

A Study of the Spelling Development of Adult Literacy Learners Compared with That of Classroom Children

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This study compared the spelling development of 195 child and 124 adult literacy learners through a comparison of spelling errors. These errors occurred across 24 word features, which included examples of phonetic patterns, visual patterns, and word relationships ranging from beginning consonant sound (dig) to root constancy matches such as the vowel in accented and unaccented syllables (compete/competition). The order of mastery of the 24 spelling features examined was assessed through the Guttman scale analysis. This analysis indicated a similar developmental pattern occurring in both child and adult spellers especially at the early spelling levels. The differences that occurred in the two groups showed the adults better at identifying visual patterns and understanding some word concepts. They fell behind the children in their correct representation of certain phonetic features because of a tendency to depart from the phonics of the word in their spellings. However, because the adults showed no tendency to skip or shortcut the developmental pattern, it lends support to the theory that adult spelling acquisition, like that of children, needs careful assessment as an essential part of the instructional process.

THE READING-SPELLING DEVELOPMENT OF CHILDREN has been widely researched (Adams, 1990; Bryant & Bradley, 1985; Clay, 1979; Ehri, 1987; Gillet & Temple, 1986; Goswami & Bryant, 1990; Henderson, 1981; Morris, 1992; Perfetti, Beck, Bell, & Hughes, 1988; Read, 1975; Tangel & Blachman, 1992; Templeton, 1983). As explained by these researchers, children progress through predictable stages of word knowledge, which can be identified by their spellings and confirmed by their reading behaviors. This progression begins very early, during preschool years, and eventually leads to proficient reading and writing.

In contrast, there is very little research investigating the way in which adults develop or progress in literacy skills. In a 1982 study, Sticht noted the lack of comparative studies of children and adults in regard to literacy learning and called for more research to develop “valid understandings of the learning skills and capacities of adult literacy students” (p. 24). This concern continues to exist; Chall (1987) stated, “There is need for greater and more systematic research and development effort in how literacy develops among adults – as compared to children” (p. 79). More recently, Wagner (1993) noted that “Compared to reading in school-aged children, the research literature on adult literacy acquisition is only just beginning” (p. 6). Because this study is a comparison of the spelling development of adults and children with the goal of gaining new information on adult literacy development, it is appropriate to begin by reviewing what we know about the way children progress in their reading and writing.

Reading-Spelling Development in Children

In the developmental theory of learning, on which this study is based, the skills of spelling, word identification, and reading comprehension progress together through ordered stages of learning. Clay (1975) showed the drawings of children 4 and 5 years old as they experimented with the principle of repeating symbols, working in a directional pattern, and generating variations of known letters. The results of the Early Word Knowledge Test used by the McGuffey Reading Clinic at the University of Virginia show that children recognize “writing” before they have any sound-to-print match, rejecting picture symbols or repetitive forms as improper. Henderson (1985) referred to this early childhood stage as *preliterate word knowledge*. He included in this stage the attainment of a concept of printed word boundaries, the ability to parse speech into word units, and finger pointing accurately to the printed words of a memorized passage. All of these concepts must be in place before the stages of identifiable reading and writing can begin.

As described by Henderson (1985), children’s first recognizable attempts at reading and writing begin with a *prephonetic stage* in which they correctly represent the beginning consonant of a word and, as they progress, include an appro-

appropriate end sound. Some children also recognize the need to include a vowel in each word, but they are, as yet, unable to discriminate and represent the correct vowel.

The second stage of reading-writing is referred to as the *phonetic* or *letter-name stage*. Children now “hear sounds in sequence within words” (Clay, 1979) and represent each sound with an appropriate letter. Consonant clusters are still very confusing to them and often are represented by a single letter (*bup* for *bump*, or *sap* for *slap*). Long-vowel sounds are represented by the most salient vowel (*mal* for *mail*, or *sid* for *side*).

The third stage is the *within-word pattern stage*. Children begin to mark long-vowel sounds by including an extra vowel, which may or may not be correctly placed (*nead* for *need*, or *sied* for *side*). They have abandoned the idea of “one letter, one sound” and are entering a stage of more abstract word knowledge.

The progression of word knowledge continues. Complex vowel patterns, which include silent letters such as *igh* in *right* or low-frequency vowel patterns such as *oi* in *voice*, appear in the students’ spellings. Spellers enter the *syllable-juncture stage*, where they begin to attend to the issues of multisyllable words including the decision to double or not double consonants across syllable junctures. Related words begin to serve as clues for spelling features that cannot be sounded out in the target word (the sounded *g* in *signal* becomes a clue for including the silent *g* in *sign*) and a new concept, which Templeton (1983) refers to as the *spelling-meaning connection*, appears.

As children progress in their word knowledge, their reading of stories and content material reflects their attention to newly discovered word features and becomes more fluent, with increases in speed, vocabulary, and comprehension of ever more difficult text.

Reading-Spelling Development in Adults

As previously stated, there is very little research on the way adults acquire literacy skills. A few studies (Bear, Truex, & Barone, 1989; Byrne & Ledez, 1983; Liberman, Rubin, Duques, & Carlisle, 1985; Marcel, 1980; Read, 1988; Sticht, 1982) have paired adult learning with that of children in specific literacy areas, finding strong similarities in the general pattern of reading-spelling errors, but noting deficits in the adult poor readers on phonological segmentation tasks and the closely related skill of reading and spelling nonwords.

When Bear et al. (1989) compared the word recognition and qualitative spelling assessments of 32 adults enrolled in an adult basic education program with those of children reading and spelling at the same level, they found that the adults’ reading and spelling development followed a pattern similar to that of the children, with the adults exhibiting certain common errors at each stage. This

common pattern was also observed by Worthy and Viise (1996) in a statistical study of child and adult spelling errors. They examined eight spelling features across four spelling levels using a shortened version of the Schlagal (1982) spelling list. Based on *t* tests for mean differences, no significant difference ($p < .01$) was found between the two groups on five of the features, which included the treatment of long and short vowels, double-consonant units, and syllable-juncture issues. The three features on which differences were found, with the adults showing significantly more errors, were all errors in correct phonetic representation of the word as in omissions, substitutions and erroneous additions to suffixes (*batting* for *batted*; *plaining* for *plain*; *-tion* for *-ous*), substitution of one word for another (*breath* for *brave*; *pattern* for *parading*), and misspellings that shared some but no more than half of the correct phonemes with the target word (*sloret* for *smoke*; *huwering* for *hugging*). The adult problem with suffixes was also noted by Liberman et al. (1985) in a Connecticut adult literacy class, where 21% of the spelling errors were omissions or substitutions of inflectional endings.

Marcel (1980) also identified phonetically incorrect spellings of adults, but when he compared the spelling errors of adult low-skilled readers with those of 8 and 9 year olds scoring at least a year behind their peers in reading and spelling skills, he found that the two groups made the same types of errors. They reduced consonant clusters (*spings* for *springs*), omitted parts of consonant units (*met* for *-ment*), substituted vowels (*problam* for *problem*), and showed confusion over the placement of the *r* sound (*furit* for *fruit*). Marcel suggested that adults who spell this way may be caught at a level of phonological awareness similar to that of young children, especially those experiencing early spelling difficulty.

Byrne and Ledez (1983) found that adults with low reading skills experienced great difficulty in manipulating sound. On a phoneme reversal task (exchanging beginning and end sounds such as *pat* to *tap*), they achieved scores very much like those of beginning child readers. On a similar assessment, Viise (1996), using the Bryant and Bradley (1980) rhyming oddity task (ask the student to listen to three words such as *hill*, *hop*, *fill* and identify the one that does not rhyme), found that a class of below-fourth-grade-level adult readers scored only slightly better than the 5-year-old nonreaders in the Bryant and Bradley (1980) study, achieving an average of 72% correct compared with the children's 67% correct.

These studies indicate that whatever the base cause of reading failure in adults, the majority share the problem of limited phonological skills along with the poor ability to identify or decode words and represent them correctly in print. Because this is also typical of normally achieving children in the early stages of literacy, it presents interesting questions. Do adult beginning readers pass through the same stages of learning as children reading at a comparable level? Are the adults who are experiencing severe reading problems caught at some early level of reading-spelling knowledge which must be identified for instruction in the same way that children's reading knowledge is assessed?

The Reading-Spelling Connection

The study presented here was designed to examine the developmental nature of adult learning in one specific area of language acquisition, that of spelling. A strong parallel has been found between measures of spelling, word decoding, word fluency, and reading comprehension, especially at the early reading levels. Morris (1981) compared children's ability to point correctly to individual words in a memorized passage, the number of words they identified correctly when the words were presented in list form, and the quality of their spelling samples. He found a strong correlation existed among the three measures.

Gill (1989) compared children's ability to identify words that they had previously written based on their own phonetic and orthographic knowledge (invented spelling) with the same words presented with standard spellings. He found them able to identify words from both lists to almost the same degree and interpreted this to mean that reading and spelling are dependent on the same phonetic and orthographic awareness.

Among slightly older students in the third and fifth grades, a study (Zutell & Rasinski, 1989) showed that spelling accuracy and the phonetic quality of spellings correlated significantly ($p < .05$) with reading accuracy at both the third- and fifth-grade levels, and that 40% to 60% of the variance in oral reading measures at both levels could be explained by an analysis of students' spelling achievement.

Common reading-spelling errors were also evident in an adult education class in Virginia (Viise, 1996), where the student who wrote *brump* for *bump* read *blend* for *bend*. Other individuals produced paired reading-spelling errors by changing letters in words resulting in phonetic mismatches (spelling *slice* for *slide* while reading *roach* for *notch*), leaving off endings in both areas (spelling *carry* for *carried* while reading *poison* for *poisonous*), and showing confusion over the placement of the *r* sound (spelling *thorat* for *throat* while reading *from* for *form*).

Additional researchers who have studied the reading-spelling connection include Bear and Barone (1989); Ehri (1987); Henderson and Templeton (1986); Perfetti (1985); Stanovich, Nathan, and Zolman (1988); and Tunmer (1989). Their findings support the assumption that a spelling assessment also provides information on reading achievement.

Current Study

The current study compares the spelling behaviors of adults with those of children spelling at the same general level of achievement. It addresses the following questions: How predictable (developmental) is the mastery of specific phonetic and visual-pattern word features in the spelling of both children and adults?

How closely do adults follow the same developmental pattern as children in their spelling acquisition?

Method

The study began with the hypothesis that adults and children spelling at the same general level would make the same types of spelling errors, and that these errors would disappear or become negligible as more advanced reading-spelling levels were examined. Statistical verification that these spelling changes happen in a similar predictable order among both children and adults would be evidence of a developmental spelling pattern occurring in all learners regardless of their age or years of school experience. It would support the use of similar tests in assessing word recognition and spelling knowledge in both child and adult learners as well as the need to match instructional materials to the reading-spelling level of all learners.

Participants

Children. The children in this study ($n = 195$) were children in regular elementary classrooms who had not been identified as needing special help in reading. The total population of 11 Central Virginia elementary school classrooms was assessed. The classes were chosen on availability rather than random selection; however, an attempt was made to achieve a cross-section of grade levels and area schools. The grade levels included 1 kindergarten class, 2 first-grade classes, 1 second-grade class, 1 third-grade class, 3 fourth-grade classes, and 3 fifth-grade classes. Each class was taught by a different teacher. Eight elementary schools were represented. Ethnic information on 152 of the 195 students was provided. The schools reporting this information included those in both city and rural areas. In this group of 152 children, 85% were White, 13% were African American, and 2% were Hispanic.

Adults. The adults ($n = 124$) were the total population of a variety of adult literacy programs, plus individuals in one entry-level community college class. Because many of the teachers who reported scores chose to identify the students by number or initials to preserve confidentiality, complete gender or ethnic information was not provided, but the 39 for whom this information was available included 18 women and 21 men; 17 White and 22 African American. All were proficient in the English language; no ESL students were included. The adults represented three communities in central and southern Virginia and were students of nine different teachers. They ranged in age from 18 to 60 and, with one exception, had between 4 and 12 years of formal schooling. The one exception was a woman with 2 years of formal schooling.

Measures

The spellings of the participants were assessed through the use of the Word Feature Spelling (wfs) list, an instrument designed for this study. This list was patterned after Schlagal's list, which he developed from his 1982 study of the most frequent errors made by normal spellers. However, whereas the Schlagal list has a varied number of examples of each spelling feature, the wfs list maintains an even number of five examples of each examined feature. Also, whereas the simplest Schlagal list includes words such as *brave*, *white*, and *father*, the wfs list begins at a lower level, assessing a student's ability to correctly represent the beginning and end sounds in words such as *pit*, *dig*, and *bed*. The design of the wfs list also allows for quick scoring, an important issue when examining the responses of a large number of spellers.

On the wfs list, spelling words are divided into subgroups of five words with each subgroup made up of words that include examples of the same spelling feature (see Appendix). The list includes 24 spelling features representing phonetic, visual-pattern, and conceptual elements of spelling across all elementary grade levels. The spelling features were chosen and arranged according to a predicted developmental pattern as suggested by Henderson (1985); Bear (1982); Gillet and Temple (1986); Morris, Nelson, and Perney (1986); Templeton (1983); and others. In addition to the categories suggested by these researchers, two additional categories were added when a preliminary study indicated additional areas of concern. The category of *marked ending* was added when it became apparent that early errors in the use of inflected endings such as *-ed* and *-ing* were examples of a failure to treat them as morphemic parts resulting in spellings such as *crakt* for *cracked* and *sharpn* for *sharpen*. This proved to be a more basic error than the errors found under "correct" *-ed* and *-ing* endings, a feature that required proficiency with doubling and *e*-dropping, and the two features were separated on this list. Feature N, representation of syllable units, was also added when it was noted that certain adults exhibited a strong tendency to neglect whole syllables in the spelling of four- and five-syllable words.

The predicted pattern of spelling development was confirmed or readjusted through the Guttman scale analysis, a statistical program which will be discussed later. The order of the features presented here is the order established by the Guttman scale analysis; words were dictated in a slightly different order based on prediction.

The 24 features on this assessment were divided into 3 achievement levels. List 1, which included 6 features, compared the student's ability to correctly represent sounds in single-consonant beginnings and endings (Features A and B) with the ability to correctly represent two-consonant clusters (Features D and F). It also compared the use of a vowel, any vowel (Feature C), to the use of the correct vowel (Feature E).

List II included 7 features. These features compared the student's recognition of the need to include an extra vowel or vowel marker (Feature G) in a long-

vowel word even if the choice were incorrect (*loed* for *load*, or *fite* for *fight*) with the student's accuracy in choosing the correct marker (Feature J). Features H and L investigated the student's ability to maintain a firm grasp of the identity and position of the vowels in short- and long-vowel words in spite of the distraction of the strong *r* sound. Feature I, as previously mentioned, checked the student's recognition of endings such as *-en*, *-er*, *-ed*, *-ly* as morphemic parts separate from the root word. Feature K assessed the student's reaction to increasingly more complex consonant clusters, and Feature M examined the spellings of the ambiguous sounds of digraphs and diphthongs.

Eleven spelling features were included in the List III analysis. The first feature, Feature N, the representation of syllable units, was one of those added to this study. Words included on this feature list were scored correct if each syllable was acknowledged by including a vowel even if the vowel was not correct (*en-va-ta-shin* for *in-va-ta-tion* was counted correct, *in-va-tion* was an error). Feature O examined the spellings of words with phonetically ambiguous *-ar*, *-er*, and *-or* endings, and Feature P looked at spellings across syllable junctures. Feature Q was an assessment of the correct spelling of *-ed* and *-ing* endings including a knowledge of the concepts of doubling and *e*-dropping. Feature R looked at the student's recognition of the suffix as a stable morpheme unit, and credit was given only if the suffix was spelled correctly (*-tion* not *-shun*). Features S, V, and W examined the student's ability to correctly represent the ambiguous *schwa* sound as it appeared in unaccented syllables of increasingly more difficult multisyllable words including those (Feature W) where referring back to the root word would provide spelling clues (*invite/invitation*). Features T and U compared the student's spellings of prefixes attached to root words as they appear in common prefix units (*unnecessary*, *address*, *impress*). Feature X was an assessment of the use of contractions.

The words on List I were given to all the children in one kindergarten class, two first-grade classes, and one second-grade class. Because the purpose of the study was to look at the pattern of developmental progression, kindergartners and adults who were assessed with their classes but failed to achieve a passing score (four out of five correct) on any of the word features were not included in the statistical analysis. Also eliminated from the List I analysis were several members of the second-grade class who achieved a passing score on all List I features. A total of 52 children and 25 adults were included in the statistical analysis.

Sixty-one children and 47 adults were included in the List II analysis, and the same standards were maintained as for List I. Additional children in the third- and fourth-grade classrooms who failed to achieve a passing score on any feature or who scored as having mastered all features were not included in the analysis. However, for the purpose of this study, once the children and adults had been identified as List II learners, they were also assessed on a shortened version of the List I features as well as three of the features on List III to check the consistency of inter-list responses. This resulted in a statistical assessment of 16 features on the List II analysis.

Eighty-two children and 52 adults were included in the List III analysis. The children were members of one fourth-grade and three fifth-grade classrooms. As on the previous list assessments, students who achieved all correct or all failure scores on all features were eliminated from the Guttman scale analysis. Because there was no grade level to guide the anticipated responses of adults, most were assessed on List II level and moved up or down as their spelling responses indicated.

The actual spelling words were chosen from lists found in Henderson, 1985; Schlagal, 1982; Houghton Mifflin Spelling, Levels 2–7, 1985, along with the addition of words with matching features. This list was developed over a period of 3 years before being used as a tool for the study. During this period, the spellings of over 200 children and adults were assessed, and each sublist of five words was refined to eliminate words that were consistently spelled correctly by spellers still striving to master the feature and also words that were missed at a higher rate than other words on the list. As an example, the word *pig* was removed from an early list when all adults in the program spelled it correctly, and *den* was eliminated when it proved to be an unknown word and caused a noticeably greater number of errors than the other four words on the list. The same was true of *purse*, which was eliminated from the *r*-controlled long-vowel list when it caused an overanticipated number of errors and replaced with *cure*, a word that was more in line with other words on the list.

It is possible to argue that because words such as *den* and *purse* are allowable words in their categories, they should have remained on the list; however, because the goal of this assessment was to identify a student's reaction to the spelling of the most representative words, every attempt was made to choose words for each feature that were spelled with the same number of correct responses.

To assure that general spelling achievement was similar in the groups examined, the average group scores for children and adults included in the analysis of each list were computed (see Table 1). The average scores were very similar, with a maximum of five percentage points separating the two groups on any list.

TABLE 1. Group Spelling Scores of Adults and Children Entering Study Based on Correct Responses to Word Feature Spelling Lists

	<i>Total possible</i>	<i>Average score</i>		<i>Percent correct</i>		<i>Difference</i>
		<i>Child</i>	<i>Adult</i>	<i>Child</i>	<i>Adult</i>	
List I	30	20.4	21.8	68	73	+5
List II	80	60.8	59.2	76	74	-2
List III	55	37.5	38.0	68	69	+1

Scoring

The spellings of the participants were scored by counting the number correct on each sublist of five examples. Only the feature being considered was scored (Feature A was scored for correct beginning consonant, Feature B was scored for correct end consonant, etc.). Errors that occurred in any other part of the word were not scored as errors. In a few instances, a subgroup was scored for more than one feature such as correct beginning consonant and correct short vowel scored on the same words in List 1.

Analysis

A Guttman scale analysis was conducted of the spelling data collected. The Guttman scaling procedure was chosen as the appropriate statistical analysis method, because it provides a method of assessing the similarities of adult and child spellings examined from a developmental perspective. The special properties that define a Guttman scale (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) are its unidimensional measurement which measures the movement of intercorrelated items toward or away from a single goal, and its cumulative scaling. In the case of items such as the spelling feature assessment, once the scale has arranged features in the order in which they are most often accomplished, the cumulative scaling measures the consistency with which all students who respond correctly to a certain scaled item will always respond correctly to an item designated as less difficult and, once an item is failed, continue to fail the more difficult items.

The statistical products of the scale include a coefficient of reproducibility which is an index based on the percentage of responses that meet the Guttman scaling criteria. In the case of this spelling analysis, an individual's spellings that perfectly follow the most-often accomplished order of mastery would receive a coefficient of reproducibility of 1.0. Each failure or mastery response that is out of line with the most-often accomplished order would reduce the coefficient of reproducibility for that individual as well as that of the entire group. By convention, a reproducibility of .9 or higher is considered to indicate a valid scale (Nie et al., 1975).

The Guttman scaling procedure also yields a figure of minimum reproducibility, the lowest reproducibility that is possible considering the proportion of respondents passing and failing each item. The difference between the minimum score possible, as computed by the scaling procedure, and the score actually attained is the percentage of improvement. An additional measure, coefficient of scalability, is arrived at by dividing the percentage of improvement by the difference between the minimum score possible and 1.0. The coefficient of scalability should be above .6 if the scale is truly unidimensional and cumulative. The coefficient of reproducibility and the coefficient of scalability, along with the

listing of items as they arrange themselves on a cumulative scale, are the statistics used to interpret and discuss the results of this statistical analysis.

The Guttman scale requires that a cutting point or points be established in the number scores to allow the scaling procedure to assess mastery. One cutting point was used in this study. Because each of the sublists of spelling words contained five words, four correct responses or 80% correct was established as the cutting point. The scaling procedure then considered all sublist responses of 0, 1, 2, and 3 correct as a *zero* (0) or failure response; and sublist responses of 4 or 5 correct as a *one* (1) or mastery response. Conducting scales of both groups on each spelling-list level allowed for the comparison of the similarities and differences in the order of mastery of spelling features.

Results

When the scores of the children and adults on each spelling list were analyzed by the Guttman scaling procedure, the results showed a similar pattern of reproducibility in the two groups at all levels, with no group falling below a .81 attainment of the Guttman criteria (see Table 2). At each level, the reproducibility figure for children was slightly above that of adults.

The scalability of adult spellings fell significantly below that of children on List I, a fact which will be discussed. On List II, the list that included inter-list responses, the scalability of children and adult spellings was very similar. The scalability on List III followed the overall tendency for both reproducibility and scalability to decrease as the spelling features became more difficult, and this decrease was evident in both child and adult spellings.

List I

As previously stated, the conditions established for this study were that all participants would achieve a mastery score on at least one spelling feature. All children and adults included in the study showed proficiency on Feature A (see Table 3). No participant, child or adult, achieved a mastery score on any other feature if the beginning consonant was not in place.

The second feature (B), single end-consonant sound, was almost as developmentally predictable, as was Feature C, recognition of the need to include a vowel in each word. At least 85% of the members of both groups attained mastery scores on all of the first three features. Also, as reported in Table 3, Features A, B, and C were accomplished in the same order in children and adults.

The last three features in List I were much more difficult for both children and adults, with a more than 40% drop in proficiency from the previous features, the steepest drop between any two features in the entire spelling assessment. The

TABLE 2. Guttman Scale Statistics as a Function of List and Group Membership

<i>Statistics</i>	<i>Children</i>	<i>Adults</i>	<i>Difference</i>
List I			
Reproducibility	.97	.87	-.10
Minimum reproducibility	.79	.77	-.02
Percentage of improvement	.18	.09	-.09
Scalability	.85	.41	-.44
List II			
Reproducibility	.90	.86	-.04
Minimum reproducibility	.75	.69	-.06
Percentage of improvement	.15	.17	.02
Scalability	.59	.55	-.04
List III			
Reproducibility	.84	.81	-.03
Minimum reproducibility	.69	.69	.00
Percentage of improvement	.15	.12	-.03
Scalability	.49	.38	-.11

graph for List I (see Figure 1) pictorially emphasizes this drop in proficiency between Feature c (inclusion of a vowel) and Feature D (beginning blend) for both child and adult groups.

The children maintained a high developmental pattern on the last three features of List I as indicated by the high level of reproducibility and scalability of the children's scores on the Guttman scale analysis (see Table 2). The adults, however, showed very low scalability on List I. This was due to the similarity of the adults scores on Features D, E, and F, which showed no real developmental differentiation between the mastery of the use of beginning and end two-consonant clusters.

List II

List II (see Table 4) showed the greatest similarity between children and adults in the reproducibility and scalability of the spelling features examined (see Table 2). Only two features showed more than a 10% variance between the two groups.

The adults scored lower than children on their treatment of marked endings (Feature I) because of their tendency to leave off or change simple *-en*, *-er*,

-ed, and -es endings, a problem that rarely occurred among the children. The children's most common error on this feature was failure to acknowledge the addition of morphemic endings (*cract* for *cracked*; *shortr* for *shorter*). The deletions of the adults (*sharp* for *sharpen*; *crack* for *cracked*) could possibly be related to dialect, but their substitutions of one ending for another (*parting* for *parted*; *shorten* for *shorter*) seem to indicate a more complex problem.

On Feature J, which investigated the correct spelling of homophones (*plane, plain*), the adults scored above the children. Although both children and adults at this level showed a strong ability to recognize the need for a vowel marker (Feature G: the extra vowel or word part that acknowledges the long-vowel sound such as *tape*, not *tap*; *meat*, not *met*), the adults were actually employing the correct marker to almost the same degree as they were recognizing the need to mark the long vowel.

One other issue should be noted on the List 11 graph (see Figure 2). Although the adults maintained the same order of spelling mastery as children, they had a tendency to "plateau" across Features H through M (except for the sharp increase at Feature J which has already been discussed). This would indicate that for adults these features (H-M) are of similar difficulty and are being acquired as a group in the developmental spelling process.

List 111

The List 111 table and graph (Table 5 and Figure 3) also show a similar developmental spelling pattern in children and adults.

TABLE 3. List 1: Average Percentage of Child and Adult Spelling Responses Meeting Mastery Criteria on Each Feature as Determined by the Guttman Scaling Procedure

Order	Percentage		
	Children	Adults	Difference
A. Single begin. con.	100	100	00
B. Single end con.	87	96	+09
C. Short vowel inclusion	85	92	+07
D. Begin. 2-con. cluster	42	40	-02
E. Correct short vowel	37	40	+03
F. End 2-con. cluster	21	44	+23*
List I average	62	69	+07

*more than 10% variance between groups on List I.

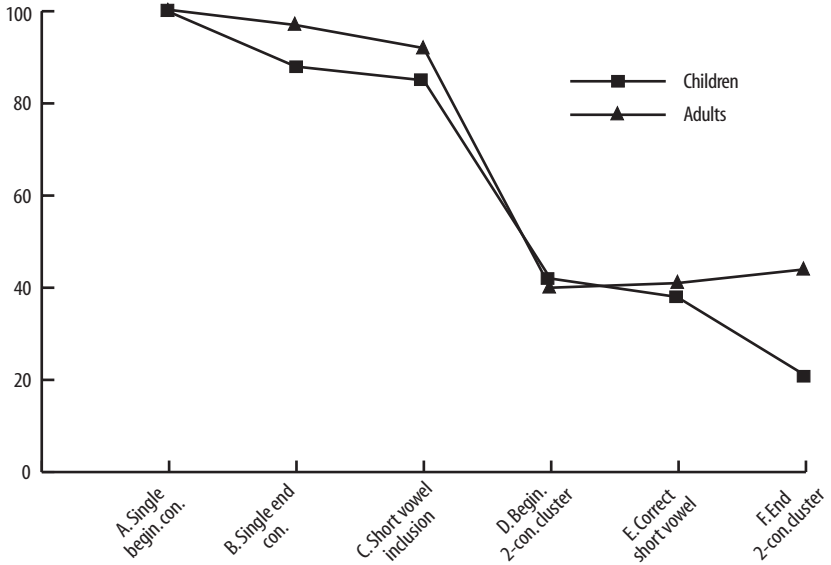


FIGURE 1. Developmental pattern of spelling as measured by percentage of adults and children achieving a mastery (80% correct) score on individual word features on List 1.

The most notable departure from a uniform pattern was the marking of syllables (Feature N), which was a much more difficult concept for adults than for children. The children showed a high level of proficiency in honoring the existence of each syllable in a four- or five-syllable word by including a vowel in each syllable, although it was not necessarily the correct vowel (*navagater* for *navigator*; *repatisis* for *repetitious*). Many of the adults showed an equally strong tendency to leave out vowels in their spellings (*indiction* for *indication*; *adminstrator* for *administrator*) thereby creating words that appeared to be missing a syllable. In many cases, they did leave out the entire syllable with spellings such as *invition* for *invitation* and *repitus* for *repetitious*. This tendency to leave out vowels and syllables lowered the adult group score to 31 percentage points below that of the children.

A feature on which adults showed greater accuracy than children was that of correctly spelling the syllable junctures of intact words (*bottom*, *message*). The adults also outscored the children on prefixes and, to a lesser degree, on suffixes. Although they scored higher than the children on these features, it did not change the order of their pattern of spelling acquisition.

On Feature v, that of correctly representing vowels in four- and five-syllable words, the adults scored more than 10 percentage points below the children. This problem was closely tied to Feature N, the adult tendency to leave out syl-

lables, because many of these vowels were not misrepresented, but rather, were part of omitted syllables.

Discussion and Conclusions

The two groups entered the study with many differences. Besides the most obvious difference of age, our initial interviews showed a difference in “years of formal schooling,” with the adults reporting 4 to 12 years of schooling in comparison with the children’s 1 to 6 years. In addition, the incomplete racial information indicates a higher percentage of African Americans among the adults, bringing up the possibility of dialect-related spelling errors. The strength of this study lies in the finding that, in spite of these and other very real differences, the developmental spelling pattern of the child and adult learners was very similar.

Original Questions Addressed

How predictable (developmental) is the mastery of specific phonetic and visual-pattern word features in the spelling of both children and adults? On Lists I and II, the children achieved scores of reproducibility and scalability (see Table 2), which indicate a valid scale according to the Nie et al. (1975) standard (.9 reproducibility; .6 scalability). Although the adults failed to meet these standards,

TABLE 4. List II: Average Percentage of Child and Adult Spelling Responses Meeting Mastery Criteria on Each Feature as Determined by the Guttman Scaling Procedure

<i>Order</i>	<i>Percentage</i>		
	<i>Children</i>	<i>Adults</i>	<i>Difference</i>
G. Long vowel plus marker	95	91	-04
H. Short vowel <i>r</i> -controlled	79	70	-09
I. Marked ending	79	68	-11*
J. Long vowel plus correct marker	75	89	+14*
K. 3-con. cluster	74	66	-08
L. Long vowel pattern <i>r</i> -controlled	66	64	-02
M. Vowel digraph/diphthong	59	64	+05
List II average	65	66	+01

*more than 10% variance between groups.

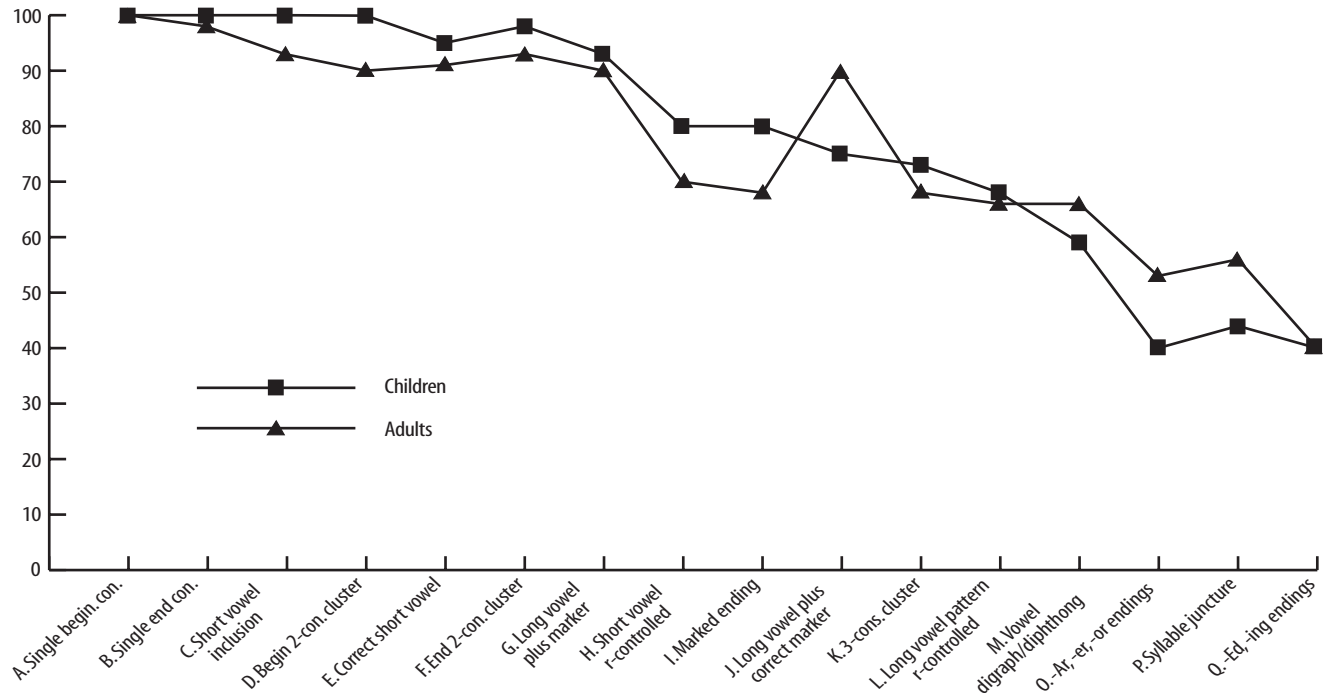


FIGURE 2. Developmental pattern of spelling as measured by percentage of adults and children achieving a mastery (80% correct) score on individual word features on List 11. Graph is extended to include features assessed to check the consistency of inter-list responses.

the reproducibility of their scores never fell below .81. The plateauing effect of spellers on two or more features, as noted at certain points on Figures 1 through 3, lowers the scalability of a feature-by-feature analysis. As anticipated, the Guttman scale analysis indicates that spellers do not progress in a lock-step feature-by-feature manner toward proficient spelling, but rather are attending to groups of features at any one time.

This, however, does not deny the developmental qualities of spelling acquisition. A look at the data shows that no student who missed scoring a four or five (mastery) score on the single beginning and end consonants (Features A and B) attained a mastery score on the double-consonant clusters (Features D and F), and likewise, no student who failed to achieve on the double-consonant clusters achieved a mastery score on the more complex triple-consonant clusters (Feature K). Other examples are not as exclusive, but there is strong evidence that the more difficult spelling features are rarely mastered until the simpler features are understood and accomplished. This is very similar to the stages of learning theory promoted by Henderson (1985), Morris (1981), and others.

How closely do adults follow the same developmental pattern as children in their spelling acquisition? The similarity of the order in which mastery of specific spelling features occurs in child and adult spellers can be seen in Tables 3 through 5 and Figures 1 through 3. Of the 24 features examined, 16 were within 10 percentage points of the same mean percentage correct. In the areas in which adults surpassed children on mean scores, the difference was related to better knowledge of visual spelling patterns such as *robin* not *robbin* and *rabbit* not *rabit*, better judgment on representing homophonous sounds such as *-ar*, *-er*, and *-or* endings, and better understanding of common spelling conventions such as the use of prefixes and suffixes.

On the phonetically driven spelling features, adults followed the same developmental pattern as children (with the exception of Feature N, as previously explained). Once the necessary phonetic realization was in place, however, adults, with their additional years of school, seemed able to make spelling progress on features that depend on visual pattern memory and learned concepts rather than new phonetic knowledge.

Importance of Findings

The evidence that adult learners do follow a developmental pattern of spelling acquisition and that this pattern is very similar to that of children is important information for the planning of assessment and instruction. Adults entering literacy programs need the same careful assessment of literacy skills as do classroom children. This requires tests that can pinpoint the developmental word knowledge of adult students in a more specific manner than most current standardized adult tests are equipped to do. As the similarity of child and adult word knowledge acquisition is confirmed, new tests of word knowledge can borrow

TABLE 5. List III: Average Percentage of Child and Adult Spelling Responses Meeting Mastery Criteria on Each Feature as Determined by the Guttman Scaling Procedure

<i>Order</i>	<i>Percentage</i>		
	<i>Children</i>	<i>Adults</i>	<i>Difference</i>
N. Rep. of syllable units	88	57	-31*
O. -Ar, -er, -or endings	72	81	+09
P. Syllable juncture	67	87	+20*
Q. -Ed, -ing endings	63	73	+10
R. Suffix	57	63	+06
S. Vowel, unaccented, 2-3 syllables	54	63	+09
T. Prefix (unchanged)	38	54	+16*
U. Prefix (assimilated)	30	48	+18*
V. Vowel, unaccented, 4-5 syllables	28	13	-15*
W. Root constancy	27	35	+08
X. Contractions	16	21	+05
List III average	49	54	+05

*more than 10% variance between groups.

from or be patterned after carefully designed children’s tests. Needed coping strategies such as the reading of street signs, menus, forms, and workplace directives, which now make up much of the adult literacy curriculum, can be treated not as isolated skills but rather incorporated into developmentally appropriate instruction.

Differences Noted

Phonological processing. Along with the overall similarity in the child and adult developmental spelling pattern, there were also areas of specific differences. The most obvious was in the area of phonological processing. Many of the adults in this study showed a strong tendency to depart from the phonics of the word, especially in their representation of morphemic endings. This agrees with the findings of the Liberman et al. (1985) study, where omissions or substitutions of inflectional endings accounted for 21% of the spelling errors in a Connecticut adult literacy class. Also, when the adult errors involving inflectional endings in the Worthy and Viise study (1996) were further analyzed, 47% (45) were deletions, but 23% (22) were substitutions, and 30% (29) were additions, indicating that

over half involved something other than the more predictable dialect-related dropping of inflections.

The problem with phonemic awareness was also revealed in the depressed scores of the adults on Feature N, the representation of syllable units in multisyllable words. We do not know whether this was strictly a spelling problem or whether they would also have distorted or failed to acknowledge all parts of the word in their oral representation. A one-on-one reassessment of one woman in the group showed this to be true in her case. When she was asked to repeat the words aloud before writing them, many of those that she had misspelled she also mispronounced. This agrees with the findings of Blalock (1987) in a Northwestern University study of 93 adults with reading problems. She found that 23% (21) had difficulty pronouncing multisyllable words. In a test of echolalia given to 46 members of the Blalock group, only 7 repeated every word correctly. They were often unaware of their errors. It is notable that the echolalia test used was the Slingerland Screening Test for Identifying *Children* with Specific Language Disabilities.

The Blalock (1987) and Liberman et al. (1985) studies found adults with reading disabilities experiencing phonological awareness problems very similar to the problems experienced by the adults in this study. The use of child tests to

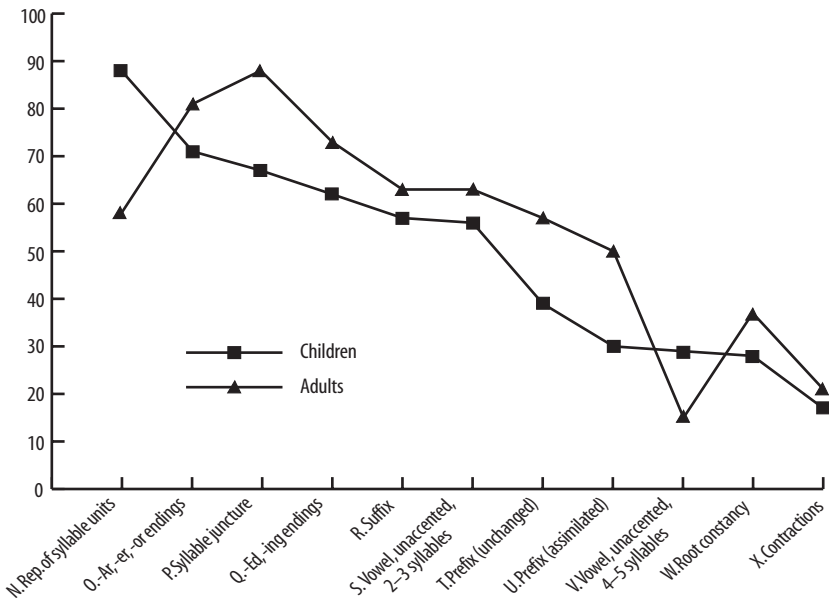


FIGURE 3. Developmental pattern of spelling as measured by percentage of adults and children achieving a mastery (80% correct) score on individual word features on List III.

assess this difficulty indicates that it is a problem that has been assumed to be limited to children. Tangel and Blachman (1992) stated that “there is now considerable evidence that phonological awareness is related to early reading and spelling success ... and, without this awareness, children are likely to become poor readers and spellers” (p. 234). The nonphonetic spellings of many of the adults may be a carry-over from earlier school days when phonological awareness was a problem.

Instructional differences. The adults in this study were from 20 to 60 years old. Information from informal conversations shows that some had attended small one-room country schools, some large urban schools, and some mid-sized neighborhood schools. Many had been in special education classes. The instructional practices over the years and among the schools represented would have varied greatly. The children, while representing a less diverse group, were from schools where both phonics-based and whole language teaching methods were used. The most important result of this study regarding instructional practices is that, in spite of these differences, both children and adults followed the same general pattern of spelling acquisition. For this group, instructional practices, although possibly very influential in the speed of moving students along the learning path, did not change the overall pattern of development.

Topics For Future Study

The results of this study suggest the need for future studies which would address several unanswered questions.

Dialect Variable

One of the most interesting differences between adult and child spelling responses was the adult learners' difficulty in correctly representing inflectional endings. Because the ethnic information available suggests a higher number of African Americans among the adult learners, it is tempting to assume that this problem is strongly dialect related. However, because this was an unexpected finding, the ethnic- and dialect-related information is incomplete, and it is impossible to draw conclusions comparing the inflectional spelling responses of speakers with dialects versus those without. To confirm the effect of dialect on the spellings of inflectional endings, a study comparing the spellings of these two adult groups or a study comparing the spellings of child and adult learners judged to be free of dialects which modify word endings is one of the first areas for further research. If the correlation between dialect and the spelling modification of inflectional endings proves to be weaker than anticipated, the need to consider other causes increases.

Learning Disabilities

The children in this study were all members of regular classrooms. Children who had been identified as learning disabled were not included in the study. As reported, the adults in this study, except for one woman, had between 4 and 12 years of formal schooling. Most were reading at least 2 years and many as much as 8 years behind their “years of school” expectations. According to the broad definition of learning disabled or special education recipients, this would put most of the adults in these categories. This is a very difficult factor to check, because for many of the older students, their elementary schools no longer exist, or they came from schools that did not acknowledge learning disabilities.

Because we cannot go back and retrieve classroom information about adult learners, a second possibility is to include children from special education and learning disability classes in a future comparison of adult and child spelling development. If the nonphonetic spellings of the adults are related to learning disabilities, the children identified with special learning problems should be exhibiting more of these errors than the regular classroom children. A preliminary assessment of the spellings of two special education classes showed this to be true in this group and, along with the data from Marcel’s 1980 study of the similarity of the spellings of adult and child low-skilled readers, provides the rationale for planning a more complete future study.

Phonological Processing Difficulties

Much of the data in this study suggests specific problems in phonological processing. However, the nonphonetic spellings quoted in this study were all discovered in studies designed to assess another major issue. A study directly designed to identify these spellings and to look for correlations with ethnic background, reading level, years of school, and phonemic awareness would give us valuable insights into the reading problems of many adult learners.

Instructional Practices

For our adult learners, the most important instructional question is, Can we identify instructional practices that will be most effective in helping our adult learners to overcome their variety of difficulties and progress in their learning goals? This question, of course, needs further research. We do know that tying instruction directly to the area of need displayed in the spelling assessment helped many students. One man with 12 years of formal schooling moved from an entry score of 70% correct to an exit score of 90% correct on the first-grade-level spelling list. This happened when careful attention to the phonetic make-up of simple one-syllable words encouraged him to eliminate the nonphonetic superfluous

letters which were typical of his entry-level spellings. At a higher level, a woman whose fifth- and sixth-grade-level spellings were filled with nonphonetic endings and dropped syllables increased her score by 21% on a given list of words during one session in which the instructor helped her to examine the words from the point of view of “root word plus prefixes and suffixes.” Careful oral production of the word before the written attempt was a part of the strategy.

These are encouraging signs that even adults with special problems and often years of frustrating school experience can be successful when instruction is geared to their developmental needs. Continued research in the area of effective instruction will increase these students’ chances for success.

Notes

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APPENDIX

Word Feature Spelling List

List 1 Words

- A. Single beginning consonant
 1. *pit*
 2. *sad*
 3. *net*
 4. *dig*
 5. *man*

- B. Single end consonant
 1. *fat*
 2. *top*
 3. *car*
 4. *bed*
 5. *him*

- C. Short vowel inclusion

- D. Beginning two-consonant cluster
 1. *drop*
 2. *chin*
 3. *step*
 4. *glad*
 5. *shut*

- E. Correct short vowel

- F. End two-consonant cluster
 1. *fish*
 2. *dump*
 3. *luck*
 4. *rich*
 5. *last*

Note: Feature C (short vowel inclusion) and E (correct short vowel) are assessed on the 20 words already dictated.

List II Words

G. Correct long vowel plus a vowel marker

1. *game*
2. *load*
3. *slide*
4. *free*
5. *fight*

Note: Patterns of rhyming words such as *fite* and *lode* counted correct.

H. Correct short vowel, *r*-controlled

1. *clerk*
2. *girl*
3. *cord*
4. *barn*
5. *first*

I. Marked ending

1. *sharpen*
2. *cracked*
3. *shorter*
4. *classes*
5. *parted*

J. Correct long vowel plus *correct* marker

Note: Feature J is assessed on the words already dictated for Feature G.

K. Three consonant cluster

1. *ranch*
2. *scram*
3. *splatter*
4. *threw*
5. *catch*

L. Correct long vowel pattern, *r*-controlled

1. *cure*
2. *fear*
3. *wire*
4. *shore*
5. *chair*

Note: Correctly spelled words.

M. Vowel digraph/diphthong

1. *voice*
2. *mouth*
3. *chew*
4. *crawl*
5. *shook*

List III Words

- N. Representation of syllable units
1. *indication* (4)
 2. *interferenc(e)* (4)
 3. *navigator* (4)
 4. *administrator* (5)
 5. *repetitious* (4)
- O. Phonetically matched endings, *-ar, -er, -or* in unaccented syllable
1. *butcher*
 2. *actor*
 3. *collar*
 4. *harbor*
 5. *corner*
- P. Syllable juncture
1. *bottom*
 2. *pilot*
 3. *command*
 4. *message*
 5. *basic*
- Q. Correct *-ed* and *-ing* endings
1. *dropped*
 2. *mailed*
 3. *traded*
 4. *dressed*
 5. *planning*
- R. Suffix
1. *jealous*
 2. *caution*
 3. *basement*
 4. *structure*
 5. *comprehensive*
- S. Vowel in unaccented syllable, 2–3 syllable word
1. *private*
 2. *weapon*
 3. *admiral*
 4. *circus*
 5. *policy*
- T. Prefix (unchanged)
1. *unnecessary*
 2. *address*
 3. *companion*
 4. *arise*
 5. *dissolve*

U. Prefix (assimilated)

1. *immature*
2. *appear*
3. *impress*
4. *illegal*
5. *assign*

V. Vowel in unaccented syllable, 4–5 syllable word

1. *indication*
2. *interference*
3. *navigator*
4. *administrator*
5. *repetitious*

Note: The target syllable in Feature v is assessed on the same words as dictated for Feature n and requires a rechecking, not a rewriting, of the words.

W. Root constancy

1. *invitation*
2. *dividend*
3. *imposition*
4. *competition*
5. *majority*

X. Contractions

1. *isn't*
2. *ours*
3. *what's*
4. *we're*
5. *its* (The dog hurt its paw.)

J L R

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N R C