| drove | 21.5 | 6-0 thru 6-5 |
| bit | 21.5 | 6-0 thru 6-5 |
| blew | 23.0 | 6-6 thru 6-11 |
| read | 24.0 | 6-6 thru 6-11 |
| shot | 25.0 | 6-6 thru 6-11 |
| rode | 26.0 | 6-6 thru 6-11 |
| drank | 27.0 | 7-0 thru 7-5 |
| hid | 28.0 | 7-6 thru 7-11 |
| rang | 29.0 | 7-6 thru 7-11 |
| slept | 30.0 | 7-6 thru 7-11 |
| drew | 31.0 | 7-6 thru 7-11 |
| dug | 32.5 | 7-6 thru 7-11 |
| swam | 32.5 | 7-6 thru 7-11 |
| left | 34.0 | 8-0 thru 8-5 |
| caught | 35.5 | 8-0 thru 8-5 |
| slid | 35.5 | 8-0 thru 8-5 |
| hung | 37.0 | 8-0 thru 8-5 |
| sent | 38.5 | 8-6 thru 8-11 |
| shook | 38.5 | 8-6 thru 8-11 |
| built | 40.0 | 8-6 thru 8-11 |

[^0]generalized forms with the words came, ate, and hit. There was also a high percentage of uninflected forms at the early ages with the words bit, found, and read.

One reason for these different patterns of irregular form use may have related to the phonologic environment of the irregulars. There were five phonologic categories in which at least three stimulus items were tested. These were:

1. Internal vowel change (such as come-to-came)
2. Internal vowel change with a final dental consonant (such as stand-to-stood)
3. Internal vowel change plus final change of a $/ \mathrm{d} /$ to $/ \mathrm{t} /$ (such as sweep-to-swept)
4. Final consonant change from $/ \mathrm{d} /$ to $/ \mathrm{t} /$ (such as build-to-built)
5. No change (such as cut-to-cut)

The correct use of the irregular forms by five categories is displayed in Figure 1. Tables $4-8$ also contain the percentages of subjects' different responses within each of these phonologic environments.

An increase in the percentage of correct responses across age is seen in Table 4-7. A less apparent trend towards greater correct use is also seen for the No Change category in Table 8. Several patterns seen in these tables and Figure 1 include:

1. The highest percentage of correct responses was found in the No Change (e.g., cut-to-cut) category (see Table 8). This high percentage of correct responses may have occurred because the correct form is not inflected and, therefore, the word is the same for both the present and past tense. Thus, even if some children did not yet possess morphologic endings, their responses would still appear to be correct.
2. The Final Consonant Change from /d/ to /t/ (e.g., build-to-built) category was the latest of the five phonologic categories to develop (see Table 7). None of the three words in this category achieved $80 \%$ criterion by 8:0 through 8:5 years. It is possible this occurred because there are so few words that require the $/ \mathrm{d} /$ to $/ \mathrm{t} /$ change. Another reason for this late development may be the subtle voiced-to-voiceless nature of the final consonant change.
3. The greatest percentage of uninflected responses occurred with the Internal Vowel Change with a Final Dental Consonant (e.g., ride-to-rode) and Final Consonant Change From /d/to /t/ (e.g., build-to-built) categories (see Tables 5 and 7). This may have occurred because the uninflected form in both categories has a final dental consonant. Solomon (1971) found that her subjects tended to treat uninflected singular nouns that ended in sibilants as if the words were already inflected. Like Solomon's subjects, the children in the present study tended to use uninflected forms to denote past tense with these categories.
4. The greatest number of overgeneralized responses occurred with the Internal Vowel Change (e.g., take-totook) and Vowel Change Plus Final Change to $/ \mathrm{d} /$ or $/ \mathrm{t} /$ (e.g., sleep-to-slept) categories. As seen in Tables 4 and 6,


Figure 1. A comparison of correct irregular verb development by five phonologic categories.
many of these irregular forms were overgeneralized. Conversely, there were relatively few overgeneralizations with the words in the No Change category (see Table 8), which all ended with an alveolar stop /t/.

## Variables Affecting the Acquisition of Irregular Forms

Slobin (1971), MacWhinney (1978), and Derwing and Baker (1979) have suggested that several variables interact to affect the development of irregular forms. These include the frequency of word use, the importance or "functionality" of the word, and the phonologic environment of the irregular word. Thus, it seems probably that no single factor is totally responsible for the acquisition of irregular forms. Rather, the interaction of several variables contributes to the developmental process.

Table 4. The percentages of responses within four categories for irregular past tenses requiring an internal vowel change ( $n=23$ ). (An example of this category is fall-to-fell.)

|  | Age |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Category | 3 | 4 | 5 | 6 | 7 | 8 |
| Correct | $9 \%$ | $28 \%$ | $46 \%$ | $71 \%$ | $76 \%$ | $85 \%$ |
| Uninflected | 28 | 8 | 8 | 1 | - | - |
| Overgeneralized | 60 | 60 | 43 | 21 | 17 | 8 |
| Miscellaneous | 4 | 3 | 3 | 7 | 7 | 7 |

## Limitations and Clinical Implications

A potential limitation is that the sentence-completion task required children to respond in a structured manner which differs from a more natural speaking situation. Children are sometimes able to produce certain words or language structures in their spontaneous speech, but are unable to demonstrate this knowledge in more structured testing situations. This phenomenon probably occurred in the present study. Brown (1973) commented on this research dilemma and suggested that both experimental and naturalistic designs would eventually result in the most accurate information about language development.
In light of this limitation, several implications may apply to our views of language development and diagnos-tic-treatment activities. It appears that irregular past tense forms are not a singular group of grammatic features that develop simultaneously. Instead, irregular past-tense verbs probably develop in differing patterns at different

Table 5. The percentages of responses within three categories for irregular past tenses requiring an internal vowel change with final dental consonant ( $n=14$ ). (An example of this category is ride-to-rode.)

|  |  | Age |  |  |  |  |  |
| :--- | :---: | :--- | :---: | :---: | :---: | :---: | :---: |
| Category | 3 | 4 | 5 | 6 | 7 | 8 |  |
| Correct | $8 \%$ | $25 \%$ | $34 \%$ | $68 \%$ | $74 \%$ | $87 \%$ |  |
| Uninflected | 75 | 51 | 35 | 8 | 8 | 1 |  |
| Overgeneralized | 17 | 23 | 31 | 23 | 19 | 11 |  |

Table 6. The percentage of responses within three categories for irregular past tenses requiring an internal vowel change plus final change to $/ \mathrm{d} /$ or $/ \mathrm{t} /(n=4)$. (An example of this category is sweep-to-swept.)

|  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Category | 3 | 4 | 5 | 6 | 7 | 8 |
| Correct | $13 \%$ | $30 \%$ | $43 \%$ | $70 \%$ | $70 \%$ | $90 \%$ |
| Uninflected | 24 | 4 | 1 | - | - | - |
| Overgeneralized | 61 | 63 | 56 | 30 | 30 | 10 |

times (Kuczaj, 1977). At each age tested, the children exhibited some correct and some incorrect forms of the irregulars. Since various irregular words seem to develop in different profiles at different times, it seems unwise to assume that irregular forms are mastered or not mastered by sampling only a few of the irregular morphemes (Hegde, 1985; Shipley \& Banis, 1981, 1989; Shipley, Stone, \& Sue, 1983). Thus, extensive sampling of various irregular forms is suggested before clinical conclusions (such as the child "has" or "does not have" irregulars) are drawn.
A number of our field's more commonly used, standardized tests that sample children's morphologic abilities contain only a few irregular past tense forms. These include tests like the Test for Examining Expressive Morphology (Shipley, Stone, \& Sue, 1983), "Grammatic Completion" of the Test of Language Development (Newcomer \& Hammill, 1977), and "Grammatic Closure" of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, \& Kirk, 1968). These tests can be very useful clinically, but we may need more extensive sampling of the irregular past tense forms before any definitive conclusions about these structures are formed.

A teaching order based in part on the data in Table 3 might be useful for clinicians who are targeting past tense forms. For example, it would seem inadvisable to focus inordinate attention on a particular irregular form with a 4 -year-old child when that irregular structure might not typically be produced correctly even by older children. Teaching some irregular past tenses within their phonologic groupings (see Appendix C) seems to be effective, with some irregulars as there is some "predictability" with these specific irregular forms. Of course, the most important consideration in item selection will be the child's specific language needs.

Table 7. The percentages of responses within three categories for irregular past tenses requiring a final consonant change from $/ \mathrm{d} /$ to $/ \mathrm{t} /(\mathrm{n}=3)$. (An example of this category is build-to-built.)

|  |  | Age |  |  |  |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Category | 3 | 4 | 5 | 6 | 7 | 8 |  |  |  |  |  |  |
| Correct | $8 \%$ | $13 \%$ | $28 \%$ | $38 \%$ | $45 \%$ | $67 \%$ |  |  |  |  |  |  |
| Uninflected | 82 | 75 | 48 | 23 | 23 | 2 |  |  |  |  |  |  |
| Overgeneralized | 10 | 12 | 22 | 38 | 30 | 32 |  |  |  |  |  |  |

Table 8. The percentages of responses within two categories for irregular past tenses requiring no change ( $n=3$ ). (An example of this category is cut-to-cut.)

|  |  | Age |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :---: |
| $\quad$ Category | 3 | 4 | 5 | 6 | 7 | 8 |  |
| Correct |  |  |  |  |  |  |  |
| Uninflected |  |  |  |  |  |  |  |
| Overgeneralized | 10 | $90 \%$ | $85 \%$ | $87 \%$ | $93 \%$ | $97 \%$ |  |

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## APPENDIX A <br> A Sample Stimulus Item


"Here she is drinking. Yesterday she $\qquad$ ."

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## APPENDIX B

A Summary of the Analysis of Variance for Responses to the Irregular Past Tense Items by Age and Sex

| Source | $d f$ | SS | $m s$ | $F$ |
| :---: | :---: | :---: | :---: | :---: |
| Total | 2411.70 | 119 | - | - |
| Sex | 26.13 | 1 | 26.13 | . 49 |
| Age | 18532.70 | 5 | 3706.54 | 69.88 |
| Age/Sex | 124.66 | 5 | 24.93 | . 47 |
| Error | 5728.20 | 108 | 53.03 | - |
| $3-0$ to $3-11$ vs. $4-0$ to $4-11$ |  |  |  |  |
| $7.35-$ | $=8.10$ |  | *Sig |  |
| 4-0 to 4-11 vs. 5-0 to 5-11 |  |  |  |  |
| 15.45 | $5=6.8$ |  | *Sig |  |
| 5-0 to 5-11 vs. 6-0 to 6-11 |  |  |  |  |
| 22.25 | = 12.35 |  | *Sig |  |
| 6-0 to 6-11 vs. 7-0 to 7-11 |  |  |  |  |
| 34.60 | $0=2.20$ |  | Not S | cant |
| 7-0 to 7-11 vs. 8-0 to 8-11 |  |  |  |  |
| $36.80-42.25=5.45$ |  |  | *Significant |  |

*. 05 level of confidence

## APPENDIX C

The Irregular Past Tense Verbs by Phonologic Categories

The 49 irregular past tense verbs tested belong to one of seven categories based on what phonologic changes occur when the present tense verb is changed to the past tense. These categories are listed below.

Internal Vowel Change

| blow-blew | run-ran |
| :--- | :--- |
| break-broke | ring-rang |
| come-came | sing-sang |
| choose-chose | sink-sank |
| drink-drank | see-saw |
| draw-drew | shake-shook |
| drive-drove | swim-swam |
| dig-dug | swing-swang |
| fall-fell | throw-threw |
| fly-flew | take-took |
| give-gave | wear-wore |

Internal Vowel Change with a Final Dental Consonant

| eat-ate | read-read |
| :--- | :--- |
| bite-bit | ride-rode |
| feed-fed | sit-sat |
| find-found | shoot-shot |
| fight-fought | slide-slid |
| hold-held | stand-stood |
| hide-hid | write-wrote |

Internal Vowel Change Plus the Change to a/d/ or /t/ Ending

| catch-caught | sleep-slept |
| :--- | :--- |
| leave-left |  |

Final Consonant/d/Changes to a $\mathrm{It} /$
bend-bent send-sent
build-built

Final Consonant Changes to $a / \mathrm{d} /$
make-made
Total Change
go-went
No Change
cut-cut hurt-hurt
hit-hit

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[^0]:    Note. Nine words did not reach criterion by 8-5 through 8-11 years. These were bent, chose, fought, held, sang, sank, stood, swang, and swept.

