The Development of Phonological Awareness and Orthographic Processing in Reading Recovery

Katherine Anne Dougherty Stahl, Clarke County (GA) Public Schools
Steven A. Stahl, The University of Georgia
Michael C. McKenna, Georgia Southern University

Abstract

Success in Reading Recovery has traditionally been measured by text reading, concordant with its meaning-driven theoretical base. Yet Reading Recovery lessons include a considerable amount of attention to the visual or orthographic patterns in words and phonological awareness instruction as well. In this study, children in Reading Recovery were found to perform significantly better than a control group not only on Reading Recovery measures, but also on measures of phonological awareness. Children successfully discontinued from Reading Recovery were also found to perform as well as a group of average achieving first graders on a measure of orthographic processing. This suggests that Reading Recovery has effects beyond those ordinarily claimed.

Reading Recovery is a program intended to accelerate the progress of the lowest-achieving 20% of first-grade children so that they are able to perform as well as the average children in their classrooms (Klein, Kelly, & Pinnell, 1997). Reading Recovery has demonstrated impressive rates of success and a number of evaluations have supported the program's effectiveness (e.g., Center, Wheldall, Freeman, Outhred, & McNaught, 1995; Shanahan & Barr, 1995; Wasik & Slavin, 1993). For example, in their conservative analysis, Center et al. (1995) found that Reading Recovery was able to accelerate the reading progress of 35% of the children who would not, under other programs, reach the level of their successful peers. In addition, group programs that are based on similar theoretical perspectives have been successful in increasing children's reading achievement (e.g., Fountas & Pinnell, 1996; Hiebert, 1994; Taylor, Short, & Shearer, 1990).

Because Reading Recovery educators view the program as a meaning-oriented approach, and consider one of its major goals to be the improvement of students' ability to read and comprehend connected text, evaluations of Reading Recovery have stressed text reading as an outcome measure. However, there are aspects of

An International Journal of Early Reading and Writing
An Official Publication of the Reading Recovery Council of North America

the program that seem to be especially conducive to growth in other aspects of beginning reading, such as phonemic awareness and orthographic knowledge. Those studies that have used isolated word measures have found that Reading Recovery does seem to improve students'word identification. For example, Center et al. (1995) found that Reading Recovery students performed significantly better than a control group on measures of isolated word reading and word attack, but not on a measure of phoneme awareness (see Askew, Fountas, Lyons, Pinnell, & Schmitt, 1998, for review).

Although Reading Recovery teachers generally work within the context of reading and writing connected text, they also pay considerable attention to word and sub-word level information (e.g., letter, clusters) during lessons. In fact, Adams (1990) and J. S. Chall (personal communication, 1998) have both cited Reading Recovery as an exemplar of high quality phonics instruction. Attending to both spelling-sound relationships and phonological awareness is integral to the lesson framework.

How Orthographic Knowledge and Phonological Awareness Develop in Reading Recovery Instruction

The goal of Reading Recovery is for the child to develop a "self-extending" system in reading and writing (Clay, 1991; Clay, 1993b) so that he or she can function independently and benefit from classroom instruction. This self-extending system comprises strategies that enable the child to grow and learn from his or her own attempts to read and write. The successful child demonstrates reading behaviors that signal the underlying strategies used, including the integration of cueing systems, self-monitoring, and self-correction. Such strategy use involves the orchestration of orthographic knowledge (including phonological awareness) with semantic and syntactic knowledge to aid in word recognition.

The development of orthographic knowledge in both word recognition and spelling is well-documented. The basic tenet is that children move through a series of stages, becoming increasingly sophisticated at using letter-sound knowledge to identify words (Ehri, 1998; Stahl & Murray, 1998). As children learn to recognize words, they first recognize them holistically, as a single logograph. For example, children at this stage may recognize words such as 'look'through the two "eyes" in the middle or the word 'monkey'by its "tail." This is considered a pre-alphabetic stage (Ehri, 1995), since children are not using letters and sounds, but rather are using the visual representation of each word.

As children develop phonological awareness, they may begin to use some partial sound information in the word, such as an initial or final sound (see Stahl & Murray, 1998). Ehri called this stage phonetic cue reading or partial alphabetic reading. In this stage, a child might substitute a word that begins with the same letter, such as 'bird'for 'bear,'when reading words either in text or in lists. As children learn more words, phonetic cue reading becomes less efficient and children analyze the word more deeply.

In the cipher or full alphabetic phase (Ehri, 1995), children use all the letters and sounds to identify words. Children's reading may still appear labored as they

rely on sounding out the word (i.e., using a letter-to-sound analysis) or on other, less efficient strategies. At this stage, they are engaging in either this letter-to-sound analysis or in the use of analogies to identify the whole word.

Following this stage, children move to automatic word recognition, what Ehri calls the consolidated phase. It is within this stage that children seemingly are able to identify the word as a whole or through rapid recognition of chunks within the word. At this point, children are free to allocate all of their attention to comprehension, for word recognition has become fluent and transparent. With greater practice, children develop such automatic word recognition that they can concentrate fully on the meaning (Chall, 1996; Ehri, 1995).

Stahl and Murray (1998) suggest that children in the first stage lack rudimentary phonological awareness. To reach the second stage, children need to possess not only knowledge of the alphabet, but also the insight that words can be broken into onsets and rimes. Accordingly, the third stage depends on both more sophisticated phonological and orthographic insights. As children learn more about the spellings of words, they can use that knowledge to perform more sophisticated phonological tasks.

Reading Recovery lessons proceed in a manner consistent with the development of orthographic knowledge and phonological awareness. Three features of the lesson improve children's knowledge of words — the use of gradient texts, the use of Elkonin boxes in writing practice, and planned word analysis activities.

Gradient Texts

Students are immersed in easy-to-read books in which the orchestration of the reading process can take place at an appropriate level. The use of gradient, predictable materials provides for a gradual move from an excessive reliance on meaning (context) and structural (syntactic) cueing systems to an increased integration of visual (graphemic or letter-sound) cues.

Even children who have little knowledge of orthography have many language skills that enable them to read without phonological awareness or letter knowledge (Perfetti, Beck, Bell, & Hughes, 1987). In the beginning of a student's work in Reading Recovery, highly predictable books may be used to develop concepts of print. These would include directionality, word-to-word matching, and so on. As students gain greater control over print concepts, the teacher, in a supportive text reading environment, introduces books that are gradually less predictable. This requires that the children use increasing amounts of visual information to recognize words, thereby increasing their reliance on orthography as they progress through the program.

Children who have a self-extending system in reading and writing understand how words work and how they can use what they know to problem-solve difficult words they encounter (Clay, 1993b). To solve novel words one has developed "the cipher" — the analogical mechanism that has been internalized by the process called "cryptanalysis" (Ehri & Wilce, 1985; Gough & Juel, 1991). "Cryptanalytic intent" is the realization by the reader that there is a system to be mastered.

When the cipher has been discovered, children begin to see reading and words in a new way, although actual reading measurements may not register any immedi-

ate change (Chall, 1983; Gough & Juel, 1991). Both Clay (1991) and Chall (1996) concur that a major breakthrough in reading occurs when a child can let go of excessive attachment to meaning and syntactic substitution and see reading as a problem solving process.

Phonological Awareness and Writing

Current theorists no longer believe that letter knowledge and phonological awareness cause reading success to proceed in a linear fashion. Recent research has uncovered a reciprocal causation (Adams, 1990; Clay, 1991; Juel, 1988; Perfetti et al., 1987; Stahl & Murray, 1998; Stanovich, 1986; Stanovich & West, 1989) between children's increasing phonological insights and their knowledge of the alphabetic system. Stahl and Murray (1998) suggest that a certain amount of phonological insight — the ability to segment an onset and a rime — combined with letter knowledge, leads to the insight that letters in words have relationships with speech sounds. This recognition is reflected in both children's initial reading attempts (Ehri, 1991) and their invented spellings (Bear & Barone, 1989). Children's ability to relate sounds and letters increases as they have opportunities both to analyze spoken words further and to tie them to elements of orthography.

In Reading Recovery, phonological awareness is developed largely through activities that support writing. When a child has reached an appropriate level of understanding, the child will be taught to analyze a word using a phonological awareness technique adapted from Elkonin (1973). The technique progresses through stages from simply saying a word slowly in order to hear the sounds, to writing the letters that represent the sounds. Teacher involvement gradually changes over time to allow for independence in processing at each stage.

Initially, to learn the task of analyzing a word into its component sounds, the teacher and the child articulate a word slowly. When the child can do this independently, the teacher helps him or her slide a marker into a box representing each phoneme. When the child can perform this task independently, the teacher selects a word from the child's dictated sentence for the purpose of helping him or her hear and record the sounds of that word. The teacher draws a series of boxes, one for each phoneme in the word. The child then slowly articulates the word, sliding a marker into a box as each phoneme is spoken, and then records the letter or letters that represent that sound. Essentially, this is a shift in the task from a phonological activity to a spelling strategy.

Gradually, the child eliminates the use of the marker and eventually does not require the boxes to hear and record the sounds.

The use of Elkonin boxes is based on a theory of mental process learning, which moves from the establishment of the task, to operating with objects, verbalizing the operation, and finally, operating mentally. Impressive experimental evidence supports the effectiveness of using Elkonin boxes (e.g., Ball & Blachman, 1991; DeFord, 1994; Elkonin, 1973). In DeFord's (1994) study relating writing and Reading Recovery student achievement, more frequent use of boxes for hearing sounds in words was consistently associated with well above average scores on tasks on An Observation Survey of Early Literacy Achievement (Clay, 1993).

Planned Word Analysis

Another feature of Reading Recovery lessons that influences the development of phonological awareness and orthographic knowledge is a teaching activity referred to as "making and breaking," a planned word analysis activity from the procedures intended to help children in "Linking Sound Sequence with Letter Sequence" (Clay, 1993b, p. 43). This activity was given greater emphasis in Reading Recovery lessons in Clay's revised book as a response "to recent research on phonological awareness, onset and rime, and analogy" (Clay, 1993b, p. 44).

During the "making and breaking" activity, the child uses magnetic letters to construct words and take words apart. These activities may include, but are not limited to, manipulations of onset and rimes. Stahl and Murray (1994, 1998) concluded that the ability to manipulate onsets and rimes within syllables relates strongly to reading progress, once an adequate level of letter recognition is achieved.

When teachers use gradient texts for reading, Elkonin boxes for hearing sounds in words, and "making and breaking" activities for linking sound sequence with letter sequence, the lesson's emphasis is on the system, or the process, not on an item (Clay, 1993b). When the teacher emphasizes the visual cueing system, it is used as one tool, or strategy, in an effort to help students understand text, rather than as an end in itself. It is this goal distinguishes Reading Recovery lessons from traditional phonics lessons.

Previous Research on Reading Recovery and Metalinguistic Development

Previous research evidence shows strong support for the effectiveness of Reading Recovery (Center et al., 1995; Clay, 1993b, Iversen & Tunmer, 1993; Wasik & Slavin, 1993). However, some of these studies had some methodological concerns about Reading Recovery-based research reports. One concern is Reading Recovery's research emphasis on discontinuants (Center et al., 1995; Iversen & Tunmer, 1993). These studies addressed an additional concern over the absence of a phonological recoding instrument in Reading Recovery assessments. Center et al. (1995) and Wasik and Slavin (1993) investigated limitations of the An Observation Survey of Early Literacy Achievement (Clay,1993a). It is the only battery of tests used to determine selection of children receiving and discontinuing from Reading Recovery service.

Children who are pre-tested, tutored in the Reading Recovery format, and then re-tested in the same format, may have an advantage over children not required to perform similar tasks on a daily basis. There may be a bias in favor of skills taught in low levels of text reading, where assessment tends to measure concepts about print and the utilization of syntax and context (Wasik & Slavin, 1993).

Based on these concerns, Center et al. (1995) included a more detailed testing procedure on first graders in Reading Recovery. The researchers found no marked pretest differences between students who could be successfully discontinued and those who could not be, except in metalinguistic areas (phoneme awareness and

phonological recoding). Center et al. suggest that children with poor metalinguistic skills are less likely to be successfully discontinued.

Hatcher, Hulme, and Ellis (1994) compared three individual intervention methods: phonological training, reading and phonology (based on a Reading Recovery model but incorporating 10 minutes of phonological activities) and a reading only intervention (similar to Reading Recovery). The reading and phonology group made the greatest progress in contextual reading achievement and comprehension. Although the phonological training group had the highest scores in phonological skills, they were unable to use the skills in contextual reading.

Iversen and Tunmer (1993) had similar positive results with greater attention to phonological processing within a Reading Recovery lesson. They modified a Reading Recovery lesson by adding daily activities specifically focused on word analysis. They found that students in the modified program discontinued with fewer lessons, but that there was no overall difference in the achievement of the two groups of students. Iversen and Tunmer theorized that the additional emphasis on the visual cueing system within their study caused a greater overall promotion of word analysis and less reliance on context. Results of a path analysis suggested that instruction and manipulation of phonograms promotes the development of orthographic processing, allowing children analyze words at a deeper level.

The aim of early reading instruction is to enable children to develop a self-extending system. This involves the development of orthographic processing, among other abilities. Both phonological processing abilities and exposure to print are prerequisites and facilitators of this aim (Clay, 1991; Cunningham, 1990; Perfetti et al., 1987; Stanovich, 1986). Reading Recovery has been effective in promoting reading success for "at-risk" first graders through the use of a metalevel instructional model (Clay, 1991; Clay, 1993b; Iversen & Tunmer, 1993; Wasik & Slavin, 1993). Despite the wide range of measures used to assess emergent reading in An Observation Survey of Early Literacy Achievement (Clay, 1993a), more refined measures of phonological processing may be needed to give an accurate portrayal of children's metalinguistic abilities (Iversen & Tunmer, 1993; Stahl & Murray, 1994; Yopp, 1988).

The purpose of this study was to use refined measures of phonological and orthographic processing in conjunction with An Observation Survey of Early Literacy Achievement (Clay, 1993a) to determine whether techniques utilized in Reading Recovery lessons are effective in promoting progress in the metalinguistic areas of phonological awareness and phonological recoding.

Method

Participants

The participants in this study were first-grade students in a public elementary school in a small city in south Georgia. Students receiving Reading Recovery were the treatment group (n = 12). The control group (n = 19) was comprised of students who qualified for Reading Recovery service, but who were not accepted into

one of the available first-round slots (i.e., they were on a "waiting list" to be served) because of the selection criteria (i.e., serving the lowest children first).

Originally, there were five girls and seven boys in the Reading Recovery group. One of the girls moved at the end of her program, before testing could be completed. There were six girls and thirteen boys in the control group. All students were six or seven years old and were in first grade for the first time. The majority of the students came from middle to low socioeconomic families. The Reading Recovery group consisted of 64% African-American participants and 36% European-American participants. The control group included 63% African-American participants and 37% European-American participants.

All participants were "at-risk" students who were given An Observation Survey of Early Literacy Achievement (Clay, 1993a) as part of the school Reading Recovery selection process. This selection process began at the end of the students'kindergarten year when the teachers ranked students in their classes from those needing the most help to those needing the least help in reading and writing activities. At the beginning of the next school year, first-grade teachers followed the same ranking procedure for their students. Based on a comparison and compilation of both sets of rankings, Reading Recovery teachers formulated a list of students who were achieving in the lowest 25% of the ranked lists (n = 31).

The six survey tasks were administered to those children by the three Reading Recovery teachers (including the first author). The children were then priority ranked based on the results of the survey and Reading Recovery teachers'observations of the students. In this particular county, the selection process for Reading Recovery gave weight to the results of the following survey subtests in descending order: Text Reading, Concepts About Print, Writing Vocabulary, Hearing Sounds in Words (Dictation Task), Ohio Word Test, and Letter Identification. The authors acknowledge this is a variance from the procedures recommended by Reading Recovery standards.

The 12 available Reading Recovery slots were filled by selecting the children with the lowest scores on the survey tasks. At this stage, students who were among the lowest-achieving group were placed on the "waiting list" only if their oral language was extremely developmentally delayed or if the student support team process recommendation for a long-term program was close to completion. (The authors acknowledge this is another variance from standards.)

Both Reading Recovery and control group students were from five first-grade classrooms receiving approximately two hours of language arts instruction daily. All of the classrooms incorporated instruction in literacy groups, which are designed to provide a small group setting where children can participate in literacy activities at their ability level. The control group did not receive any support beyond what was offered within their classroom. There was little consistency in methods of literacy instruction among the first-grade classrooms in this school.

Measures

Pretest and posttest scores were compared to determine achievement on two subtests of An Observation Survey of Early Literacy Achievement (Clay, 1993a). The subtests that were relevant to this study were Letter Identification and Hearing

and Recording Sounds in Words (Dictation Task). In addition to Clay's instruments, the Yopp-Singer Test of Phoneme Segmentation (Yopp, 1988) was given as a more refined measure of phonological processing. In addition, a pseudoword reading measure developed for this study (see Appendix) was used to measure children's knowledge of orthographic patterns. By utilizing instruments not affiliated with Reading Recovery, we hoped to have measures in which the instructional format of Reading Recovery did not provide a treatment group advantage. Behaviors demonstrated on these tasks reflect children's phonological processing abilities as well as the early orthographic connections they are making.

The Letter Identification task is an assessment of letter recognition of the fifty-four capital and lower case letters, plus conventional print forms of a and g, arranged in a random manner. Children may identify the letters by name, sound, or by identifying a word that begins with the letter. Reliability measures were calculated in 1990 and yielded a Cronbach's alpha coefficient of .95. Concurrent validity was established in 1966 yielding a .85 correlation with the Word Reading subtest (Clay, 1993a).

The Hearing Sounds in Words task requires the child to record one or two dictated sentences. There are 37 possible points with one point scored for each correctly analyzed and recorded phoneme. Points are given if the child uses graphemes that may record the sound even if the spelling is not correct (e.g., 'koming'for 'coming'). Reliability measures were calculated in 1990 and yielded a Cronbach's alpha coefficient of .96. No validity information is available for this subtest (Clay, 1993a).

The Yopp-Singer Test of Phoneme Segmentation is used to measure each child's ability to hear and articulate sequentially the separate sounds of 22 words (Yopp, 1995). Reliability was calculated at .95 using Cronbach's alpha (Yopp, 1988). Construct validity was determined using a factor analysis (Yopp, 1988). Of the ten measures included in Yopp's (1988) study, it had the highest predictive validity with a reading task. Predictive validity based on a seven-year longitudinal study ranged from .58 to .74 (Yopp, 1995).

We had planned to determine the orthographic stage of word recognition achieved by the discontinued Reading Recovery students by gauging each child's ability to "pronounce" pseudowords. For the purpose of this study, pseudoword decoding was selected because prior research has found it to be the best measure of phonological recoding and one of the best indications of the development of "the cipher" (Gough & Tunmer, 1986). We designed this test (see Appendix) using a constant onset and twenty common rimes (Wylie & Durrell, 1970). The validity of the test was determined by jurying six reading specialists. Pilot testing was conducted among first-term second graders who had been discontinued from Reading Recovery the previous school year and average and above average first grade-readers during the current year.

Procedures

The total battery of six tasks from An Observation Survey of Early Literacy Achievement (Clay, 1993a) was given as a pretest to all subjects by three trained Reading Recovery teachers (including the researcher) during the first two weeks of

the school year. The results of the Letter Identification task and the Hearing Sounds in Words task were used as measures of letter familiarity and phonological processing for the purposes of this study. The Yopp-Singer Test of Phoneme Segmentation (Yopp, 1995) was conducted by the researcher during weeks three and four before Reading Recovery lessons were started.

Based on the prioritized survey pretest results, four students were selected for treatment by each of the three Reading Recovery teachers (n = 12). Each member of the treatment group received a daily 30 minute, individualized, prescriptive, tutoring session according to the standard Reading Recovery lesson format (Clay, 1993b).

Posttest procedures occurred between week 12 through week 16 as explained below. In order to be discontinued from Reading Recovery mid-year in this district, children must be able (a) to read text level 10 with at least 90% accuracy and with evidence of a self-extending system, (b) to spell correctly 30 high-frequency words within 10 minutes, and (c) to demonstrate mastery of the Hearing Sounds in Words task (Clay, 1993a). Such criterion levels correspond to the class average in this particular school. Text Reading evaluations were conducted by a Reading Recovery teacher who had not been the child's Reading Recovery instructor. The other discontinuation measures were conducted by the child's Reading Recovery instructor.

Two students in this study were successfully discontinued from the program during week 12. Four students were discontinued during week 15. The student who moved during week 15 was being tested for discontinuation but moved before testing was concluded. Her results are not included in this study. The other five treatment group students were given the Letter Identification and Hearing Sounds in Words tasks (Clay, 1993a) as posttests during week 16 by their Reading Recovery instructor.

Letter Identification and Hearing Sounds in Words posttests (Clay, 1993a) were administered individually to all control group students by one of the three Reading Recovery teachers during weeks 14 to 16. The phoneme segmentation test was given individually to all participants by the first author during weeks 16 and 17. In addition, the first author conducted all pseudoword assessments at the time of discontinuation of individual Reading Recovery students.

Results and Discussion

Independent t-test analysis of the pretests did not find significant differences between the Reading Recovery and the control group students. Even though the differences were not statistically reliable, as seen in Table 1, the control group performed slightly better on all measures than the experimental group. Such a finding is consistent with the selection process of taking the lowest-achieving children into the program first. Recall that the greatest weight was given to the Text Reading, Concepts About Print, and Writing Vocabulary tests in the screening and selection process, with lesser weight given to the measures of interest in this study. Since little or no weight was given to the Letter Identification or Hearing Sounds in Words tests in the screening process, we did not anticipate that the Reading Recovery

group and control group would differ on these measures, nor on the Yopp-Singer measure.

Because the sample size was small, as might be expected in a study of Reading Recovery students, we examined the distribution of the data using Kolmogorov-Smirnov tests to determine the appropriateness of parametric statistical procedures. Of the six pretests and posttests, only the Letter Identification posttest differed significantly from a normal distribution, allowing the use of parametric statistical analysis. Children in both groups approached the ceiling in Letter Identification at posttest, leading to a significantly skewed distribution.

Means for pretests and posttests are shown on Table 1. Analysis of covariance was used to examine treatment effects. For each posttest, we used the corresponding pretest as a covariate. (The data met the assumptions of analysis of covariance.) For all three analyses, there was a significant treatment effect (Hearing Sounds in Words, $F(1,27) = 12.11$, $p < .002$; Yopp-Singer, $F(1, 27) = 6.72$, $p < .02$). Respective effect sizes (η^2) were .30 for Hearing Sounds in Words and .13 for the Yopp-Singer. The Wilcoxin Matched-Pairs Signed Ranks Test, a non-parametric test suitable for examining pretest-posttest differences, found significant gains in letter identification, $Z = -4.75$, $p < .001$.

In the following sections, we will discuss the findings relative to the focus of the study; that is, measures of phonological and orthographic processing, which were used to determine if Reading Recovery lessons are effective in promoting progress in the metalinguistic areas of phonological awareness and phonological recoding.

Phonological Processing

The results described above suggest strongly that Reading Recovery students gained in phonological processing, even without additional lesson components. Based on the results of this study, all students in Reading Recovery made significantly greater improvement in phonological processing tasks than students not yet served. The relative magnitude of the effects corresponds to the degree of similarity between Reading Recovery lessons and outcome measures. Dictation is stressed

Table 1. Means of Reading Recovery Group and Control Group on Pretest and Posttest Measures

Variable	Maximum Score	Reading Recovery M	Reading Recovery SD	Control Group M	Control Group SD
Letter Identification	54				
Pretest		33.36	11.34	41.21	10.43
Posttest		50.64	2.80	48.58	6.96
Dictation Task	37				
Pretest		5.36	5.26	8.42	6.35
Posttest		31.18	2.04	23.37	8.86
Phoneme Segmentation	22				
Pretest		5.73	6.13	6.26	5.06
Posttest		15.55	4.01	11.21	7.15

daily during Reading Recovery lessons, so one would expect that the effects from the treatment would be high on this measure. Letter identification is usually stressed only during the beginning lessons. There is explicit instruction in phoneme awareness only through the use of Elkonin boxes during the writing segment. This instruction is brief and of a different form than the Yopp-Singer tasks. Therefore, we expected the effect size to be lower for this measure.

This study supports the findings of Iversen and Tunmer (1993), namely that all "at-risk" students exhibited deficiencies in phonological processing abilities initially. Yopp (1988) reported average scores of 11.8 on her segmentation test when given to kindergarten students. The pretest mean of all first-grade participants in this study was 6.07. On posttest measures, students with high knowledge of orthography and correct spelling would frequently make the sounds of the letters that spelled the word instead of repeating the phonemes in the given word. This could indicate that phoneme segmentation abilities are reflective of a child's knowledge of how words work in reading and writing. However, a larger sample size would be required to demonstrate that this trend is generalizable to a larger population.

Pseudoword Reading

Students who were discontinued from Reading Recovery within the time frame of this study were given a pseudoword decoding test. To inform our work, we had previously conducted a pilot study of pseudoword reading that revealed differences in abilities in the areas of accuracy and automaticity among students in the different developmental stages defined in this study. Based on the pilot study, students reading at a second grade level (as measured by teacher observations) read the 20 pseudowords within three minutes and had accuracy rates of 90% and above (Gough & Juel, 1991). We judged these students to be reading at the consolidated processing stage.

Students (n = 8) reading at a first grade level (again, from teacher observation) had scores ranging from 20% to 80%. None of these students was able to read the word cards with automaticity. They scanned each word visually and with their fingers, deleted the initial consonant before saying the whole pseudoword (e.g.,"ump, zump"), made verbal analogies (e.g., "can, zan"), and when necessary used letter-by-letter decoding. These students were judged to be at the full alphabetic phase, according to Ehri's (1995) model described earlier.

These procedures took four to ten minutes to perform. Accuracy ranged from 30% to 80% and appeared to correlate negatively with the amount of time it took to attempt the 20 pseudowords.

In the current study, discontinued Reading Recovery students (n = 6) displayed a range of accuracy from 10% to 60%, slightly lower than that of the average first-grade reader but within the full alphabetic stage. Their attempts to associate the given letters of the pseudowords to the sounds were similar to those made by the children reading at the first grade level in the pilot study. This suggests that these discontinued students were using strategies similar to children in the alphabetic stage (Ehri, 1998), a stage reached by normally achieving first graders.

Students who were reading at the second grade instructional level appeared to have arrived at the consolidated phase based on the automaticity and accuracy of their responses. However, most children in the sixteenth week of first grade may not yet have had enough exposure to print and be fluent enough with words for orthographic processing to be fully developed (Adams, 1990; Chall, 1983). The average ability first-grade readers were still operating in various levels of the alphabetic stage. The children at the lowest level appeared to be engaging in tedious, letter-by-letter reading. Those in the level immediately preceding the automaticity of the orthographic stage appeared to be noticing the familiar rime and adding the onset, without verbalizing the analogy.

Limitations of the Study

There are several limitations to this study to consider. First, we used a small sample size. This study's lack of power is of concern only if we failed to reject a null hypothesis. The lack of power would increase the probability of a Type II error. But since all analyses produced statistically significant findings, this is not an issue. The fact that we found statistical significance with such a small sample size suggests that the effects are robust. Second, the students were evaluated by other Reading Recovery teachers in the same school, who were aware of these children from ongoing discussions. It is possible that these discussions may have biased the examiners. Because Reading Recovery teachers receive extensive training in coding running records, it is unlikely that any other group of individuals would be as reliable in administering or coding. However, it would have been preferable to tape record the final evaluations and have them checked by a neutral party. Third, some Reading Recovery teachers may have given different emphasis to the activities discussed earlier in this paper, in spite of the extensive training designed to create uniformity of instruction. These results may not generalize to other Reading Recovery teachers.

Finally, we should have administered the pseudoword measure to both groups. As a result, we cannot conclude that Reading Recovery instruction produces better word recognition skills than a control intervention would have. However, the results do support the idea that many discontinuants reach the alphabetic phase of word recognition, and process words in ways similar to average first graders. This is useful information.

Concluding Remarks

Reading Recovery is intended to be a supplemental program, given only to children who have difficulties in learning to read. To improve the reading instruction of all children in first grade, students need high quality classroom reading instruction, with programs such as Reading Recovery available for children who do not yet benefit from that instruction.

Although Clay based Reading Recovery on her theory of reading development, we have found that the instruction and the growth of children is consonant with other models of reading development, notably Ehri's (1995) model. Although

Ehri's model concentrates on word recognition, rather than reading in general, Reading Recovery lessons seem to have a positive effect on both aspects of reading.

Adams (1990) cites Reading Recovery as an example of a quality beginning reading program, showing a balance between text reading and explicit instruction in decoding, aspects not claimed by advocates (e.g., Clay, 1993b; Klein et al., 1997). Gains achieved by Reading Recovery students on phonological processing tasks in this study provide strong support for the program's effectiveness in promoting these abilities. The inclusion of all Reading Recovery participants and the utilization of measures other than Clay's Observation Survey of Early Literacy Achievement (1993a) should dispel some of the methodological concerns stated in other reports (Center et al., 1995; Wasik & Slavin, 1993). This study also reinforced the value of pseudowords as a measure of recoding abilities and as an aid in determining a student's developmental reading stage.

References

Adams, M. J. (1990). Beginning to read: Thinking and learning about print. Cambridge, MA: MIT Press.

Askew, B .J., Fountas, I. C., Lyons, C. A., Pinnell, G. S., & Schmitt, M. C. (1998). Reading Recovery review: Understandings, outcomes, and implications, Columbus, OH: Reading Recovery Council of North America.

Ball, E. W., & Blachman, B. A. (1991). Does phoneme awareness training in kindergarten make a difference in early word recognition and developmental spelling? Reading Research Quarterly, 26, 49-66.

Bear, D. R., & Barone, D. (1989). Using children's spellings to group for word study and directed reading in the primary classroom. Reading Psychology, 10, 275-292.

Center, Y., Wheldall, K., Freeman, L., Outhred, L., & McNaught, M. (1995). An evaluation of Reading Recovery. Reading Research Quarterly, 30, (2), 240-263.

Chall, J. S. (1996). Stages of reading development. (reprinted with a new forward). New York: McGraw-Hill.

Chall, J. S. (1996). Stages of reading development. (2nd ed.). Fort Worth, TX: Harcourt-Brace.

Clay, M. M. (1991). Becoming literate: The construction of inner control. Portsmouth, N.H.: Heinemann.

Clay, M. M. (1993a). An observation survey of early literacy achievement. Portsmouth, N.H.: Heinemann.

Clay, M. M. (1993b). Reading Recovery: A guidebook for teachers in training. Portsmouth, N.H.: Heinemann.

Clay, M. M. (1995). Reading Recovery: A guidebook for teachers in training. Portsmouth, N.H.: Heinemann.

Cunningham, A. E. (1990). Explicit versus implicit instruction in phonemic awareness. Journal of Experimental Child Psychology, 50, 429-444.

DeFord, D. (1994). Early writing: Teachers and children in Reading Recovery. Literacy, Teaching and Learning: An International Journal of Early Literacy, 1 (1), 31-56.

Ehri, L. C. (1995). Phases of development in learning to read words by sight. *Journal of Research in Reading, 18*, 116-125.

Ehri, L. C. (1998). Grapheme-phoneme knowledge is necessary for learning to read words in English. In J. Metsala & L. C. Ehri (Eds.), Word recognition in beginning literacy, Mahwah, NJ: Lawrence Erlbaum Associates.

Ehri, L. C., & Wilce, L. S. (1985). Movement into reading: Is the first stage of printed word learning visual or phonetic? Reading Research Quarterly, 20, (2), 163-179.

Elkonin, D. B. (1973). U.S.S.R. In J. Downing (Ed.), Comparative reading (pp. 551-579). New York: Macmillan.

Fountas, I. C., & Pinnell, G. S. (1996). Guided reading: Good first teaching for all children. Portsmouth, NH: Heinemann.

Gough, P. B., & Juel, C. (1991). The first stages of word recognition. In L. Rieben & C. Perfetti (Eds.), Learning to read: Basic research and its implications (pp. 47-56). Hillsdale, NJ: Erlbaum.

Gough, P. B., & Tumner, W. E. (1986). Decoding, reading, and reading disability. Remedial and Special Education, 7, 6-10.

Hatcher, P. J., Hulme, C., & Ellis, A.W. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. Child Development, 65, 41-57.

Hiebert, E. H. (1994). A small group literacy intervention with Chapter 1 students. In E. H. Hiebert & B. M. Taylor (Eds.), Getting reading right from the start (pp. 85-106). Boston: Allyn & Bacon.

Iversen, S., & Tunmer, W. (1993). Phonological processing skills and the Reading Recovery program. Journal of Educational Psychology, 85, (1), 112-126.

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. Journal of Educational Psychology, 80, 437-447.

Just, M. A., & Carpenter, P. A. (1987). The psychology of reading and language comprehension. Boston: Allyn and Bacon.

Klein, A. F., Kelly, P. R., & Pinnell, G. S. (1997). Teaching from theory: Decision making in Reading Recovery. In S. A. Stahl & D. A. Hayes (Eds.), Instructional Models in Reading (pp. 161-179). Hillsdale, NJ: Lawrence Erlbaum Associates.

Perfetti, C. A., Beck, I. L., Bell, L., & Hughes, C. (1987). Phonemic knowledge and learning to read are reciprocal: A longitudinal study of first grade children. Merrill-Palmer Quarterly, 33, 283-319.

Peterson, B. (1991). Selecting books for beginning readers. In D. E. DeFord, C. A. Lyons, & G. S. Pinnell (Eds.), Bridges to literacy: Learning from Reading Recovery (pp. 119-147).

Shanahan, T., & Barr, R. (1995). A synthesis of research on Reading Recovery. Reading Research Quarterly, 30, 958-996.

Stahl, S. A. (1992). Saying the “p” word: Nine guidelines for exemplary phonics instruction. The Reading Teacher, 45, (8), 618-625.

Stahl, S. A., & Murray, B. A. (1994). Defining phonological awareness and its relationship to early reading. Journal of Educational Psychology, 86, 221-234.

Stahl, S. A., & Murray, B. A. (1998). Issues involved in defining phonological awareness and its relation to early reading. In J. Metsala & L. C. Ehri (Eds.), Word Recognition in Beginning Literacy, Mahwah, NJ: Erlbaum.

Stanovich, K. E. (1980). Toward an interactive-compensatory model of individual differences in the development of reading fluency. Reading Research Quarterly, 16, 32-65.

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. Reading Research Quarterly, 21, 360-406.

Stanovich, K. E., & West, R. (1989). Exposure to print and orthographic processing. Reading Research Quarterly, 26, 402-429.

Taylor, B. M., Short, R., & Shearer, B. (1990). Early intervention in reading: Prevention of reading failure by first grade classroom teachers. Paper presented at annual meeting, National Reading Conference, Miami, FL.

Wasik, B. A., & Slavin, R. E. (1993). Preventing early reading failure with one-to-one tutoring: A review of five programs. Reading Research Quarterly, 28, 179-200.

Wylie, R. E., & Durrell, D. D. (1970). Teaching vowels through phonograms. Elementary English, 47, 787-791.

Yopp, H. K. (1988). The validity and reliability of phonemic awareness tests. Reading Research Quarterly, 23, 159-177.

Yopp, H. K. (1992). Developing phonemic awareness in young children. The Reading Teacher, 45, 696-703.

Yopp, H. K. (1995). A test for assessing phonemic awareness in young children. The Reading Teacher, 49, 20-29.

Biographies

Katherine Anne Dougherty Stahl is a second grade teacher at Whit Davis Elementary School in Athens, Georgia. She was a Reading Recovery teacher for four years and has taught a total of 21 years. She has both a theoretical and practical interest in issues involved in early literacy.

Steven A. Stahl is a professor in the Department of Reading Education at the University of Georgia, where he teaches courses in various aspects of elementary reading and directs the Reading Clinic. He has a long-standing interest in literacy instruction, especially in the beginning stages of reading and vocabulary instruction and has focused his research in this area.

Michael C. McKenna is a professor of Reading at Georgia Southern University in Savannah, where he teaches graduate courses in reading education. His principal research interests include beginning reading, content literacy, technological applications, and reading attitudes.

Appendix

Pseudoword Learning Test

Child's Name _____

Date _____

zack	zain	zake	zale	zall
zame	zan	zank	zap	zash
zat	zate	zaw	zay	zeat
zell	zest	zice	zick	zide
zight	zill	zin	zine	zing
zink	zip	zit	zock	zoke
zop	zot	zore	zuck	zug
zump	zunk			