Repeated Reading to Enhance Fluency: Old Approaches and New Directions

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As phoneme awareness deficits and resulting decoding weaknesses are increasingly addressed, there is heightened awareness of the role of fluency in reading. This paper reviews the history of fluency training, discusses the theoretical bases of such training, and summarizes the current knowledge about the efficacy of training procedures. We focus on Repeated Reading (RR), the most familiar and researched approach to fluency training. Outcome data on Repeated Reading, presented in the form of questions, is meant to answer practitioners' questions about implementation and efficacy and to provide a starting point for researchers interested in the topic. Although some answers are straightforward, others indicate the subtleties involved in answering the broad question, "Does Repeated Reading work?" In addition to a list of practical suggestions based on Repeated Readings findings, three new approaches to fluency training are introduced.

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INTRODUCTION

Recent intervention research (Torgesen, Rashotte, and Wagner 1997; Foorman et al. 1997; Foorman et al. 1997; Scanlon and Vellutino 1996) demonstrates that direct, intensive instruction in phoneme awareness and phonics improves decoding and word identification in poor readers, but yields only minimal gains in reading fluency. These findings attest to the need to turn our attention to fluency, defined here as the ability to read connected text rapidly, smoothly, effortlessly, and automatically with little conscious attention to the mechanics of reading, such as decoding. A major reason for focusing on the development of fluent reading is the theoretical relationship between fluency and comprehension. In theory, fluent reading allows the reader to attend to the meaning of text rather than to the mechanics of reading (Samuels 1979; Adams 1990). This hypothesis is supported by empirical research demonstrating strong correlations between reading fluency and comprehension (Dowhower 1987; Shinn et al. 1992; Tan and Nicholson 1997).

Dysfluent reading can also adversely affect the reader's motivation to engage in reading. Students with learning disabilities, in contrast to their normally achieving peers, often believe their academic performance is determined by their ability rather than their effort (Renick and Harter 1989). Therefore, pessimism about their ability to read, coupled with the experience of reading as an effortful and frustrating task, may lead dysfluent readers to avoid reading. Research douments that poor readers spend significantly less time reading than do skilled readers (Allington 1980, 1983; Biedmiller 1977; Lyon 1998), and Stanovich (1986) has hypothesized that reduced exposure to text leads to restricted vocabulary development which, in turn, has a negative impact on comprehension. Given the escalating demands for reading skills in our technological society, it is critical that researchers and practitioners focus on fluency as an important component of reading instruction.

THEORETICAL EXPLANATIONS FOR NONFLUENT READING

Three theoretical explanations posited for nonfluent reading are slow recognition of individual words, lack of sensitivity to prosodic cues, and failure to make higher order semantic connections between words, meanings, and ideas. Each theory has its own particular instructional implications.

SLOW RECOGNITION OF INDIVIDUAL WORDS

The earliest explanation for dysfluent reading focused on dysfluent readers' slow recognition of individual words (LaBerge and Samuels 1974; Samuels 1979). Research has confirmed that poor readers take much longer and require more exposures to recognize individual words than do normally reading children (Ehri and Wilce 1983; Reitsma 1983). Furthermore, the more complex the word, the longer it takes individuals with reading disabilities to learn it (Manis, Custodio, and Szeszulski 1993).

Two models have been proposed to account for the impact of slow word recognition on reading comprehension. LaBerge and Samuel's (1974) information processing model postulated that word recognition and comprehension cannot be performed simultaneously if a reader must focus disproportionately on word recognition. In this model, practice and overlearning lead to a high level of automaticity in word recognition, leaving attention free for comprehension. The verbal efficiency model proposed by Perfetti (1977, 1985) also assumes that through learning and practice, a reader can become more efficient and free cognitive resources to focus on higher level demands in reading. Perfetti's theory, which others have described as a sequential processing model, or "bottleneck" theory, posits that slow rate of word recognition obstructs the individual's ability to hold large units of text in working memory. This deficit makes reading less efficient. Shankweiler and Crain's (1986) hierarchical conceptualization extended Perfetti's theory by hypothesizing that the demands of orthographic decoding, in combination with limited working memory capacity, contribute to the reading comprehension difficulties of poor readers.

In the past twenty years, researchers have identified two major factors affecting speed and accuracy of single word recognition. Word recognition relies heavily on decoding ability, which, in turn, is related to underlying phonological awareness and phonological processing skills (Liberman and Shankweiler 1979; Adams 1990). Individuals who are poor decoders read slowly as they attempt to match letters to sounds in unfamiliar words. A potentially separate factor is retrieval or naming speed. Individuals with a deficit in this area have difficulty rapidly and accurately retrieving the names of familiar high frequency words (of, in, the), of word families/patterns (-at, -an), or letter-sound associations, even when decoding skills are accurate. Slow speed of lexical access has been shown to be a highly stable characteristic of poor readers (Meyer et al. 1998). A double

deficit hypothesis has been proposed by Wolf (1997) and Wolf and Bowers (1999) who argue that phonemic awareness and rapid naming are partially separate, independent processes which predict different specific reading subskills. By this hypothesis, individuals with deficits in phonemic awareness are likely to have poor decoding accuracy, whereas individuals with deficits in rapid naming/retrieval are likely to have poor sight word recognition, especially in terms of speed. Individuals with deficits in both areas, the so-called double deficit, are considered to be at even greater risk for dysfluent reading than are individuals with only a single problem, either a rapid naming/retrieval problem or one involving phonology/decoding. The instructional implications of the double deficit hypothesis are clear. Effective instruction must focus specifically on an individual's area(s) of weakness.

LACK OF SENSITIVITY TO PROSODIC CUES

Schreiber (1980) proposed that dysfluency in poor readers occurs because they cannot grasp the prosodic and rhythmic characteristics of language in written text. Schreiber posits that it is the readers' ability to grasp the underlying syntactic structure of the language that leads to automaticity. He points out that young children often rely on prosodic and rhythmic characteristics of oral language to derive meaning before they acquire true linguistic competence. However, for beginning readers with poor word identification skills who do not understand how the sounds of oral language are represented in written text, such prosodic cues are not available. In this framework, fluency instruction should focus on recognition of phrases within sentences using techniques such as parsing exercises (separating noun and predicate phrases) and modeling prosody (listening to a fluent reader produce the appropriate phrasing in sentences).

FAILURE TO MAKE HIGHER ORDER ORTHOGRAPHIC AND SEMANTIC CONNECTIONS

Theorists propose that rapid single word identification and phrasal knowledge are necessary, but not sufficient, conditions for fluent reading. Adam's (1990) "connectionist" approach posits that skillful word reading is the consequence of rapid, coordinated, and highly interactive processing. She identifies four key processes—orthography, phonology, meaning, and context—and proposes that the stronger the connections among them, the more rapidly the word is recognized. As an example, Adams proposes that both orthographic and meaning processors are critical

for learning morpheme patterns or units making up compound words with Greek, Latin, and Anglo-Saxon roots. Learning morpheme patterns enhances vocabulary acquisition and fluency because it makes word parts familiar and provides rich associations arising from lexical and semantic knowledge. Adams views the four processes as both complementary and compensatory to one another, and as a necessary component for comprehension.

The connectionist theory of fluent reading suggests that students should be taught to recognize common letter patterns, to map sounds onto letters and patterns within words, to understand the meanings of words, and to use context to construct meaning from text.

REPEATED READING METHODS

Recent research indicates that decoding instruction improves word attack and word identification, but does not correspondingly improve fluency (Torgesen, Rashotte, and Wagner 1997). How, then, are educators and clinicians to promote reading fluency? Because RR of connected text is the oldest, most frequently cited, and most researched method for improving fluency, we will focus primarily on this methodology. As originally conceptualized by Dahl (1974) and Samuels (1979), Repeated Reading is based on the information processing model which suggests that fluent readers are those who decode text automatically, leaving attention free for comprehension. The goals of RR as stated by Samuels were threefold: to increase reading speed; to transfer that improvement in speed to subsequent material; and to enhance comprehension with each successive rereading of the text.

The basic RR method is simple and straightforward. The student reads a passage at the appropriate instructional level aloud several times until the desired rate of reading, measured in words per minute, is achieved. After reaching the criterion rate, the student reads another passage at the same level of reading difficulty until that rate is attained again. In some cases, the child is given feedback on word recognition errors, as well as on the number of words correct. Results are graphed.

There are several variations of the RR technique in addition to the standard oral reading described above. One involves *unassisted* repeated reading where the child silently reads and rereads the same passage to himself with no adult supervision (text rereading). Another model involves *assisted* repeated reading

where the child reads aloud and along with a fluent reader (spoken or modeled text) (Young, Bowers, and MacKinnon 1996). The third variation—*prosodic* reading—directs the attention of the reader to syntactic and rhythmic cues of the passage. Prosodic reading can include simply listening to the same passage read aloud several times by an adult, or be a variation on assisted repeated reading where the reader reads aloud with the person modeling. The critical factors are that the model reads in an expressive manner, using correct intonation, and reads at a rate slightly faster than that of the child (Schreiber 1980).

OUTCOME DATA: ANSWERS TO PRACTICAL QUESTIONS

To consider the outcome data, we pose questions of practical consequence and indicate current findings in each area.

Descriptions of studies used to answer the practical questions posed below are listed in chronological order in Table I. Herman's early (1985) study serves to illustrate the methodology of RR research. Herman selected intermediate-grade students whose reading ranged from the 2nd to the 17th percentile on a group test, and whose reading rate was between 35 and 50 words per minute (wpm). Each student's reading level was subsequently assessed using an individual reading test, and the level for the repeated reading texts were chosen on that basis. After practicing their stories until they reached the criterion of 85 wpm (which took an average of four days), students chose another story at the same reading level. Students remained in the experiment for an average of 21 days. Using a repeated measures design, data on reading rate, accuracy, and number of speech pauses (analyzed by a microprocessing computer program) were collected four times during the study. Data were analyzed using a within-subjects and between-story analysis. Although Herman did not measure comprehension or prosody, other early studies, such as Dowhower's (1987), did. It seems, therefore, that early researchers anticipated many of the major questions about the efficacy of the RR method.

How fluent is fluent?

The most common way to assess fluency is by measuring oral reading rate per minute. Use of a sliding scale based on age and skill level is appropriate. In first graders, 30 to 50 words per minute is satisfactory (Mercer and Campbell 1998). For students

Table I. Repeated Reading-Fluency Training Research.

Study	Participants	Sample Size	Length of Intervention
Spring, Blunden, and Gatheral 1981	Average readers grade 3	48	1 session
Herman 1985	Nonfluent readers grades 4–6	8	21 sessions
Rashotte and Torgensen 1985	Nonfluent reading disabled readers grades 2–5	12	7 sessions
O'Shea, Sindelar, and O'Shea 1985	Average or above readers grade 3	30	3 sessions
Dowhower 1987	Transitional readers grade 2	17	30 sessions
Rasinski 1990	Average and above readers grade 3	20	4 sessions
Stoddard, Valconte, Sindelar, O'Shea, and Algozzine 1993	Reading disabled grade 3–5	30	15 sessions
Faulkner and Levy 1994	1. good and poor readers grade 6	48	2 sessions
	2. good and poor readers grade 3	56	2 sessions
	3. good readers grade 2	48	2 sessions
	4. average readers grade 4	32	2 sessions
Varden, Bosh, VonBon, and Schreider 1995	Reading disabled grades 2–6	41	16 sessions
Young and Bowers 1995	1/2 average readers 1/2 reading disabled grade 5	85	1 session
Young, Bowers, and MacKinnon 1996	poor readers grade 5	40	1 session
Tan & Nicholson 1997	poor readers grades 2-5	42	5 sessions
Levy, Abello, and Lysynchuk 1997	poor readers grade 4	28	4 sessions (6 training sessions per day)
Flynn, Talbar, and Deering, 1998	reading disabled grades 2–7	44	54 sessions
Levy 1999	good and poor readers, grade 4	48	4 sessions

reading at approximately a mid-second grade level, rates considered acceptable range from 85 to 120 wpm with most hovering around 100 wpm ± 15 (Herman 1985; Dowhower 1987; Mercer and Campbell 1998). Oral reading rates improve slowly and incrementally over time (Hasbrouck and Tindal 1992; Hintze et al. 1997) and by 5th grade and above, desirable rates range from 120 to 150 wpm (Campbell and Mercer). Silent rates also improve incrementally (at least through high school) at a constant rate of about 10-20 words per minute/per year when reading material is at or below instructional levels (Carver 1989). In high school, the mean silent rate, based on the Nelson-Denny Reading Test revision (1993), is around 200 wpm (± 20).

A second way of assessing fluency involves counting the number and length of pauses. However, the issue of whether "fluent" reading is to be defined as virtually pause-free has never been addressed directly, and studies have produced conflicting results. Dowhower (1987) found that pauses decreased once second graders achieved a certain degree of reading facility, whereas Herman (1985) found no such decrease in length of pauses.

The third method of assessing fluency requires rating the prosodic quality (phrasing, fluency, and expression) of oral reading (Young, Bowers, and MacKinnon 1996). The Fluency Scale developed by Allington and Brown (1979) rates students on a scale from 1 to 6, with 6 defined as optimally fluent. This technique requires two independent raters and is more complex than other methods.

Can reading speed be increased by Repeated Reading?

Many researchers have convincingly shown that for a wide variety of readers, RR improves reading speed as measured by the number of words read per minute. This is true for normal third grade readers (Rasinski 1990; O'Shea, Sindelar, and O'Shea 1985; Faulkner and Levy 1994), for second grade readers with normal decoding skills but slow reading rate (Dowhower 1987), and for older elementary school students who are poor readers (Herman 1985; Rashotte and Torgesen 1985; Stoddard, et al. 1993; Faulkner and Levy 1994; Flynn, Rahbar, and Deering 1998). Note that most studies of Repeated Reading focus on elementary school students, which limits our ability to generalize the results to older students.

Do reader characteristics influence the amount of improvement?

Two reader characteristics, naming speed and degree of reliance on decoding for word recognition, have been found to be re-

lated to reading rate. Bowers (1993) studied a sample of average and poor readers, and found that those students with faster naming speeds showed greater increases in fluency after repeated reading training (reading passages four times). When accuracy of word identification was controlled statistically, slower readers' gains in fluency were predicted by naming speed. The results of this study suggest that poor readers with deficits in naming speed show improvements in reading speed more slowly than do poor readers without deficits in naming.

In direct contrast, two recent studies utilizing longer periods of training have found greater improvement in fluency among slow namers than among average namers following training. In a study by Levy, Abello, and Lysynchuk (1997), fourth grade poor readers read sets of 72 single words 20 times before reading stories containing those words. In results that contradicted those of Bowers'(1993) earlier study, slow namers gained relatively more than their faster naming peers. The 1997 results did, however, support the earlier finding that rapid naming rates did predict reading rate both before and after practice. Flynn, Rahbar, and Deering (1998) provided 54 hours of individual instruction over seven months to students categorized as either dysorthographic (overly reliant on decoding) or dysphonetic (rapid but inaccurate decoders) readers. Dysorthographic readers showed greater increases in fluency than did the dysphonetic readers when fluency training was emphasized. That study used a repeated oral-assisted reading format first with teacher modeling, then duo reading followed by student solo reading. Midway through the intervention, dysorthographic readers' rate had increased 61 wpm from baseline compared to a 43-wpm increase for dysphonetic readers.

Given that accuracy is another measure of fluency, can reading accuracy be increased by Repeated Reading?

A number of investigators report improvement in word recognition accuracy in a range of readers, including poor or disabled readers (Herman 1985; Young, Bowers, and MacKinnon 1996; van Bon et al. 1991; Flynn, Rahbar, and Deering 1998), transitional second grade readers (Dowhower 1987), and normal readers (Rasinski 1990).

How many rereadings are needed to improve reading rate?

O'Shea et al. (1985) report that in normal reading third graders who reread passages 7 times, 83 percent of the improvement

occurred after four rereadings. Consistent with this, researchers typically have both disabled (Young, Bowers, and MacKinnon 1996) and normal readers (Bowers 1993) reread passages three to four times.

What is the average duration of fluency training during a single session?

In general, the length of the sessions described by various researchers averages about 15 minutes daily (range 10–20 minutes). Note that this time may include not only fluency training but also the test time for outcome measures (including rate, fluency, accuracy and comprehension) and correction of errors.

What level of instructor training is needed to implement Repeated Reading?

Although instructor training level is not addressed directly in most of the research, RR has been implemented by teachers, paraprofessionals, and volunteers (Mercer and Campbell 1998). Students at risk for reading failure can profit from reading with an adequately trained, higher-functioning peer (Simmons et al. 1990). Clinical practitioners have also provided simple, straightforward directions for parents who wish to do repeated reading exercises at home.

Which types of repeated readings are most effective: assisted, unassisted, or prosody?

Research findings suggest that variation in the students' level of reading skill prior to practice with RR techniques may produce differential results. For readers with average skills, researchers (Dowhower 1987; Rasinski 1990) found that all types of RR techniques produced gains in reading speed and accuracy. However, Dowhower concluded that the "read along" approach (prosodic reading) may be especially helpful for beginning readers who read accurately but slowly (reading rate less than 45 wpm). Young, Bowers, and MacKinnon (1996) evaluated the influence of prosodic modeling within a Repeated Readings instructional procedure on the development of fluency in fifth grade disabled readers. Whereas both assisted repeated readings (students read text in unison with a fluent oral model) and unassisted repeated readings (students read text independently) improved reading performance, it was the actual rereading of the text, not the prosodic modeling, that accounted for the most improvement.

What is the role of text difficulty in reading fluency?

Young and Bowers (1995) evaluated the impact of text difficulty on oral reading fluency in fifth grade average and poor readers. Differences in reading fluency between average and poor readers were evident on even the easiest stories; that is, poor readers were significantly slower than average readers, even when accuracy of word identification was not a factor. Poor readers showed significant declines in reading rate, accuracy, and fluency (phrasing, oral expressiveness) with each increase in text difficulty. In this study, naming speed (not phonemic awareness) contributed significant and unique variance to reading rate and fluency. This provides support for the double deficit hypothesis and suggests that accuracy of reading cannot be equated with oral reading rate or fluency in poor readers with naming deficits. These results seem to support the instructional practice of using materials that can be read accurately as the basis for fluency training with poor readers.

What factors in Repeated Readings increase the likelihood that the effects will transfer to novel text?

This is a complicated issue. Rashotte and Torgesen (1985) and Dowhower (1987) report it is the number of shared words in the text that increases transfer. Rashotte and Torgesen found that if one half of the words are shared between texts, reading speed of subsequent text improves. However, Faulkner and Levy (1994) found that for sixth graders (good and poor readers), it was only on more difficult stories that words shared between texts improved fluency; on easier stories, it was the shared content of the stories that improved fluency.

In a sample of fifth grade disabled readers, Young, Bowers, and MacKinnon (1996) studied transfer effects under four different types of fluency training conditions: repeated reading of lists of words from the text; repeated listening to the text read aloud; unassisted repeated reading with error correction; and assisted repeated reading with the students and teacher reading text together. Texts were used that contained a large number of shared words. All training conditions produced some transfer in oral reading fluency (expressiveness) and comprehension, but only the assisted repeated reading condition resulted in improved *accuracy* of word identification on the unpracticed material. The repeated reading conditions, but not repeated listening, resulted in a transfer of reading speed.

And the ultimate question: Does Repeated Reading improve comprehension?

This question is prompted by the theoretical relationship between fluent reading and comprehension and by studies indicating strong correlations between these two factors (Shinn et al. 1992; Dowhower 1994). Unfortunately, this is a very difficult question to answer since the methods of measuring comprehension—for example, cloze method (Spring, Blunden, and Gatheral 1981), unaided literal recall questions (Dowhower 1987), story-retelling (Young, Bowers, and MacKinnon 1996; O'Shea, Sindelar, and O'Shea 1985), and comprehension questions and recall (Tan and Nicholson 1997)—and subject samples vary considerably and results are not consistent across studies.

In second grade readers, Dowhower (1987) found that the assisted reading group, using the prosodic model, showed significant gains in comprehension in comparison to the unassisted group who read alone. However, in a study of poor readers, Young, Bowers, and MacKinnon (1996) came to a different conclusion. These researchers found that comprehension was improved by repeated reading of intact text, not by prosodic modeling or listening to text. They hypothesize that repeated reading practice allowed the poor readers to become more efficient readers, which, in turn, enabled them to shift their processing resources to comprehension.

O'Shea, Sindelar, and O'Shea (1985) found that the type of cueing such as directing students' attention to either fluency or comprehension is critical. Students cued to attend to fluency showed significant improvement in fluency but not as much improvement in comprehension, whereas students cued to pay attention to meaning showed better comprehension and were better able to retell the story. O'Shea et al. (1985) suggest that a combination of cueing for fluency and comprehension using materials at the student's instructional level may be ideal.

These findings indicate the complexity involved in assessing comprehension gains from fluency instruction, and suggest some factors that need to be considered such as student age, reading level, instructional method type (types of repeated reading or rapid decoding of single words), and cueing. Furthermore, the question of whether fluency and comprehension reciprocally influence one another is unanswered. Clearly, more carefully defined research is necessary to determine which

approach—with which students, under what conditions, and for how long—will have the greatest impact.

SINGLE WORD AND PHRASE FLUENCY TRAINING

The efficacy of single word reading practice was cast into doubt by an early study by Dahl (1979) that reported second grade students given practice on reading single words, as opposed to repeated reading of connected text, did not make gains in reading rates. Dahl concluded that practice with reading words in context was necessary to increase reading speed. However, recent research questions Dahl's conclusion, making it important to reconsider the efficacy of single word training. Several proponents (Levy et al. 1997 and Tan and Nicholson 1997) ascribe to versions of Perfetti's "bottleneck" theory. For example, Levy et al. (1997) states that the "bottleneck" is " a disabling problem whose correction enables, but does not necessarily cause, comprehension to improve" (p. 186).

There are several techniques for single word training. *Flashcard* practice consists of printing a word on an index card, with the goal of recognizing it within a specific time period (often one second). Training continues either until the child reaches a specified criterion level or until the child has had enough practice to assure automaticity. After training, the student should be able to read the practiced words from a list of words on one page. Fleisher et al. (1979) set the goal of 90 wpm with 95 percent accuracy. Words (or sometimes phrases) selected are those frequently missed or judged to be difficult. The words selected may or may not be related to the content of the material to be presented. Time spent in flash card practice is approximately 20 minutes per session.

Computer practice, a variation of flashcard practice, presents words one at a time on a computer monitor, and the child reads the word aloud as rapidly as possible. If the child does not respond within a specified number of seconds, the word is removed automatically from the screen. The word then may be pronounced for the child.

Page speed drills such as those advocated by Fischer (1995, 1999) involves reading pages of alternating word sequences as fast as possible in one minute. For beginning readers, this may involve only three or four words repeated randomly in rows on one page. With increasing reader skill, the number of randomly repeating words on the page increases from five to seven.

Words are phonetically similar (fat, cat, sat) or contrasting (hat, hate, rat, rate). For beginning six- to seven-year-old students, Fischer recommends a goal of reading correctly 30 wpm, gradually increasing to 60 wpm by the middle of grade three.

Two questions related to single word and phrase fluency training have been addressed:

Does rate of reading text improve after practice with single words or phrases?

Recent studies of elementary students by van den Bosch, van Bon, and Schreuder (1995), Tan and Nicholson (1997), and Levy, Abello, and Lysynchuk (1997) indicate that flash card training is valuable. Training students to read words or phrases within strict time limits (defined as one or two seconds per word) resulted in improved speed and accuracy of text containing those words (Tan and Nicholson 1997; Levy et al.1997), and in reading rate of nonpracticed lists of similar words (van den Bosch et al 1995).

In a direct comparison of the benefits of practicing words in context (looking at the transfer of the same words to a different context) versus practicing lists of single words contained in the text, Levy (1999) found that use of connected text (contextual training) did not result in either greater fluency or greater comprehension. These researchers concluded that "young readers (fourth graders) appear to consolidate word recognition gains equally in or out of context." Given equal amounts of practice time, Levy (personal communication) hypothesizes that the greater number of repetitions afforded when reading the list of target words (13 trials) versus reading the stories containing the target words (4 trials) accounts for the findings. This result indicates the practice of single word reading may be a useful component of fluency instruction.

Does single word or phrase reading practice improve comprehension, and, if so, under what conditions?

Similar to the findings on repeated reading of connected text, the findings here are mixed. In a sample of third grade average readers, Spring et al. (1981) found that practice in reading lists of words did not improve comprehension when comprehension was assessed using a cloze procedure. In contrast, in a sample of poor readers, Tan and Nicholson (1997) found that training students to read rapidly a limited number of words (7 to 8 percent of the words in a passage) or phrases significantly im-

proved comprehension. They note that the difference between their findings and those of others may have been due to several factors, including use of systematic decoding to teach single words, gearing difficulty level of passages presented to the child's reading level, and explaining unfamiliar meanings of words in the training set. Levy, Abello, and Lysynchuk (1997) found no gains in comprehension when no time limits were used. However, when demands for speed increased during the training period, comprehension improved.

GENERAL PRINCIPLES OF FLUENCY TRAINING FOR STUDENTS WITH READING DISABILITIES

Although the findings from the studies referenced above do not provide as definitive and clear cut guidelines for fluency training as would be ideal, in our opinion there is a sufficient knowledge base to support a few general principles for practitioners. These principles, presented in table II, are offered with the full realization that not all strategies are appropriate for all students, and that clinical judgments must be made appropriately. In addition to results of research, we have drawn on our own clinical experience with poor readers in preparing these principles.

NEW APPROACHES TO FLUENCY TRAINING

In spite of many limitations such as length of intervention, early studies provided positive evidence for the efficacy of fluency training. Later research helped define variables such as reader skill level and characteristics, type of RR technique, number of passages read, and length of practice to be considered. It can be said, therefore, that prior studies have prepared the way for the more comprehensive approaches currently being evaluated. Although we are aware of other approaches (Speed Drills for Decoding Automaticity by Fisher 1995, DIBELS by Kaminski and Good 1998; Continuum of Modeling Methods by Carbo 1997, Read Naturally by Inhot 1998, and an adaptation of the initial teaching alphabet by Flynn, Rahbar, and Deering 1998), we will highlight only three.

Before presenting these three approaches (RAVE-O, Great Leaps, and Decoding Pilot Program), it is important to place each in its theoretical context, to highlight their common elements, and to show how they incorporate RR techniques (including sin-

Table II. General Principles of Fluency Training for Students with Reading Disabilities.

- In addition to instruction in decoding and word identification, fluency training is an important component of reading instruction for many students.
- Multiple reading of *continuous text* (Repeated Reading) can lead to improve ments in reading speed, accuracy, comprehension, and expression.
- Students should read text that can be read *accurately* (no more than 5 percent to 10 percent error rate). Material should be carefully selected so that the student is not frustrated by reading text that is too difficult.
- Material should be read *three to four times* for optimal benefit.
- Measures of *rate and accuracy* are both important benchmarks of improvement in reading fluency.
- Multiple readings of *single words and phrases* may improve fluency.
- Fluency training can be combined with strategies to enhance comprehension such as vocabulary development.
- Specific strategies for multiple readings should take individual student charac teristics into account. For *more impaired readers*: provide more adult guidance during reading; use more decodable texts as reading materials; practice on words and phrases from the text before reading the text; practice reading short passages; and model expressive reading.
- *Short, frequent periods* of fluency practice should be scheduled on a regular basis.
- *Incentives* for reading practice as well as concrete *measures of progress*—graphs of changes in rate and accuracy; records of number of stories/passages read—should be provided.

gle word speed drills) in addressing reading fluency. Consistent with the first causal hypothesis presented, all three approaches implicitly acknowledge that slow single word reading is a (but not *the*) main source of dysfluency. Furthermore, all three refer to research indicating that both decoding and lexical access are important to improving reading acquisition and reading fluency. Citing the role of phonemic awareness and decoding in reading acquisition, and the efficacy of code instruction for disabled readers, RAVE-O and Decoding Pilot Program use systematic code instruction as a basis for direct reading instruction. In addition, they both use decodable text for fluency practice. Although Great Leaps advocates such instruction, it does not include decoding as a formal aspect of its program. In all three approaches, retrieval or lexical access weaknesses are addressed by direct fluency training: it is the emphasis of this training which varies. Specifically, Great Leaps and Decoding Pilot Program use standard RR techniques for practicing text passages (although for shorter amounts of time than the standard

10–20 minutes), and both RAVE-O and Great Leaps place significant emphasis on single word speed drills. Great Leaps, in particular, incorporates single word speed drills that recent findings indicate to be an effective training exercise. Taking advantage of advances in computer technology, RAVE-O and Decoding Pilot Program use software with adjustable speed controls to vary rates of presentation and gradually increase reading rate.

None of the approaches specifically highlight Schreiber's prosody theory, but both RAVE-O and Decoding Pilot Program devote a significant portion of instructional time to activities consistent with Adams' connectionist theory. Briefly, the connectionist theory posits that weaknesses in orthographic and semantic knowledge account for a portion of the difficulties in fluency. Both RAVE-O and Decoding Pilot Program provide considerable instruction on "chunking," or sublexical pattern recognition, using patterns ranging from onset rimes for early readers to morphological patterns from Greek and Latin bases for adult readers. Based on the logical assumption that words with rich associations are more easily retrieved when encountered in text, both programs use vocabulary development exercises to enhance semantic knowledge.

Despite the assumption that improved fluency may be a prerequisite for better comprehension, none of these three approaches includes a complete and intensive comprehension component, although two have some elements. Although research on comprehension is not as well developed as the research base in beginning reading, we would argue that comprehension strategies should be taught directly, as part of a balanced reading program (Williams 1998).

Finally, each of these approaches provide daily fluency training over a substantial period of time (often one year). This extended length of intervention is, in itself, an important difference from the traditional repeated reading approach.

RAVE-O (RETRIEVAL, ACCURACY, VOCABULARY, ELABORATION-ORTHOGRAPHY)

RAVE-O is a direct outgrowth of the double deficit hypothesis of Wolf and Bowers (1999) and is the focus of an ongoing National Institute of Child and Human Development (NICHD) project. RAVE-O differs from earlier fluency techniques by attempting to provide a more comprehensive approach to

fluency in underlying perceptual, phonological, and lexical retrieval skills, as well as to fluency in overt reading skills (word identification, word attack, orthographic patterns, and recognition and comprehension). RAVE-O is coordinated with Lovett et al.'s phonological analysis and blending (PHAB) program (1994) on the premise that there must be a systematic phonological basis for reading.

RAVE-O has two semi-independent parts: RAVE and O. The RAVE component focuses on helping students understand the meaning of words through awareness of common meaning components and how the word changes in different contexts. Wolf and Bowers propose that fast, accurate retrieval of both oral and written words is easiest when words are familiar and possess rich associations that arise from lexical and semantic knowledge. The O component—orthographic fluency—is at the heart of the program and emphasizes "the systematic development of automaticity in orthographic pattern recognition." Consequently, teaching children to "chunk" word parts (such as rimes, affixes, and consonant blends) is a key component since chunking or sublexical pattern recognition allows for more rapid recognition.

RAVE-O is taught by trained research teachers to small groups of early elementary students whose reading level falls below the tenth percentile. The first half hour of instruction uses systematic, sequential code materials that emphasize phoneme analysis and blending. The next half hour (the RAVE-O component) follows scripted lesson plans devised by the researchers and focuses on learning a list of decodable "core" words, all of which have multiple meanings. (An example is the decodable CVC word, "jam", which could mean "jam on toast," "traffic jam," or "jam an object into a box.") Specific materials and programs, many of which impart a game-like quality to lessons, have been developed to accompany RAVE-O, with the intent of making learning fun for readers. For example, since overlearning of orthographic patterns is critical, a computer program called Speed Wizard has been designed. This program includes a set of systematically controlled games that reinforce previously taught phonological skills and emphasize rapid, automatic word recognition. Other materials include Minute Mysteries (stories to develop fluent reading of controlled text), manipulatives (such as word webs to associate other words, ideas, and phrases with the word in the middle of the web), and props (such as sand and sandpaper to illustrate word meanings). Comprehension activities incorporate words that have been taught previously.

GREAT LEAPS

Great Leaps is a remedial program originally developed by Kenneth Campbell (1995) and supplemented at the K–2 level by Cecil Mercer, serves a broad range of ages (kindergarten through adult) and uses a wide range of tutors (community volunteers, paraprofessionals, peers and parents, in addition to regular classroom teachers). It requires a minimum of five to seven minutes daily. This fluency program is meant to supplement an existing reading curriculum, which the authors recommend should provide systematic code instruction for poor readers. For the youngest students, K–2, Campbell and Mercer have developed fluency tasks, hierarchically arranged from phonemic awareness skills to sound-symbol correspondence to systematic decoding. Materials for older students are designed to be age appropriate, that is, high interest and low vocabulary. Initial fluency levels are established by having the student read for three minutes in a basal text.

Taught for a minimum of five to seven minutes daily in a one-on-one tutorial setting, students read in one-minute segments, first from a list of learned decodable words, next from a list of phrases, and finally from a story geared to the student's instructional level. Tutors pause as needed to review skills and/or model fluent reading. After each portion of instruction (decodable word reading, phrase reading, and text reading), the student's performance is graphed. Errors are pointed out immediately following each minute segment and the student is commended for effort. This graphing—a means of visually demonstrating progress to the student and specifically calling attention to the need for speed and accuracy—is an important component of Great Leaps and encourages the student to work toward rate-per-minute goals. The student reads the same passage each day until he or she can read a page in one minute with less than two errors. The student then "leaps up" to a higher level passage.

DECODING PILOT PROGRAM

Decoding Pilot Program is Landmark College's newly devised experimental program begun by Linda Hecker and Rob Gunter-Mohr and shares a number of characteristics with the RAVE-O program. Developed for eight college students with low decoding skills (elementary level), relatively stronger oral language skills, and at least average intellectual ability, the program's general goal is to provide a sequence of courses with an intensive focus on improving reading and writing skills while providing intellectual

challenge. The specific goals of this year-long program are to increase decoding skills, fluency, vocabulary, metalinguistic knowledge, and the quality and quantity of written output. Four days a week students receive individual tutoring in decoding using systematic, sequential, multisensory methods. All take a daily class on the structure of language which emphasizes the morphology (or meaningful word parts) and the structure of words in order to increase vocabulary knowledge. In addition, students take a written composition class that uses voice recognition software designed to help them overcome the obstacles of weak encoding as a supplement to the more traditional approaches of teaching paragraph and essay structure. Finally, students take a daily class which reinforces decoding skills and adds a comprehension and fluency component to the program.

Landmark's fluency training component was developed by Mary Doherty and uses computers and software to enhance a Repeated Reading approach. Using the Kurzweil Ultimate Reader-3000, a PC-based reading system with its own software program and scanner, the student wears headphones and reads along silently as the computer reads the text aloud at a chosen speed. The rate can be adjusted from 50 to 390 wpm and text can be highlighted either by single words, phrases, sentences, or lines. Pronunciation and dictionary functions can be accessed by highlighting a specific word. Passages read are from high-interest low-vocabulary material, geared to approximately a fifth grade level. After this solo exercise, students are paired and asked to read the same passage aloud to a partner, obtaining feedback about errors. Students read the passage several times to the partner, measuring subsequent improvements in rate.

RESEARCH DIRECTIONS

The good news is that the reading community is now sufficiently focused on fluency training that funding sources are allocating monies for research that explicitly incorporates fluency training in the treatment component. The critical question is not whether fluency training is effective. Rather, the question is "With what groups of children, at what stage of development, and using which methods, can fluency—and ultimately comprehension—be significantly improved?" Among the specific research questions to be addressed are:

1. What is the relationship between the intensity and type of fluency training and characteristics of individual students (subtypes)?
2. Does a code approach plus fluency training significantly improve outcome for double deficit students?
3. Are there students who can profit especially from single word and phrase reading training, and if so, is there a certain stage of fluency training at which it can be best incorporated ?
4. Are four rereadings, the standard number now used, sufficient for dysfluent readers?
5. How long do fluency gains last, and do individuals with fluency problems need "boosters" throughout their academic career?
6. What is the specific interaction between decoding, lexical access, and working memory in comprehension and fluency?
7. What comprehension approaches need to be a part of a balanced reading program?

If fluency studies are able to incorporate good research methodology—carefully chosen and defined samples, balanced and explicitly taught treatments, adequate control groups, sufficient length of intervention, awareness of teacher variables and generalization effects, etc.— as recommended by Lyon and Moats (1997), then we are on the way to helping even more children become good readers.

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References

Adams, M. J. 1990. *Beginning to Read: Thinking and Learning About Print*. Cambridge, MA: MIT Press.

Allington, R. L. 1980. Poor readers don't get to read much in reading groups. *Language Arts* 57:872–76.

Allington, R. L. 1983. Fluency: The neglected reading goal *The Reading Teacher* 36:556–60.

Allington, R. L., and Brown, S. 1979. *FACT: A MultiMedia Reading Program*. Milwaukee, WI: Raintree Press.

Beidmiller, A. 1977. Relations between oral reading rates for letters, words and simple text in the development of reading achievement. *Reading Research Quarterly* 13:223–53.

Bowers, P. G. 1993. Text reading and rereading: Determinants of fluency beyond word recognition. *Journal of Reading Behavior* 25(2):133–53.

Campbell, K. 1995. *Great Leaps Reading Program.* Micanopy, FL: Diarmuid, Inc.

Carbo, M. 1997. *Continuum of Modeling Methods: Release Your Students' Learning Power.* Syosset, NY: National Reading Styles Institute.

Carver, R. 1989. Silent reading rates in grade equivalents. *Journal of Reading Behavior* 21:155–66.

Dahl, P. R. 1974. An experimental program for teaching high speed word recognition and comprehension skills. (Final report project #3-1154) Washington, DC: National Institute of Education.

Dahl, P. R. 1979. An experimental program for teaching high speed word recognition and comprehension skills. In *Communications Research in Learning Disabilities and Mental Retardation,* J. E. Button, T. C. Lovitt, and T. D. Rowland, eds. Baltimore: University Park Press.

Dowhower, S. 1987. Aspects of repeated reading on second-grade transitional readers fluency and comprehension. *Reading Research Quarterly* 22:389–406.

Dowhower, S. 1994. Repeated reading revisited: Research into practice *Reading and Writing Quarterly: Overcoming Learning Difficulties* 10:343–58.

Ehri, L. C., and Wilce, L. S. 1983. Development of word identification speed in skilled and less skilled beginning readers. *Journal of Educational Psychology* 75:3–18.

Faulkner, H. J., and Levy, B. A. 1994. How text difficulty and reader skill interact to produce differential reliance on word and content overlap in reading transfer. *Journal of Experimental Child Psychology* 58:1–24.

Fishco, V. V., and Hanna, G. S. 1993. *Nelson-Denny Reading Test.* Chicago: Riverside Publishing Co.

Fisher, P. 1995. *Speed Drills for Decoding Automaticity.* Farmington, ME: Oxton House Publishers.

Fisher, P. 1999. Getting up to speed. *Perspectives* 25(2):12–13.

Fleisher, L. S., Jenkins, J. R., and Pandy, D. 1979. Effects on poor readers' comprehension of training in rapid decoding. *Reading Research Quarterly* 15:30–48.

Flynn, J., Rahbar, M., and Deering, W. 1998. Manuscript submitted. Dysphonetic and dysorthographic readers: Response to treatments using the initial teaching alphabet.

Foorman, B. R., Francis, D. J., Beeler, T., Winikates, D., and Fletcher, J. M. 1997. Early interventions for children with reading problems: Study designs and preliminary findings. *Learning Disabilities: A Multidisciplinary Journal* 8:63–72.

Foorman, B. R., Francis, K. J., Winidates, D., Mehta, P., Schatschneider, C., and Fletcher, J. M. 1997. Early interventions for children with reading disabilities. *Scientific Studies in Reading* 1:255–76.

Hasbrouck, J., and Tindal, G. 1992. Curriculum-based oral reading fluency norms for students in grades 2 through 5. *Teaching Exceptional Children:*41–44.

Herman, P. 1985. The effect of repeated readings on reading rate, speech pauses and word recognition accuracy. *Reading Research Quarterly* 20:553–65.

Hintze, J., Shapiro, E., Conte, K., and Basile, I. 1997. Oral reading fluency and authentic reading material: Criterion validity on the technical features of CBM survey-level assessment. *School Psychology Review* 26:535–53.

Inhot, C. 1998. *Read Naturally.* St. Paul, MN: Read Naturally, Inc.

Kaminski, R. A., and Good, R. H., 1998. Use of curriculum based measurement to assess early literacy: Dynamic indicators of basic early literacy skills. In *Advances in Curriculum Based Measurement: Use in a Problem Solving Model,* M. Shinn, ed. New York: Guilford Press.

LaBerge, D., and Samuels, J. 1974. Toward a theory of automatic information processing in reading. *Cognitive Psychology* 6:293–323.

Levy, B.A. April 1999. Learning to read: Context doesn't matter. Paper presented at the Society for the Scientific Study of Reading, Montreal.

Levy, B.A., Abello, B., and Lysynchuk, L. 1997. Transfer from word training to reading in context: Gains in reading fluency and comprehension. *Learning Disability Quarterly* 20:173–88.

Liberman, I. Y., and Shankweiler, D. 1979. Speech, the alphabet, and teaching to read. In *Theory and Practice in Early Reading* (Vol. 2), L. B. Resnick and P. A. Weaver, eds. Hillsdale, NJ: Lawrence Erlbaum Associates.

Lovett, M., Borden, S., DeLuca, T., Lacerenza, L., Bensen, N., and Brackstone, D. 1994. Treating the core deficits of developmental dyslexia: Evidence of transfer of learning after phonologically and strategy-based reading training programs. *Developmental Psychology* 30:803–22.

Lyon, G. R., and Moats, L. C. 1997. Critical conceptual and methodological considerations in reading intervention research. *Journal of Learning Disabilities* 30(6):578–88.

Lyon, G. R. 1998. Critical advances in understanding reading acquisition and reading difficulty. Paper read at North Carolina Branch of the International Dyslexia Association, November 1998, Boone, NC.

Manis, F. R., Custodio, R., and Szeszulski, P. A. 1993. Development of phonological and orthographic skill: A 2-year longitudinal study of dyslexic children. *Journal of Experimental Child Psychology* 56:64–86.

Mercer, C., and Campbell, K 1998. *Great Leaps Reading Program.* Micanopy, FL: K-2 Diarmuid, Inc.

Meyer, M. S., Wood, F. B., Hart, L. A., and Felton, R. H. 1998. Selective predictive value of rapid automatized naming in poor readers. *Journal of Learning Disabilities* 31:106–17.

O'Shea, L., Sindelar, P., and O'Shea, D. 1985. The effects of repeated readings and attentional cues on reading fluency and comprehension. *Journal of Reading Behavior* 17:129–42.

Perfetti, C. A. 1985. *Reading Ability.* New York: Oxford University Press.

Perfetti, C. A. 1977. Language comprehension and fast decoding: Some psycholinguistic prerequisites for skilled reading comprehension. In *Cognition, Curriculum and Comprehension,* J. T. Guthrie, ed. Newark, DE: International Reading Association.

Rasinski, T. 1990. Effects of repeated reading and listening-while-reading on reading fluency. *Journal of Educational Research* 83:147–50.

Rashotte, C., and Torgesen, J. 1985. Repeated reading and reading fluency in learning disabled children. *Reading Research Quarterly* 20:180–88.

Reitsma, P. 1983. Printed word learning in beginning readers. *Journal of Experimental Child Psychology* 36:321–29.

Renick, M. J., and Harter, S. 1989. Impact of social comparisons on the developing self-perceptions of learning disabled students. *Journal of Educational Psychology* 81:631–38.

Samuels, S. J. 1979. The method of repeated readings. *The Reading Teacher* 32(4):403–08.

Scanlon, D. M., and Vellutino, F. R. 1996. Prerequisite skills, early instruction, and success in first-grade reading: Selected results from a longitudinal study. *Mental Retardation and Developmental Research Reviews* 2:54–63.

Schreiber, P. 1980. On the acquisition of reading fluency. *Journal of Reading Behavior* 12:177–86.

Shankweiler, D., and Crain, S. 1986. Language mechanisms and reading disorder: A modular approach. *Cognition* 24:139–68.

Shinn, M. R., Good, R. H., Knutson, N., Tilly, W. D., and Collins, V. L. 1992. Curriculum-based measurement of oral reading fluency: A confirmatory analysis of its relation to reading. *School Psychology Review* 21:459–79.

Simmons, D. C., Fuchs, L. S., Fuchs, D., Mathes, P. G., and Page, M. J. 1990. The effects of explicit teaching and peer-mediated instruction on low performing and mildly

handicapped students' reading achievement. Paper presented at the American Educational Research Association's Annual Meeting. Boston, MA.

Spring, C., Bluden, D., and Gatheral, M. 1981. Effect on reading comprehension of training to automaticity in word-reading. *Perceptual and Motor Skills* 53:779–86.

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

Stoddard, K., Valcante, G., Sindelar, P., and Algozzine, B. 1993. Increasing reading rate and comprehension: The effects of repeated readings, sentence segmentation and intonation training. *Reading Research and Instruction* 32:53-65.

Tan, A., and Nicholson, T. 1997. Flashcards revisited: Training poor readers to read words faster improves their comprehension of text. *Journal of Educational Psychology* 59:276–88.

Torgesen, J., Rashotte, C., and Wagner, R. November 1997. Research on instructional interventions for children with reading disabilities. Paper delivered at International Dyslexia Association, Minneapolis, MN.

van Bon, W. H. J., Boksebeld, L. M., Font Freide, T. A. M., and van den Hurk, A. J. M. 1991. A comparison of three methods of reading-while-listening. *Journal of Learning Disabilities* 24(8):471–76.

van den Bosch, K., van Bon, W., and Schreuder, R. 1995. Poor readers' decoding skills: Effects of training with limited exposure duration. *Reading Research Quarterly* 30:110–25.

Williams, J. 1998. Improving the comprehension of disabled readers. *Annals of Dyslexia* 48:213–38.

Wolf, M. 1997. A provisional, integrative account of phonological and naming-speed deficits in dyslexia: Implications for diagnosis and intervention. In *Cognitive and Linguistic Foundations of Reading Acquisition: Implications for Intervention* Research, B. Blachman, ed. Hillsdale, NJ: Lawrence Erlbaum Associates.

Wolf, M., and Bowers, P. 1999. The double deficit hypothesis for the developmental dyslexias. *Journal of Educational Psychology* 91:415–38.

Young, A., and Bowers, P. 1995. Individual differences and text difficulty determinants of reading fluency and expressiveness. *Journal of Experimental Child Psychology* 60:428–54.

Young, A., Bowers, P., and MacKinnon, G. 1996. Effects of prosodic modeling and repeated reading on poor readers' fluency and comprehension. *Applied Psycholinguistics* 17:59–84.