EARLY IDENTIFICATION AND INTERVENTION FOR YOUNG CHILDREN WITH READING/LEARNING DISABILITIES

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We can all agree that reading is one of the principal tools for understanding our humanity, for making sense of our world, for advancing the democratic ideal, and for generating personal and national prosperity. We can agree that ability to read allows us to achieve three important goals: building knowledge (e.g., learning about the physical world); acquiring information for accomplishing tasks (e.g., installing a VCR); and deriving pleasure and feeding our interests (e.g., how our favorite athletic team has fared). Lacking reading ability, our lives would be very different. They would not be as rich.

Students with reading/learning disabilities (R/LDs) face enormous challenges learning to read. Many never reach a level of reading proficiency that allows them to build knowledge, acquire information, feed their interests, or enrich their lives. In some cases, their attempts to read result in such a degree of discouragement and frustration that reading subtracts rather than adds to their lives. For students with R/LDs, their early struggles in learning to read are a harbinger of dismal educational outcomes. Overall, students with learning disabilities leave elementary school with severely deficient reading and writing skills (deBettencourt, Zigmond, & Thornton, 1989; Deshler, Schumaker, Alley, Warner, & Clark, 1982) and leave secondary school with little or no improvement in these areas (Zigmond, 1990), with many dropping out before graduation (deBettencourt & Zigmond, 1990). This is why early identification and prevention of reading difficulties is important.

This paper summarizes (a) our current understanding of the difficulties encountered by children with R/LDs as they start down the road to reading and (b) research on early identification and intervention. The focus is children in kindergarten through second grade, although research on older children is included when it informs the understanding of problems in early reading acquisition. The paper is divided into four sections: background on skilled reading and reading disability (RD); early identification of children with R/LDs; intervention research on this population; and final thoughts on intervention approaches. We also offer short lists of sensible actions for practitioners working in this field.

BACKGROUND: SKILLED READING AND READING DISABILITY

Comprehension is the immediate goal of reading. Successful reading comprehension sits atop three essential pillars: the ability to read words; the ability to comprehend language; and the ability to access background and topical knowledge relevant to specific texts. Lacking any one of these foundations, reading comprehension suffers. Having an R/LD means having trouble with one or more of the foundation skills. Reading, language skills, knowledge, and word reading ability are all mutually dependent and reciprocally related (Stanovich, 1986). Weakness anywhere in the system can spell trouble for growth in the other foundation skills, and for reading development.

Reading Comprehension and Word Reading

Students with an R/LD may have weaknesses in any of the three foundation areas. However, during the beginning stages of learning to read, the most salient characteristic of these students is difficulty in acquiring efficient word-level reading skill. Thus, this paper focuses on assessment and treatment of word-level reading problems.

Two aspects of word reading are important for comprehension: accuracy and speed. Accurate word reading is critical to reading comprehension because the meanings that readers construct from text come via the words. No words, no meaning. If individuals cannot read words accurately, their comprehension suffers. Speed of word recognition is also strongly related to reading comprehension; individuals skilled in reading comprehension can read single words faster than individuals with poor reading comprehension (Perfetti &

Hogaboam, 1975). Perfetti (1985) explained this relationship in terms of verbal efficiency and the sharing of limited cognitive resources.

According to Perfetti's verbal efficiency theory, both word recognition and comprehension processes consume attentional resources, which are known to be finite. The more attentional resources consumed by lower level processes (i.e., word identification), the fewer resources available for comprehension. Individuals who develop highly efficient word identification processes release cognitive resources for constructing and integrating meaning during reading. By contrast, individuals with inefficient word-reading skill (indicated by slow word recognition) must divide their attention between word identification and comprehension, and comprehension suffers. A major difference between skilled and unskilled readers, according to verbal efficiency theory, is efficiency at word-level processing. Whereas skilled readers read words in a split second (literally) without using conscious attention, the word reading of poor readers is inaccurate, slow, or both. Poor readers' inefficient word-level processing drains the very attentional resources needed to maximize comprehension.

By the end of grade 4, when the majority of children with R/LDs have been identified, these students already demonstrate pronounced deficits in word reading relative to their more skilled peers. The magnitude of this difference is illustrated in a study by Jenkins, Fuchs, Espin, van den Broek, and Deno (2000). These researchers asked fourth-grade students to orally read a passage of third-grade difficulty. Figure 1 shows the accuracy and fluency (i.e., mean number of words read in 1 minute) by students with R/LDs and more skilled peers (i.e., classmates who had average or above scores in reading comprehension). In 1 minute of reading, skilled comprehenders read three times more words than did students with R/LD. Accuracy levels were 98% and 86%, respectively, for the skilled and R/LD groups. These kinds of results underscore how disadvantaged elementary school students with R/LD are in word reading. It is not difficult to imagine how these students' inefficient word reading might overload working memory, making it difficult for them to connect and integrate text ideas into a coherent meaning representation.

Jenkins et al. (2000) illustrated the potential ramifications of slow word reading on comprehension. Using a procedure developed by Brown and Smiley (1977), they estimated that one new idea unit was introduced approximately every six running words in their experimental passage. Because skilled readers on average read the passage at a rate of 155 words per minute, they encountered approximately 26 idea units per minute (i.e., 155/6). By contrast, the R/LD group encountered approximately 9 idea units per minute (52/6). The temporal contiguity of ideas encountered by the two reader groups was sizable (26 vs. 9 per minute), a difference that may have consequences for comprehension. Interestingly, the 155-words-per-minute rate of the skilled readers is close to the speed with which TV news anchors read the news, which may be an optimal rate for processing verbal information. Considered in light of verbal efficiency theory, the less efficient word reading of students with R/LD overloads working memory and undermines reading comprehension.

Ways to Read Words

Because word-reading accuracy and speed are important, it is worthwhile to consider some of the ways we read words. We could "read" unfamiliar words by guessing their identity from sentence contexts, but guessing hardly qualifies as reading. Moreover, guessing words from context is a notoriously unreliable process (Adams, 1990). There are better ways to read words. For example, we can read unfamiliar words by analogy, noting their similarity to a familiar word (Goswami & Bryant, 1990). Using an analogy strategy, we might read the pseudoword *flad* by recognizing its similarity to known words like *had, mad,* and *sad.* Alternatively, we might read the pseudoword *feab* using a graphophonemic conversion strategy (i.e,, decoding) to assemble a pronunciation for the word. Decoding is sometimes referred to as phonological or alphabetic reading skill (Torgesen, Wagner, & Rashotte, 1997), because it involves mapping phonemes onto appropriate letters and letter combinations.

For skilled readers, pseudowords like *feab* present no challenges. We can read these words very fast, in a fraction of a second. Nor are we challenged by a pseudoword like *regnessem*, although we read it more slowly than *feab*, probably because it is longer, has three syllables instead of one, and bears little resemblance to any known word. Though skilled readers can read words by analogy and decoding, most words are read by sight. For example, *messenger* is read much faster than *regnessem* even though both words have the same number of letters and syllables. In fact, *regnessem* is *messenger* spelled backwards. The difference in the time required to read *regnessem* versus *messenger* demonstrates the advantage of having stored a *word-specific* memory. Automatic (i.e., instant) word reading requires having words readily available in memory. The fact that skilled readers can instantly read most words tells us they have *vast* stores of word-specific memories (think Home Depot warehouses filled with words). Reading words by sight is sometimes referred to as orthographic reading, in contrast to phonological or alphabetic reading in which words are read by recoding or translating individual graphemes to their phonemes (Torgesen et al., 2001).

Words become sight words when their *complete* spellings and pronunciations are stored in memory. In the sentence, "After he delivered the package, the messenjer rode off on his bicycle," we can read the word *messenjer* very fast, but not as fast as *messenger*. Even when *messenjer* is embedded in a sentence, we notice something amiss in its spelling that draws our attention to this word, momentarily interrupting meaning construction. The spelling, off by only one letter, disrupts the flow of reading, because it does not match the spelling of *messenger* in memory.

Ehri (1998) has argued that sight words, such as *messenger*, are stored and remembered by their specific grapheme-phoneme connections, not just as letter strings and a pronunciation. Memory would be quickly overloaded if words were stored by spellings alone, without phonetic values. For example, if words like *messenger* and *sword* retained their pronunciations but were spelled *egrsemsn* and *wdrso* (same letters, absent their phonemic values), our sight word vocabularies, which now number in the thousands, would be severely shrunken. Fortunately instead, we are able to store and retrieve words from memory using both letters and their phonemic values. According to Ehri, skilled readers store sight words in memory on several levels. These levels include the smallest units (phoneme-grapheme linkages) as well as larger sound-spelling units (rimes, syllables, and whole words). To accomplish this feat, readers must have sufficient generic graphophonemic knowledge to allow them to represent the specific spelling-phonological connections for specific words.

Fluent reading is essentially a function of volume of sight word knowledge. The fact that skilled readers can instantly read most any word they see tells us they have vast stores of word-specific memories. The primary difference between fluent and nonfluent readers is the difference in the number of words they can read by sight.

The Basis for Orthographic (Word) Reading Skill

What's needed to establish sight words? Two requirements stand out: repetitions and decoding skill. A study by Reitsma (1983) demonstrates the importance of both repetitions and decoding skill on the development of sight words by beginning readers. By the middle of first grade, after acquiring some decoding skill, children in a laboratory study significantly decreased reading times for words they had encountered as few as four times. With additional word repetitions, reading times decreased further. These children had begun to develop word-specific memories after encountering the words only a few times.

That high frequency words like *the, is,* and *and* become sight words is not surprising, given the number of times these words are encountered in text. However, most words that we can read by sight appear only occasionally. Individuals must read extensively in order to encounter specific words often enough to allow their instant recognition (reading by sight). Anderson, Wilson, and Fielding (1988) estimated that the number of words read during independent reading by fifth-grade students ranges from 0 to more than 4 million words annually. Individuals differ greatly in their amount of independent reading; those who avoid reading encounter and learn fewer words.

A second group of children in Reitsma's (1983) study did *not* show savings in reading times following several encounters with the same words. These were children near the beginning of first grade. Reitsma attributed their lack of word learning to insufficient graphophonemic knowledge. They were unable to take advantage of repeated encounters with target words to form word-specific memories. It is no accident that early alphabetic reading (decoding) and orthographic reading (word identification) skills are highly related (0.70 and 0.90, respectively, in Compton, 2000; Shankweiler et al., 1999).

Studies like Reitsma's demonstrate the importance of decoding ability for word learning. Some of the most convincing evidence for the important role of decoding ability for developing sight word knowledge comes from studies of exception word reading. Exception words are those that are not strictly decodable using graphophonemic knowledge (e.g., island, yacht, sword, aisle, guide). Coltheart (1978) proposed a dual-route theory to describe how exception and regular words are processed, with regular words read through application of graphophonemic knowledge, and exception words read as visual wholes. However, research on word reading has raised doubts about dual-route theory. Decoding ability seems to be at the heart of (i.e., necessary for) learning to read both regular *and* exception words. Figure 2 (from Tunmer & Chapman, 1998) shows this relationship graphically. Individuals may be skilled in both exception word reading and decoding, or skilled in neither. Some students can decode well, but perform poorly on exception word reading. Presumably, they lack adequate exposure to exception words. The necessary relationship that ties decoding to exception word reading is revealed by the observation that only skilled decoders are skilled exception word readers (Gough & Walsh, 1991). Thus, decoding skill appears to be important for learning all kinds of words.

Why is decoding skill important for developing a large sight vocabulary? Or, what does the process of working out pronunciations for unfamiliar words have to do with filling mental warehouses with sight words? One hypothesis is that decoding functions as a self-teaching tool which allows children to work out the pronunciation of an unfamiliar word on several occasions, and eventually secure the once unfamiliar word in orthographic memory (Share, 1995). In effect, the capacity to decode an unfamiliar word is like having a tutor available to pronounce unfamiliar words. After children have encountered and successfully decoded an unfamiliar word on several occasions, they begin to form a word-specific memory, which results in faster word recognition, much like the first-grade children in Reitsma's study.

A second possible explanation for the strong relationship between decoding and sight word reading derives from the act of decoding itself. In assembling a pronunciation for a novel word, the reader must attend to every letter in the word, thereby bonding each letter or letter combination with the phonemes that compose the word. Forming specific connections between a word's phonemes and graphemes enables a word to be read by sight (Adams, 1990).

A third possibility is that decoding skill is a proxy for graphophonemic knowledge. If, as Ehri (1992) has proposed, skilled readers fix sight words in memory using the words' complete spellings (i.e., storing every grapheme-phoneme connection in a word), readers must have sufficient graphophonemic knowledge to allow them to represent these word-specific connections. Even in learning exception words, individuals need a minimum level of graphophonemic knowledge to exploit existing regularities (e.g., even in exception words like *sword* and *yacht*, some phonemes map to graphemes in a regular fashion). More than likely, a level of decoding skill beyond simple graphophonemic knowledge is necessary for readers to establish high-quality, word-specific orthographic memories that include multiple levels of orthographic-phonological links (involving phonemes, onsets, rimes, and syllables; Ehri, 1998; Perfetti, 1992).

A fourth possibility is that individuals who easily acquire decoding skill are the same individuals who easily remember word-specific spellings and their pronunciations. Those individuals who easily induce graphophonemic knowledge may also detect and remember the specific graphophonemic elements of newly encountered words.

The Basis for Decoding Skill

Given the necessity of decoding skill for skilled word reading, we can ask, What is necessary for decoding?

Two foundation skills stand out: knowledge of spelling-sound relations (i.e., graphophonemic knowledge) and phonemic awareness. Both appear to be necessary . The essential role of graphophonemic knowledge in decoding is obvious, but that of phonemic awareness is less so. Byrne and Fielding-Barnsley (1991) found that phonemic awareness accounted for significant variance on a word-choice task, after controlling for letter-sound knowledge. Their research is consistent with the large body of research indicating that children who lack phonological awareness are likely to become poor readers (Bradley & Bryant, 1983; Fletcher et al. 1994; Juel, 1988; Share, Jorm, MacLean, & Matthews, 1984; Wagner & Torgesen, 1987; Wagner et al., 1997)

Figure 3 shows a typical relationship between phonemic segmentation skill and decoding ability at the end of grade 1 (Vadasy, 2001). Inspection of this figure reveals that phonemic segmentation skill and decoding have the same kind of necessary relationship as that observed between decoding and exception word reading. Some children performed well in both phonemic segmentation and decoding nonwords; others performed poorly on both tasks. However, only students with phonemic segmentation skill were successful in decoding, even though strong phonemic segmentation did not necessarily guarantee strong decoding.

Thus, both phonemic awareness and graphophonemic knowledge appear necessary, but not sufficient, for successful decoding. For many children, instruction in *how* to utilize this knowledge may also be important (Iversen and Tunmer, 1993). Fielding-Barnsley (1997) found that children who had both phonemic awareness and graphophonemic knowledge benefited from instruction that asked students to say and write the sounds within printed words as they learned to read them.

Skilled Reading and Reading Disabilities

To summarize, research on skilled reading has disclosed the following foundational skills that go into making a skilled reader: phonological awareness, graphophonemic knowledge, decoding or alphabetic reading skill, orthographic or sight reading skill, and fluency, along with language comprehension. It has also revealed the nature of the relationships among these components. Sight word reading appears necessary for maximizing reading fluency and comprehension; decoding skill appears necessary for developing a large storehouse of sight words; and knowledge of spelling-sound rules plus phonemic awareness appears necessary for alphabetic reading skill. The foundational skills are like localities along a road, where reaching distant towns depends on passing through towns on the way (Spear-Swerling & Sternberg, 1994).

What do we know about students with RD in relationship to these components of skilled reading? Research has shown that students with RD are challenged in these very areas. Their reading is not as fluent as that of skilled reader, as shown in Figure 1. Their orthographic reading skill (sight word knowledge) is substantially below that of their age-level peers (Felton & Wood, 1992). Their decoding skills are especially weak (Felton & Wood, 1992; Rack, Snowling, & Olson, 1992; Shankweiler et al., 1999). Finally, they are slow to develop phonological awareness, and their graphophonemic knowledge is less secure (Juel, 1988; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993).

The most widely accepted view of reading disabilities traces the reading problems of young children with specific R/LDs to weaknesses in processing phonological information. This weakness includes difficulties in developing phonological awareness (Shankweiler & Liberman, 1989) as well as difficulties in accessing phonological name codes (as evidenced in slower naming speeds for known stimuli like numbers and letters; Wolf & Bowers, 1999), poorer memory for phonological stimuli (e.g., recalling a series of orally presented numbers; Torgesen, Wagner, & Rashotte, 1994), or speech perception (e.g., repeating multisyllabic nonwords; Brady, 1991). In general, students with reading disabilities have been found to perform poorly in all these areas, although not every individual with R/LD will experience difficulty in every area. These phonological processing problems surface in the earliest stages of learning to read, where children experience particular difficulty in developing alphabetic reading skills (i.e., decoding). As we noted earlier, alphabetic reading skill probably plays a prominent role in the development of orthographic (sight word) reading skill, which in turn affects the development of fluency and comprehension.

Some of the most convincing evidence that students with R/LDs have specific deficits in alphabetic reading skill comes from studies using reading-level match designs. In such studies, older (e.g., grade 4) students with R/LDs are matched with younger (e.g., grade 2) typically developing readers on orthographic reading skill (e.g., the Word Identification Word Identification subtest of the Woodcock Reading Mastery Test, or WRMT; Woodcock, 1987). Both groups are then tested for alphabetic reading skill, typically measured by performance on a nonword reading measure (e.g., WRMT, Word Attack). The logic of this design is that if students with R/LDs are merely *delayed* in orthographic and alphabetic reading skills, they should perform on both tasks like younger typically developing readers. However, if they have a specific *deficit* in alphabetic reading, their performance on the nonword measure will be significantly below that of the younger typically developing readers with whom they have been matched on orthographic reading skill.

In reviewing this literature, Rack et al. (1992) concluded that students with R/LDs demonstrate nonword reading deficits relative to their younger, reading-level control group, especially in studies that control for regression effects. Since Rack et al.'s review, similarly designed research with German-speaking children with dyslexia consistently found a specific nonword reading deficit (Landerl, Wimmer, & Frith, 1997; Wimmer, 1993, 1996). These findings are important because German is considered to be an "orthographically shallow" language in which grapheme-phoneme pronunciation rules are highly consistent, unlike English which is considered an "orthographically deep" language. Whereas the nonword deficit for English-speaking students with R/LD is reflected in reading accuracy and rate, German dyslexics are relatively *accurate* readers of nonwords; however, their reading *speed* for nonwords is greatly impaired relative to that of younger, reading-level match controls (Landerl et al., 1997).

Thus, German readers with R/LD more readily acquire decoding accuracy (although this achievement is also a struggle for them). Their relative advantage over English readers in decoding accuracy is probably the result of systematic phonics instruction along with the German language's transparent graphophonemic relationships. German readers' alphabetic reading difficulty shows up as a deficit in decoding speed. Relative to German readers, English readers with R/LDs have more difficulty in acquiring decoding accuracy, probably because the graphophonemic regularities in their reading corpus is more opaque. The important point is that across languages with alphabetic orthographies, the reading problems of students with R/LD manifest most prominently as nonword reading deficits in speed and sometimes accuracy. These reading problems appear to arise from phonological dysfunction. Reading-related phonological processing problems can be observed in the development of phonological awareness, difficulty in learning graphophonemic relations, and difficulty in using phonemic awareness and graphophonemic knowledge to decode unfamiliar words, all of which negatively affect acquisition of a sight word reading vocabulary (orthographic reading skill), fluency, and comprehension.

Early Identification of Students at Risk for Reading/Learning Disabilities

Identifying early those children most likely to encounter reading problems may constitute the first step in reducing the incidence or severity of RD. Because schools tend not to identify these children until the middle elementary grades, these children's reading difficulties grow stronger roots, and possibly become more intractable. For the most effective intervention, schools must find ways to identify these children much earlier than they usually do.

Research on early identification originates from studies of potential causes of reading difficulties, in which a range of children's preliteracy skills are measured in kindergarten or first grade, and then the strength of the correlations between these skills and reading ability is calculated either concurrently, or 1 or 2 years later. As one might expect, virtually all studies in which letter knowledge was measured in preschool, kindergarten, or early first grade documented its significant contribution to reading. Other contributing factors have been explored, such as vocabulary (Bowey & Patel, 1988; Mantzicopoulos & Morrison, 1994; Scarborough, 1990, 1995), short-term memory for language-related information (Baddeley, 1986; Leather & Henry, 1994; Mann & Ditunno, 1990; Rapala & Brady, 1990), and efficient retrieval of verbal labels (Badian, 1993; Bowers & Swanson, 1991; Doi & Manis, 1996; Seidenberg & McClelland, 1989; Wagner et al., 1987; Wolf, 1991), however, findings on the unique additional variance in reading that each factor contributes have been inconsistent. Some of these differences appear to depend on whether or which control variables were used (e.g., indices of IQ, socioeconomic level, age, or phonological awareness), and whether these skills and reading achievement were measured concurrently or predictively.

Since the mid-1980s, most studies that focus on predictive correlations have also included measures of phonological awareness (e.g., Berninger, 1986; MacLean, Bryant, & Bradley, 1988; Majsterek & Ellenwood, 1995; Mann & Ditunno, 1990; Share et al., 1984; Stanovich, Cunningham, & Cramer, 1984; Uhry, 1993; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993). These measures include matching tasks, in which children match spoken words with similar beginning or ending sounds or rhymes; representational tasks, in which children tap the syllables or phonemes they hear within words spoken by an examiner; production tasks, in which children blend speech sounds together to generate words, or articulate the first, last, or all phonemes within spoken words; or deletion tasks, in which children listen to a word (e.g., baseball, street) and say the word without a particular syllable (e.g., /base/) or phoneme (e.g., /s/). A convergence of findings across these studies builds a strong case that the combination of phonological awareness and letter knowledge accounts for a large portion of the attributable variance in reading—generally 40–60% of the variance concurrently and 1–2 years later. In addition to reports of the relative stability of phonological processing over the elementary years (Elbro, Borstrom, & Petersen, 1998; Wagner et al., 1993), MacDonald and Cornwall (1995) found that phonological awareness measured in kindergarten was still more predictive of word identification and spelling 11 years later than was socioeconomic status or vocabulary.

Because sensitivity to the phonemic elements of spoken words is necessary for reading acquisition (see Figure 3), researchers have examined various ways to assess children's phonemic sensitivity as a means of early identification of RD. Yopp (1988) compared the strength of correlations and factor loadings of a range of measures of phonological awareness and a reading analogue task with kindergartners, and found that rhyme production was too easy, deletion too difficult, and segmenting the most highly correlated with reading analogue scores. Because her participants were kindergartners, she was unable to measure "real" reading. Segmenting tends to develop among typical readers during kindergarten and early first grade (Kaminski & Good, 1996; Vandervelden & Siegel, 1997), and so measures used with preschoolers, such as rhyme (MacLean et al., 1988) or alliteration (Bradley & Bryant, 1983), are often predictors of later predictors (i.e., segmenting). Murray, Smith, and Murray (2000) tested the validity of a measure of phoneme identity ("Do you hear /s/ in *moon* or *soon*?") to predict prereading children's ability to read with phonetic cues (choosing between the printed words *mad* and *sad* when *sad* was spoken). Their measure correlated more strongly with trials to criterion on phonetic cue reading than the Comprehensive Test of Phonological Processing (Wagner, Torgesen, & Rashotte, 1999) or the Yopp-Singer segmenting test (Yopp, 1988); however, again, the dependent variable was not "real" reading achievement, and the measures were used concurrently, rather than predicting reading later in time.

Despite a strong correlational knowledge base connecting children's phonological language skills to later reading acquisition, predicting exactly which children will develop RD has proved problematic. The relative accuracy of prediction varies with the specific measures used as predictors and as outcomes, the timing of their administration, and the degree and direction of classification error the researchers consider acceptable, such that differences among selection processes have resulted in confusion over how reliably and early children with RD can be identified (Felton, 1992; Hurford et al., 1993; Torgesen, Burgess, Wagner, & Rashotte, 1996). Moreover, as Tymms (1999) suggested, "assessment has its work cut out simply getting a good general measure," given the tendency of many kindergartners to become easily distracted or bored.

Degree of Prediction Error

Two types of errors reduce the prediction of RD. Errors of underprediction occur when the predictive measures miss children who subsequently develop RD. Coleman and Dover (1993) developed the RISK screening battery, which required teachers to estimate the ability of each of their kindergarten students along several different dimensions, including school competence, task orientation, social competence, behavior, and motor ability. The overall accuracy of the scale was high (94% of children correctly identified); however, 21% of the children who later needed special education services were overlooked by this screening tool. Over half of the missed children were girls, suggesting the possibility of teacher bias related to gender. Mantzicopoulos and Morrison (1994) investigated the accuracy of the SEARCH procedure developed by Silver and Hagin (1981) for identifying children at the end of kindergarten who were likely to develop RD. SEARCH, which uses 10 measures of reading readiness (visual and auditory discrimination, immediate visual recall, visual-motor copying, rote sequencing, articulation, sound-symbol associations, directionality, finger schema, and pencil grip) underidentified relatively advantaged youngsters (missing 50%), while overidentifying children from low socioeconomic backgrounds.

Measures of vocabulary or concepts about print, although moderately related to later reading achievement, can lead to underprediction of RD because some children who will develop RD, especially those who are older than their peers at the time of testing or those who come from homes rich in literacy experiences, perform better on these measures than non-RD children who are younger or who come from more impoverished literacy circumstances. Measures that underpredict RD are of concern for those interested in early intervention because they directly undermine the intent of early intervention efforts (i.e., identifying those students who require early, intense, and targeted instruction).

The second type of error, overprediction, occurs when predictive measures mistakenly identify non-RD children as at risk for becoming RD. Indeed, most efforts to identify reading problems before children receive reading instruction overpredict RD (Badian, 1994; Catts, 1991; Felton, 1992; O'Connor & Jenkins, 1999; Torgesen et al., 1996; Uhry, 1993). Sixty-nine percent of the children predicted to be at risk in Felton's (1992) study, for example, were good readers by third grade; only 58% of Badian's (1994) at-risk preschoolers had confirmed reading problems 2 years later.

Over time, attempts at early identification of RD have been linked to the theoretical models of the causes of learning disability as understood at that time. Uhry (1993) used measures of sound categorization, segmenting, fingerpoint reading, and writing in kindergarten to predict poor readers in first grade. She established cutoff scores for the measures, which increased the potential usefulness of the battery; however, establishing a low cutoff score missed 28% of the future poor readers, and raising the cutoff scores to correctly identify most at-risk students resulted in a prediction that 42% of her private school sample would develop reading difficulties. Torgesen et al. (1996) used measures of phonological awareness, rapid naming, and letter knowledge in kindergarten and first grade to predict beginning second-grade reading. Although measures administered in first grade were more predictive than in kindergarten, they still missed 35% of the poor readers 1 year later.

Nicolson and Fawcett (1996) developed the Dyslexia Early Screening Test (DEST), a set of screening measures and cutoff scores widely used in the United Kingdom at school entry. Rather than identify a small set of predictive measures with cutoff scores, their test yields a profile of current ability across rapid naming, phonological and letter tasks, copying, and balance, which is summed to a risk index. With cross-validation, however, they needed to adjust the cutoff scores for this index to avoid problems of underprediction, particularly for children who began kindergarten at an age greater than 6.5 years.

Some of the language measures that have the highest correlation with subsequent reading achievement (e.g., phonological segmentation) are difficult for many typically developing children when tested early in kindergarten, leading to substantial overprediction errors. Other language measures, such as receptive or expressive vocabulary, have strong relations with reading comprehension by second or third grade, but may weaken classification accuracy for first-grade reading because they exert a protective factor in a discriminant function, making children with RD with strong vocabularies more difficult to detect—even though, on average, children with RD earn lower verbal scores (O'Connor & Jenkins, 1999). When early intervention services are in short supply, overprediction may squander limited educational resources. Part of the challenge facing researchers is to identify early-developing reading-related skills, and design age-based measures that are at an appropriate level of difficulty. As Badian (1998) noted, "as the nature of reading changes, so change the predictors" (p. 478).

Solving the Problem of Floor Effects

Researchers have tried to solve the problem of overprediction by fine-tuning measures to make them more sensitive to small differences among children, or to growth in the same children over time. For example, even though kindergartners' ability to segment spoken words is tied ($r = 0.62$) to their reading achievement in grade 1 (Share et al., 1984), segmentation ability nevertheless overpredicts RD because many normally developing readers are unskilled segmenters in kindergarten, leading to floor effects for the measure. To better distinguish children with RD from late-developing segmenters without RD, researchers have attempted easier levels of segmenting, such as syllable tapping (Badian, 1998), alliteration matching (Bradley & Bryant, 1983), or first sound production (Good, Simmons, & Kame'enui, 2001). Although these tasks correlate with reading, they lose substantial predictive power when administered late in kindergarten (O'Connor & Jenkins, 1999). Others have used discrimination indexes or item-response theory to order the items within a segmenting task (Wagner et al., 1999) from easier to more difficult. This approach allows children with low skill levels to engage in some of the testing items; however, the number of low-level items is limited.

Another approach to controlling the difficulty of segmenting is to adjust the tasks to offer more opportunity to learn, or to assess growth in a skill, rather than merely static achievement. Spector (1992) used a dynamic segmentation measure that provided children with varying levels of prompts to help them perform the task. Dynamic segmentation proved more predictive of later reading achievement than did static segmentation. Kaminski and Good (1996) provided variable scoring on the items of their segmenting test, so that children received credit for partially segmenting a word (e.g., identifying the /f/ or the /sh/ in fish), with more points for completely correct attempts. Scoring adjustments that reflect partial knowledge of a complex task (e.g., isolating the first phoneme within a word) and progress toward a goal (i.e., to completely segment a three- or four-phoneme word) may also provide teachers with insight into children's instructional needs.

Recent Efforts to Predict RD in Kindergarten

O'Connor and Jenkins (1999) tested over 400 children in kindergarten and followed their reading development through first grade, layering the investigation by testing various cohorts from diverse geographic, community, and economic conditions. They began with measures that have been identified in studies that sought component skills with high concurrent (Badian, 1993; Perfetti, Beck, Bell, & Hughes, 1987; Tunmer, Herriman, & Nesdale, 1988) or predictive (Felton, 1992; Hurford et al., 1993; Juel, 1988; Share et al., 1984) correlations with reading, including timed letter recognition, first sound identification, syllable and phoneme blending and segmenting, deletion, short-term memory for sounds, and rhyme production. Next, they set criteria by calibrating indicators of RD on one cohort of children; testing the parameters on a new cohort; and exploring the relative accuracy of predictors gathered over time. Across the three cohorts, rapid letter naming and segment phonemes were included among the subset of strong predictors of RD at all three screening points (beginning and end of kindergarten and beginning of first grade). The stability of these two tasks across three test periods in this study may be tied to their capacity to detect fine-grain individual differences. Their letter naming task represented not only children's accuracy of letter knowledge, but also their speed in accessing that knowledge. Likewise, their segmenting measure tapped various levels of insight into the phonemic structure of words, because items were not scored simply as right or wrong; rather, credit was awarded for gradations of phonemic awareness (isolating the initial sound in a word, separating onset from rime, complete phonemic segmentation), much like that of Kaminski and Good (1996). In addition, borrowing from Spector's work (1992), they provided corrective feedback to children during administration of the measure, which offered learning opportunities within the task itself. They suggested that the combination of graduated scoring and corrective feedback increased the predictive validity of the segmentation task by reducing floor effects that otherwise would have been pronounced, particularly for the November kindergarten test period, had scores been based solely on complete phonemic segmentation.

This sensitivity to children's partial and developing knowledge of segmentation probably contributed to reduced overselection rates (4–17% across cohorts) relative to earlier prediction studies. It also reduced ceiling effects associated with tasks like identifying the first sound in words, a task that was difficult in November for all three cohorts, but mastered by April for many students, including a few children who later developed RD. Depending on the timing of the screenings and the cohort, overprediction ranged from 4 to 17% and underprediction from 0 to 9%, but like Nicholson and Fawcett (1996), O'Connor and Jenkins warned that the patterns that predict poor reading among children of typical kindergarten age may not apply as well to older kindergarten children (> 6.1 years in September) who are repeating the grade. Some children who repeated kindergarten had learned enough about letter names and segmenting first sounds to score above established cutoff criteria, even though their performance still fell below the average of first-time kindergartners.

It appears, then, that for prereaders in kindergarten, tests that incorporate some form of learning, such as providing feedback on test items (O'Connor & Jenkins, 1999), variable scoring to indicate partial knowledge (Kaminski & Good, 1996; O'Connor & Jenkins, 1999), or trials to criterion (Murray et al., 2000; Spector, 1992) may be more sensitive indicators of future reading achievement.

Using Screening Measures to Establish Intervention Criteria

Prediction studies attempt to select (a) *all* children (i.e., no underprediction) whose reading scores at the end of first or second grade reveal a pattern of RD and (b) few children (i.e., small overprediction) whose later reading scores do not reveal an RD pattern. None of the studies we have reviewed have met these stringent expectations. Discriminant analysis provides information about the extent to which tasks in kindergarten distinguish children who eventually develop an RD profile. To take the next step in developing a screening instrument requires establishing criterion, or cutoff, scores for each of the primary predictors. Few research studies provide specific criteria for interpreting scores on predictive measures, and specific measures are rarely cross-validated with other samples.

Selecting *specific* tasks that are most useful in distinguishing children who will exhibit RD is dependent on the timing of the screening effort. Second, cutoff scores on various screening measures that accurately distinguished RD in one cohort tend to have reduced predictive validity for other same-age cohorts. In studies that included cross-validations (Badian, 1998; Fawcett, Singleton, & Peer, 1998; O'Connor & Jenkins, 1999), the researchers liberalized the preceding criterion scores with each successive cohort in order to capture every child who subsequently developed an RD profile. As expected, raising criterion scores increased overprediction rates, sometimes substantially.

As we noted before, which error is most egregious depends on the consequences. Some researchers recommend screening later than kindergarten to reduce the overidentification (Torgesen, Burgess, Wagner, & Rashotte, 1996). Accuracy rates of the predictive tasks for correctly classifying RD and non-RD groups tend to be higher with later screening. Moreover, the accuracy of prediction in kindergarten is somewhat dependent on the instruction children receive in first grade. This phenomenon was documenting in a year-long study conducted by Perfetti, Beck, Bell, and Hughes (1987) in which ability to blend and segment at the beginning of first grade was predictive of reading at the end of the year for children who received instruction organized around whole language, however, early phonemic awareness lost predictive power in classes that included frequent instruction in phonics as part of the reading approach, perhaps because the instruction in sound-symbol relations and word analysis quickly established the alphabetic principle for most children who had not already acquired it.

Badian (1998) suggests that many children predicted to fail by her kindergarten measures in fact succeeded because of the instructional approach in first grade. This approach was based on Bradley and Bryant's (1985) instructional procedures for children at risk for reading problems, which included integrating letter sounds with phonological blending, segmenting, and spelling. She believed that her rate of overprediction would have decreased if children had received a less structured reading program.

Tradeoffs between increased accuracy of identification and provision of early intervention affect the choice of a screening window. Another alternative is to incorporate some of the features of early intervention (e.g., stronger emphasis on letter knowledge, phonological blending and segmenting, and activities to promote the alphabetic principle) in general kindergarten routines, so that children are less likely to score poorly on kindergarten screenings because of lack of exposure, and are more likely to succeed in first grade.

Reasonably accurate prediction of RD is essential for evaluating the outcomes of early intervention. It is obvious why the predictive net must capture all or most of the children with RD—they are whom treatment is meant to help. Unless we set liberal cutoff scores (resulting in sizable overidentification), no set of predictors appears to be 100% accurate in identifying all children who eventually develop RD. Moreover, if RD samples in early intervention studies include many non-RD children, researchers and practitioners may be misled by the *cure rate* for children who did not really have RD. Prediction batteries that can be administered more than once over time may decrease overprediction by allowing the evaluators to determine growth in response to good instruction, as well as absolute levels of skills.

Some researchers (e.g., Fawcett et al., 1998; O'Connor, 2000; Simmons, Kuykendall, King, Cornachione, & Kame'enui, 2000) advocate layered approaches to screening and intervention, such that prediction of reading problems and increasingly intense interventions are interfaced over time. The interplay between small-group instruction on early literacy skills and ongoing measurement may ease the problem of overidentification, while offering low-cost early intervention to the children captured in the predictive net. Some sensible actions to identify the children most likely to need intensive support in reading are shown below.

Early Identification of Reading/Learning Disabilities: Sensible Actions

1. Assess the prerequisite skills of letter naming and phonemic awareness early in kindergarten (e.g., November).
2. Use measures that can be administered in 5 minutes or less to avoid fatigue (e.g., letters named in 1 minute; segments identified in 10 spoken words).
3. For children who have not acquired knowledge of letter names, assess often (e.g., monthly) to determine whether children are acquiring this knowledge in the current program.
4. For children who cannot segment or blend, assess easier levels of segmenting (e.g., first sound) and blending (e.g., stretched sounds), and then increase the difficulty level of the measurement tasks as children acquire the easier levels.
5. Use assessment information to provide targeted help to children who need it.
6. Watch children as they attempt to write or spell words for clues into their understanding of the alphabetic principle.
7. Record progress in letter and phonemic knowledge in ways that encourage closer monitoring of children who appear most at risk.

Early Intervention for Students at Risk for Reading/Learning Disabilities

Because alphabetic reading skills provide the basis for developing orthographic reading skills, and because students with R/LDs encounter difficulty acquiring alphabetic reading skills, early intervention researchers have concentrated their efforts on teaching these skills and their prerequisites, specifically phonological awareness and graphophonemic knowledge. That is, researchers have attacked the very phonological weaknesses that are thought to cause word-level reading problems. In the sections that follow, we review research on teaching phonological awareness, decoding, and fluent reading.

Teaching Phonological Awareness

Individual differences in prereaders' phonological awareness are one of the best predictors of later success in learning to read (Elbro, 1996; MacLean et al., 1988; Share et al., 1984). The strong relationship between phonological awareness and reading achievement remains even after children have received several years of reading instruction (Wagner et al., 1997), suggesting a reciprocal relationship between the two skills (Ehri, 1979; Perfetti et al., 1987). However, it is the early predictive value of phonological awareness along with its theoretical status as a prerequisite for gaining insight into the alphabetic principle that has attracted the interest of prevention-oriented researchers.

Working inside and outside classrooms, teachers and researchers have used a variety of activities to teach phoneme awareness. Some instructional programs have emphasized sound categorization or phoneme identity (e.g., classifying pictures of objects on the basis of common beginning, middle, or ending sounds; Bradley and Bryant, 1985; Byrne & Fielding-Barnsley, 1993). Some researchers have used concrete visual aids such as Say-It-And-Move-It tasks (e.g., moving a plastic tile to represent each sound in a spoken word; Ball & Blachman, 1991) or a task modeled after Elkonin (1973)—given pictures of objects or spoken words (e.g., fan), children are asked to move a disk to or mark one in a series of boxes as they say each phoneme in the word (Blachman, Ball, Black, & Tangel, 1994; Vadasy, Jenkins, & Pool, 2000). Others have used a variety of metaphonological tasks (e.g., rhyming games, clapping for words in a sentence, syllables in a word, or phonemes in words; synthesizing the speech of a puppet who spoke only in segmented speech; identifying the initial sound in names and words; Lundberg, Frost, & Petersen, 1988; O'Connor, Jenkins, Slocum, & Leicester, 1993; O'Connor, Notari-Syverson, & Vadasy, 1996; Torgesen, Morgan, & Davis, 1992). A comprehensive listing of resources for assessing and instructing phonological awareness can be found in Torgesen and Mathes (2000).

Major questions pertaining to teaching phonological awareness include the following: Can phonological awareness be taught to children before they begin reading instruction? Does teaching phonological awareness either before formal reading instruction or alongside formal reading instruction affect either beginning decoding or word reading? Does combining phonological awareness and alphabetic instruction result in stronger effects on phonological awareness and reading than teaching phonological awareness alone? Does early phonological awareness instruction affect later reading development of students who are at risk for reading problems? Do the effects of early phonological awareness training persist beyond the earliest stages of reading development?

To address these questions, Bus and van Ijzendoorn (1999) conducted a meta-analysis of 32 published articles that tested the effects of phonological awareness training. Bus and van Ijzendoorn reported training effect sizes of d = 0.73 and 0.70 on measures of phonological awareness and reading, respectively. However, effect sizes on reading real words were smaller than on simpler forms of reading (e.g., determining which of two printed words matches a spoken word) (d = 0.34 vs. 0.85, respectively). Students whom Bus and van Ijzendoorn categorized as experiencing problems in the early stages of learning to read showed significantly smaller effects on measures of phonological awareness than students classified as "normal" (d = 0.54 vs. 1.16, respectively), but the two groups showed similar effects on reading measures (d = 0.60 vs. 0.40, respectively). Further, effects of phonological awareness training on reading, measured 18 months after the end of treatment, were not significant (d = 0.16).

Meta-analyses like Bus and van Ijzendoorn's are useful in estimating treatment effects across many studies (e.g., students given phonological awareness training show a better grasp of the segmental features of language than do untrained students). Meta-analyses can also provide information about particular variables (e.g., treatments combining phonemic awareness and letter-sound instruction yield larger reading effects than phonemic awareness by itself). However, because meta-analyses combine effects from many disparate studies that vary in context (e.g., preschool, kindergarten, or primary school), vary in type of training (e.g., purely phonetic, combined with letters, or within reading instruction), and depend on the researchers' classification of studies (e.g., should "normal populations" include urban students from low-income families who often are at risk for reading failure?), they do not answer other questions of importance to prevention-oriented researchers. For example, does phonemic awareness training with at-risk kindergarten students lead to better reading outcomes at the end of first grade, and is the answer to this question qualified by the type of reading program (code vs. whole language emphasis) that students receive? Individual studies focusing on particular research questions must be consulted to fill out the picture painted by meta-analyses. Below, we examine some of the major questions pertaining to phonemic awareness instruction, along with a selection of the highest quality studies addressing these questions.

Do children benefit from phonemic awareness instruction in preschool and kindergarten? Targeted phonemic awareness instruction with prereading children (preschool and kindergarten) leads to significant gains in phonological awareness and in word-level reading skills (e.g., Ball & Blachman, 1991; Bradley and Bryant, 1985; Byrne & Fielding-Barnsley, 1993). In these studies research staff provided phonemic awareness instruction outside the classroom to typically developing youngsters, with some groups taught to represent sounds with letters of the alphabet. Groups who received a combination of phonemic and alphabetic tasks showed significantly stronger performance on reading measures. In fact, few studies of prereaders report effects from pure phonemic awareness training (without teaching letter sounds) on reading tasks administered immediately after training (Cunningham, 1990) or following a year of formal reading instruction (Lundberg et al., 1988).

Phonemic awareness instruction has also proven beneficial when delivered by kindergarten teachers rather than research staff. In one study, kindergarten teachers and their assistants gave 11 weeks of phonemic awareness training (10–13 hours of instruction in 15–20-minute lessons) to low-income, inner-city youngsters (Blachman et al., 1994). The experimental group used Say-It-And-Move-It and Elkonin-like segmentation tasks, and received direct instruction in letter names and sounds. Children who had mastered several letter names and sounds also used letter tiles to form words in the Say-It-And-Move-It task. Compared to a control group that did not receive phonological awareness lessons, the experimental group performed significantly higher at the end of the year on measures of phoneme segmentation, spelling, and an experimenter-designed measure of reading phonetically regular words and nonwords. The groups did not differ on the Word Identification subtest of the WRMT. O'Connor et al. (1996), who unlike Blachman et al. (1994) included students with disabilities in their treatment, reported similar results in a kindergarten study of teacher-implemented phonological awareness instruction.

Does explicit phonemic awareness instruction add to the effects of phonics instruction for beginning readers? Whereas many typically developing students easily acquire phonemic insight, graphophonemic knowledge, and the application of these skills to decode words, students with R/LDs encounter difficulties with these skills right from the start. This fact has led some prevention researchers to conclude that merely incorporating phonemic awareness training in kindergarten is insufficient to overcome the challenges faced by students at risk for R/LD. Rather, kindergarten programs should also include systematic instruction of early reading skills.

Fuchs and colleagues conducted three kindergarten studies examining the contributions of explicit phonemic awareness instruction, decoding instruction, and their combination. In their first study, Fuchs et al. (2001) compared three groups: an untreated control; one that received phonemic awareness instruction; and one that received both phonemic awareness and decoding instruction. Classroom teachers and peer-tutoring dyads conducted all instruction. Phonemic awareness instruction was based on *Ladders to Literacy* (O'Connor, Notari-Syverson, & Vadasy, 1998). Decoding instruction was delivered through PALS, a peer-mediated format developed by the researchers. On phoneme awareness tests at the end of kindergarten, the treatment groups did not differ, but outperformed the control. On word identification, decoding, and spelling tests, however, the decoding plus phonological awareness group surpassed the other two groups, which did not differ from each other. By October of grade 1, the pattern of effects on phonological and reading tasks was similar to the earlier results, but the groups no longer differed significantly.

In their second study, Fuchs et al. (2001) compared three kindergarten groups: decoding (PALS), decoding plus phonemic awareness, and an untreated control. In non-Title 1 schools, the two treatment groups performed comparably at the end of the year on reading and spelling outcomes, and both groups surpassed the control group. Finally, in a third study, Fuchs and Fuchs (2001) compared four kindergarten groups: decoding with and without phonological awareness training; phonological awareness alone; and a control group. Again, the researchers found no evidence that phonological awareness training added to the effects of their decoding program. Together, these three kindergarten studies raise questions about the added value of phonemic awareness instruction in learning to read words, when students also receive systematic decoding instruction.

In a related study using another version of PALS, Mathes, Torgesen, & Allor (2001) examined how the quantity of phonological awareness instruction affected first graders' reading growth. The PALS treatment emphasized phonics and story reading, but also included practice in segmenting spoken words into sounds. Low achieving students who received PALS along with computer-assisted phonological awareness training performed no better than students who received PALS alone. More phonological awareness practice did not add value.

If struggling readers' critical deficit is a lack of phonemic awareness, why were they not helped by training in this skill? One possibility is that explicit instruction of phonics implicitly teaches phoneme awareness. That is, instruction that clearly specifies grapheme-phoneme relationships, gives practice in converting graphemes to phonemes, and assists students in assembling word pronunciations from strings of graphemes may be sufficient to establish the level of phoneme awareness necessary for learning to read. In any case, these three kindergarten studies found strong word-reading effects from explicit phonics instruction, whether or not it was supplemented with explicit phonemic awareness training.

The absence of a phonemic awareness training effect in the context of an explicit phonics intervention is a reminder that care is needed in interpreting the necessary relationship between phonemic awareness and alphabetic reading skill. Although alphabetic reading skill may depend on phonemic awareness, the two skills may develop concurrently, rather than sequentially, under certain instructional conditions.

Not to be overlooked in the kindergarten studies by Fuchs and colleagues is the large number of low achieving students (i.e., those most at-risk for R/LD) who registered no gains in reading, even with explicit decoding and phonemic awareness instruction. This brings us to the next question.

For students at risk for R/LDs, does phonological awareness instruction in kindergarten result in better phonological awareness and reading performance? Few researchers report the percentage of children who, despite training, fail to acquire segmental language and decoding skills (i.e., nonresponders), and those researchers who do report this statistic find that as many as 30% of low achieving kindergarten students do not show increased phonological awareness (Torgesen et al., 1992) and 50% show no increases in reading performance (Fuchs et al., 2001). Of course, these students might show a stronger response with longer and/or more intense instruction. By and large, studies reporting long-term reading effects of early training in phonemic awareness have been conducted with typically developing youngsters, not students at risk for R/LD (Bradley and Bryant, 1985; Byrne & Fielding-Barnsley, 1993, 1995; Lundberg et al., 1988).

Does the type of reading instruction students receive affect their need for explicit teaching of phonological awareness? Teaching students phonological awareness in kindergarten may be less important if they subsequently receive explicit and systematic instruction in phonics. By contrast, if first graders are left to figure out the code on their own (e.g., in a classroom with insufficient phonics instruction), kindergarten instruction in phonological awareness and graphophonemic relations may be critical. Because many studies combine phonological awareness and phonics instruction, it is difficult to separate the contributions of each. However, the value added by phonological awareness instruction may be diminished when phonics is explicitly taught (Fuchs & Fuchs, 2001; Fuchs et al., 2001). Consistent with this possibility are findings from first-grade studies that show initial level of phonemic awareness, often a strong predictor of reading success, loses its predictive power in classrooms with strong code-based instruction (Compton, 2000; Perfetti et al., 1987).

How much phonological awareness is needed? It will also be important to determine how much phonological awareness is enough for getting a start on word reading. By plotting performance on onset-rime segmentation against word-reading ability, Stahl and Murray (1994) concluded that segmenting into onset-rime is necessary for reading. On the basis of their analysis of phonemic segmenting and reading, O'Connor et al. (1996) concluded that children may need to be able to isolate two or more phonemes correctly within spoken words to facilitate reading. In a study that measured children from kindergarten through third grade, Good et al. (2001) established minimum scores for kindergarten segmenting of 25–35 segments per minute (i.e., children could provide most sounds in three-phoneme words) as indicators of children who would pass the Oregon state reading assessment at the end of third grade. Beyond three-phoneme segmentation, faster segmenting (e.g., 10 words in less than 1 minute) or deeper segmenting (e.g., four- and five-phoneme words) does not appear to improve reading outcomes at the end of first grade (Good et al., 2001; O'Connor & Jenkins, 1999). Merely isolating the first sound in words appears to be insufficient for reading words through a decoding process, and if segmenting advances no further than first-sound identification, this level may encourage the "use the first sound and guess" strategy for word identification that persists well into the elementary years for many children with RD.

Even though important questions remain unanswered about teaching phonological awareness (e.g., the contribution of phonemic awareness training to reading acquisition under different reading instructional approaches), we recommend a conservative approach (e.g., providing such training to kindergarten children). A short list of sensible actions follows:

Fostering Phonemic Awareness: Sensible Actions

1. Teach phonemic awareness early—in preschool, kindergarten, and first grade.
2. With novices, begin instruction using larger (easier) linguistic units (e.g., words, syllables) and progress to smaller units (i.e., phonemes), but be sure that children can segment words into phonemes by the end of kindergarten.
3. Teach phonemic awareness in conjunction with letter sounds.
4. Encourage spelling/writing early in literacy instruction because it prompts children to notice the segmental features of language.
5. Emphasize the sounds in spoken words when teaching phonics.
6. Assess students' phonemic awareness regularly until children attain proficiency, and permit no one to lag behind in developing this insight.
7. Provide students with whatever additional help they need to become sensitive to the segmental features of spoken language.

Teaching Alphabetic Reading Skill (Decoding)

Because students with R/LD have poorly developed alphabetic reading skill, and because this skill serves as a platform for acquiring orthographic reading proficiency, instructional researchers have sought effective ways to help students master decoding. Research has focused on three important questions—the relative effectiveness of more- and less-explicit instruction in establishing decoding and word-reading skill, the relative value of an instructional focus on phonemes or rime units, and the effects of layered interventions for at-risk readers.

Do beginning readers develop better decoding skills from more- versus less-explicit phonics instruction? When researchers have compared more and less explicit approaches to teaching phonics on *decoding* outcomes, they consistently report an advantage for more explicit approaches (National Reading Panel, 2000). We illustrate these findings by examining three particularly strong studies. Besides the level of explicitness of phonics instruction, these studies differ on several other dimensions: length (1 to 3 years); instructional arrangements (individual tutoring or classroom-level instruction); and type of comparison group (a well-specified alternative treatment or an undefined control group).

Torgesen et al. (1999) compared three approaches to beginning reading instruction for students whose performance on phonological processing measures were predicted to be in the bottom 10% of readers. Research staff tutored the students from mid-kindergarten through grade 2. The Phonological Awareness at an oral-motor level plus Synthetic Phonics (PASP) group received *Auditory Discrimination in Depth*, or ADD (Lindamood & Lindamood, 1984). ADD emphasizes how phonemes are produced and teaches grapheme-phoneme conversions explicitly (in isolation), along with how to use this knowledge to decode words. An Embedded Phonics (EP) group received less explicit phonics, with grapheme-phoneme instruction delivered in the context of learning to read and write sight words. A Regular Classroom Support (RCS) group received tutoring in the activities and skills taught in the regular classroom. The final group was a No-Treatment Control (NTC).

The primary focus of the study was on the PASP and EP groups. As students in these two groups acquired graphophonemic knowledge and word-reading skill, they spent an increasing proportion of lesson time on text reading. However, whereas PASP students spent 80% of lesson time on word-level activities and 20% on text-level activities, EP students spent 43% and 57% on word- and text-level activities, respectively. At the end of grade 2, the ADD group significantly outperformed the other groups in decoding and word identification; the EP, RCS, and NTC groups did not differ.

Other early intervention researchers have reported similarly strong effects in decoding for at-risk first-grade students who receive explicit phonics tutoring. However, in these latter studies the effectiveness of tutorial instruction was contrasted with regular classroom instruction alone (e.g., Vadasy, Jenkins, & Pool, 2000) or as demonstration of changes in reading ability of tutored students (Vellutino et al., 1996).

Early intervention has not been limited to supplemental tutoring. Blachman, Tangel, Ball, Black, and McGraw (1999) found strong effects from small-group instruction from classroom teachers, beginning in kindergarten and continuing through grade 1 for some students, and through grade 2 for those still struggling at the end of first grade. Kindergarten instruction focused on phonemic awareness and letter sounds, consistent with Blachman et al. (1994). In first grade, children were assigned to classes on the basis of their phonemic awareness and word-reading ability so that teachers could teach relatively homogeneous small groups. Following a review of kindergarten lessons, first-grade instruction consisted of daily 30-minute lessons, following a five-step reading program: (1) review and introduction of graphophonemic relations; (2) sound-blending letters to form words and using a letter board to spell words; (3) fluency building using flash cards; (4) reading phonetically controlled text; and (5) writing to dictation. Time spent reading stories and rereading increased as students acquired proficiency on word-level skills. Second-grade teachers continued using the five-step program with students reading below grade level. Control students received an equivalent amount of basal reading instruction. Treatment children significantly surpassed control children on phonemic awareness, decoding, word identification, and spelling tests at the end of grades 1 and 2.

In contrast to Torgesen et al. (1999) and Blachman et al. (1999) who examined multiyear treatments, Foorman, Francis, Fletcher, Schatschneider, & Mehta (1998) studied progress of Title I first- and second-grade students in a single-year comparison of three classroom approaches. Direct Code (DC) teachers gave explicit instruction in phonemic awareness and explicit phonics (42 phonic rules) using Open Court's *Collection for Young Scholars* (1995). Students practiced in decodable texts, and also read from Big Books to develop oral language and comprehension skills. In a second approach, Embedded Code (EC), teachers emphasized phonemic awareness and a common list of spelling patterns (word families) as well as a variety of comprehension strategies. Students learned an analogy strategy for reading new words with familiar spelling patterns, and read from predictable books. In the third treatment, Implicit Code (IC), teachers followed a whole-language philosophy. They emphasized comprehension and integrated reading, writing, and spelling activities, but did not provide explicit phonics instruction. Growth curve analyses over four first-grade measurement points revealed significantly stronger progress by the DC group on phonological awareness and word reading. The DC group also significantly surpassed the other groups on an end-of-year word-reading measure (a combination of nonword and real-word tests), and scored higher on passage comprehension than the EC group did. EC and IC groups did not differ on any outcomes. DC seemed especially stronger in assisting the lowest achieving students to acquire some word-reading skill.

In these three studies, groups that made the largest gains in decoding received decontextualized instruction in phonemic awareness and grapheme-phoneme relationships, and were shown how to use graphophonemic information to read words. This is not entirely surprising, as Brophy (2000) noted: "… bear in mind that most assessments of the relative effectiveness of explicit versus implicit methods of teaching anything, regardless of subject matter, have favored the explicit methods" (p. 176). More at issue is the transfer effects of instructional explicitness of decoding skill on subsequent skills farther downstream in the reading process (e.g., word identification, fluency, and comprehension).

Do explicit phonics treatments result in stronger word identification skill for beginning readers? Most explicit phonics treatments that obtain significant effects on decoding also find effects on word identification. However, effect sizes on word identification measures are often smaller than those observed for decoding. For example, using nonword tests for decoding and real-word tests for word identification, we figured respective effect sizes for decoding versus word identification to be 0.86 versus 0.33 for Blachman et al. (1999) at grade 1; 0.60 and 0.25 for Fuchs et al. (2001) at kindergarten; 0.88 versus 0.48 for Torgesen et al. (1999) PASP and EP at grade 2; 1.16 and 0.87 for Vadasy et al. (2000) at grade 1.

Findings on the value of explicit decoding instruction for word identification divide according to the stage of reading development of the students studied. For beginning readers, more explicit phonics approaches yield stronger word-reading skill (Foorman et al., 1998; Torgesen et al., 1999). By contrast, more- and less-explicit decoding approaches yield similar word-reading outcomes in research on older, remedial R/LD readers (Torgesen et al., 2001; Wise, Ring, & Olson, 2000). Should we conclude that explicit decoding instruction "works" for beginning readers but not for remedial readers? Such a conclusion would be premature. Nevertheless, age-qualified results serve as a reminder to exercise caution in forming general conclusions about the benefits of explicit phonics instruction.

Several studies comparing more and less explicit phonics approaches are exceptionally well designed and methodologically sound, but they are few, and comparing approaches to reading instruction is a tricky business. While it is possible to characterize different reading programs on a single dimension (for example, degree of phonics explicitness), each program is composed of many properties that can influence learning (e.g., quality of examples, attention to reviews, scaffolding of student learning). Moreover, few of the more prevalent approaches that special education teachers use have been examined. Comparative research using explicit programs like Reading Mastery, Corrective Reading, or Read Well are needed.

Should decoding instruction emphasize phonemes or phonograms (word families)? In principle, there are advantages to each approach. Focusing on phonemic units (/a/, /sh/, /ea/) forces learners to attend to every letter, something readers must eventually do. By contrast, instruction that focuses on phonograms (-at, -ate, -art) regularizes vowel pronunciations for words within a family. Teaching phonograms also helps learners chunk letter groups in ways that can speed word recognition.

In their study of beginning at-risk readers, Foorman et al. (1998) found faster word learning in classrooms teaching phoneme-level decoding than classrooms emphasizing either phonograms or whole language. Notably, first graders receiving phonograms instruction performed no better than those receiving whole-language instruction. More evidence favoring a phoneme emphasis comes from a training experiment by Berninger et al. (2000) who compared several kinds of instructional modeling for word reading (letter-phoneme; onset and rime-pronunciation; letter spelling–whole-word pronunciation), singly and in combination. Treatment groups also received decontextualized instruction on graphophonemic relations and phonemic awareness, using Berninger's (1998) "Talking Letters" and practiced assisted text reading. On a test of the taught words, all experimental groups outperformed a contact control group (who received phonological and orthographic awareness instruction along with assisted text reading), but did not differ from each other. However, on a test of transfer words, the letter-phoneme pronunciation group, the spelling–whole-word pronunciation group, and the group that received a combination of both these kinds of instructional modeling differed significantly from the control group. Groups given instructional modeling of onset and rime-pronunciations fared no better than students who received no word-level instruction. Thus, both Foorman et al.'s (1998) classroom research and Berninger's et al. (2000) clinical research found an advantage for phoneme over onset-rime instructional emphases.

However, the instructional advantage of phonemes over onset-rimes may depend on the child's reading level. Working with older (7- to 12-year-old) students with severe reading disabilities, Lovett has reported inconsistent results for these approaches across several studies. However, in her longest running study, Lovett et al. (2000) compared various combinations of graphophonemic and phonograms emphases, as well as pure versions of each, with the constraint that all groups received 70 hours of intervention. Children were given graphophonemic instruction followed by phonograms instruction, phonograms instruction followed by graphophonemic instruction, graphophonemic instruction alone, or phonograms instruction alone. Overall, Lovett et al. found no advantage for graphophonemic versus phonograms instruction. Combining the two approaches, however, produced performance superior to that of either approach by itself. In addition, on a few measures of word reading, graphophonemic instruction followed by phonograms instruction appeared stronger than the reverse order. Thus, in deciding between graphophonemic and phonogram instructional approaches, the jury awaits more definitive evidence.

Should beginning reading instruction be confined to decodable texts? Some reading authorities believe that beginning reading instruction, particularly for children at risk for reading problems, should employ text that is consistent with the phonics that children have been taught (Carnine, Silbert, & Kame'enui, 1997). With the exception of a few high-frequency irregular words necessary for creating stories (e.g., *said, the*), only words made up of previously taught letter-sound correspondences should appear in sentence or story reading. Other authorities contend that consistency between phonics and text is an open question (Allington & Woodside-Jiron, 1998). Only two studies have addressed this issue. Juel and Roper-Schneider (1985) found a decoding advantage for typically developing first graders taught with phonetically transparent text, relative to students who received the same phonics instruction but read from less phonetically consistent text. The groups did not differ on an end-of-year reading achievement test.

More recently, Peyton, Jenkins, Vadasy, and Sanders (2001) studied three groups of at-risk first graders. Two groups received supplemental one-to-one reading instruction from nonteacher tutors, using the same phonics program, *Sound Partners* (Vadasy et al., 2001). During the story reading component of the lessons, students in the more-decodable group read texts that were highly consistent with the phonics program (i.e., a high proportion of the words appearing in the texts were composed of taught letter-sounds alone). Those words that could not be decoded from previously taught graphophonemic correspondences were taught in isolation before they appeared in stories. In contrast, students in the less-decodable group read stories composed primarily of high-frequency words, with an emphasis on predictable text. A control group received regular instruction from classroom and Title 1 teachers, but were not given the supplementary one-to-one lessons. At the end-of-year reading, the tutored groups surpassed the control group on a broad array of decoding, word reading, accuracy in context, and comprehension measures. However, the more- and less-decodable groups did not differ significantly on any measure. In interpreting these findings, it must be remembered that the more- and less-decodable text treatments were supplemental to classroom reading instruction, in which students read from a variety of texts that bore little relationship to the supplemental phonics lessons. Under these circumstances, text differences may not carry the weight that some authorities claim.

How can schools organize assessment and instruction to prevent and/or ameliorate R/LDs? Most early intervention research on R/LD has compared the relative effectiveness of specific instructional approaches (e.g., Foorman et al., 1998, Torgesen, et al., 1999). Results of these studies remind us again how much students vary in their responsiveness to instruction. Even with explicit and intense decoding instruction, researchers find between 15 and 30% of at-risk students still perform significantly below average in decoding and word identification (e.g., Torgesen et al., 1999; Vellutino et al., 1996). If these students are to become competent word readers, they will require longer, more intense, or different treatments than they received. In line with this thinking are two recent studies that attempt to adjust treatment length and intensity according to student response.

Blachman et al. (1999) provided longer treatments to students who required more help by reconstituting and linking kindergarten and first-grade instruction for at-risk students, and then extending treatment into second grade for students who had not completed the intervention program. Because Blachman et al. did not report standard scores for the lowest performing students, we cannot determine the number of students who finished grade 2 still reading at an unsatisfactory level. Nevertheless, the lowest achieving treated students strongly outperformed their counterparts in the control group (ES = 1.4 and 1.24 in decoding and word identification, respectively). On a nonword decoding test, treated students in the bottom quartile tripled the performance level of control students. Blachman et al. obtained these results by organizing homogeneous, small-group instruction (including the assignment of students to classroom), designing lessons that emphasized phonemic awareness and alphabetic reading skills, and adjusting treatment duration according to students' progress. Students did not receive supplemental services from remedial and special education teachers. Despite these impressive results, it is unlikely that even high-quality general education, no matter how well organized, will be sufficient to meet the needs of students with R/LDs.

O'Connor, Fulmer, Harty, and Bell (2001) provide a model for primary schools attempting to accommodate students at risk for R/LDs who do not thrive even within high-quality general education classrooms. Focusing on grades 1 and 2, these researchers linked professional development for general and special education teachers, redesigned classroom literacy instruction, periodically assessed student performance, and provided supplemental instruction for struggling students. Literacy instruction addressed phonological and print awareness, oral language, word analysis, comprehension, writing activities, and fluency. In Layer 1 of O'Connor et al.'s intervention, classroom teachers received professional development to help them deliver literacy instruction that was geared to the needs of struggling students. Layer 2 of the intervention used periodic reading assessments to identify children requiring additional help. Research personnel provided small, homogeneous group instruction (2–3 students) to struggling students for 25–30 minutes, three times per week. Depending on students' needs, small-group instruction emphasized either alphabetic reading skills (e.g., letter sounds, sounding-out, word analysis) or fluency (e.g., reading and rereading decodable texts).

At the end of second grade, reading scores of average and low achieving students (including students with disabilities) who received the layered intervention were compared to those of control students. Treated students performed significantly higher on word identification, nonword reading, fluency, and comprehension. The fluency scores of the lowest performing students (Figure 4) indicate a strong advantage for those in the intervention group over those in the control group. Whereas 23 control students read fewer than 50 words per minute, 16 intervention students fell below this criterion. When criterion performance was set lower, at 25 words per minute, 11 control versus only 2 intervention students failed to achieve this criterion. Together, the studies of Blachman et al. (1999) and O'Connor et al. (2001) suggest that schools can reduce the number of students who fail to respond to interventions by lengthening the intervention period and by providing supplemental instruction for students experiencing the most difficulties.

Not surprisingly, many important questions remain unanswered or partially answered regarding the teaching of decoding. Here are some things we don't know. Is it important to confine beginning reading practice to decodable text? What level of decoding skill is necessary for fast, accurate word identification and comprehension? How should we teach those children who do not reach adequate levels of decoding and word-reading skill despite receiving our strongest treatments? Research like O'Connor et al.'s (2001) is sorely needed to identify specialized intervention approaches for students who do not respond to enhanced classroom instruction.

Even though important questions remain about teaching phonics (e.g., the relative emphasis on decontextualized phonics instruction and text reading practice), we recommend a conservative approach (i.e., providing sufficient explicit phonics instruction for students to read nonwords easily). A short list of sensible actions follows:

Promoting Alphabetic Reading: Sensible Actions

1. Teach grapheme-phoneme conversions explicitly right from the start.
2. Teach graphophonemic relations directly and systematically, not with worksheets.
3. Assess graphophonemic knowledge frequently until children attain proficiency.
4. To bolster word-level reading skill, encourage spelling/writing, right from the start.
5. Teach sounding-out, right from the start.
6. Provide beginning readers with ample opportunity to practice reading words that are consistent with their phonics instruction.
7. As students' decoding of short words reaches proficiency, teach strategies for reading multisyllabic words.
8. Find ways to provide more instruction in decoding for those who need it.

Promoting Orthographic Reading Skill (Fluency)

Fluent reading is an important aspect of reading ability for two reasons. First, slow, effortful reading ruins motivation to read and reduces the chances that individuals will choose reading over other activities. Second, reading fluency and comprehension are intertwined; slow reading detracts from comprehension. Children should achieve a level of word reading that is relatively effortless.

Relative to age peers, students with RD have far fewer words stored in memory, in part because their limited decoding skills result in fewer successful independent learning trials, and in part because they spend less time reading and cover less ground when they do read. And most discouraging to these students (and their teachers) is the extraordinarily high number of encounters with specific words needed to secure the words in orthographic memory. Lacking breadth of word knowledge, students with RD exhibit slow, halting, error-laced reading—that is, reading that lacks fluency. Although we understand a considerable amount about factors that contribute to fluency, a number of important questions remain about ways to facilitate its development in students with RD.

What level of decoding is necessary before broad reading will boost fluency? Because it is the principal mechanism by which individuals gain repeated exposure to words in print, wide reading is essential for developing fluency. However, in the early stages of reading acquisition, bypassing decoding instruction in favor of wide reading is a recipe for failure. Nevertheless, we lack information about the level of decoding proficiency necessary if wide reading is to have its intended effect on fluency. Chall (1996) proposed that reading fluency develops after students have mastered basic decoding skills. Research is needed on the effects of text reading practice for students at different stages of decoding proficiency.

How does text difficulty affect the development of fluency? That is, what level of reading accuracy in texts is required for students to develop fluency from practice in those texts? A variant on the previous question, this one focuses more on the reader-text interaction than on absolute levels of decoding proficiency. Instructional reading level (i.e., the minimum level of reading accuracy in a text for the student to benefit most from direct instruction) is said to range from 90 to 95%, depending on the reading authority.

Instructional level is itself something of an ambiguous term because it does not specify the nature of instruction. For example, must the first reading of texts used in repeated readings achieve a 95% level to maximize word learning and fluency growth? Is a 95% accuracy level required for “assisted reading” interventions (e.g., reading with the assistance of audiotapes or a more able reader)?

How should fluency instruction be organized? Teachers can organize fluency practice in a variety of ways. Studies examining repeated reading and continuous (nonrepeated) reading suggest that both produce gains (Dowhower, 1987; Samuels, 1979; Shany & Biemiller, 1995). Repeated reading provides students with multiple repetitions of the same words within a short time. Continuous reading exposes students to a wider volume of words (i.e., more different words). Very few studies comparing repeated and continuous reading have been performed with struggling readers, and only one of these was conducted with children in the age range covered by this paper. Vadasy (2001) obtained equivalent growth from repeated and continuous reading treatments with second-grade poor readers, consistent with findings obtained with slightly older (third grade) readers (Rasinski, 1990; Vaughn et al., 2000).

Criteria used in repeated readings treatments are also at issue, without a clear advantage for either performance criteria (number of words read per minute) or number of readings. Research is needed on target fluency levels used in repeated readings and the number of rereadings that optimize fluency development. Finally, attempts to improve fluency through reading word lists instead of texts also show beneficial effects, and it is not clear if text or word list practice produces better outcomes (Tan & Nicholson, 1997; van den Bosch, van Bon, & Schreuder, 1995).

How can we encourage students with R/LD to increase their volume of reading? Information is needed about how to make reading practice easier and more enjoyable for students who struggle with reading. Some possible areas to examine include the effectiveness and appeal of assisted reading with audiotape or computer software, and providing students with reading material that matches their interests—topical books and magazines, biographies, and books with the appeal of Harry Potter.

Does word study add to the effects of text reading practice? Assuming that increased text reading (with the aid of adults, tapes or software, or rereading opportunities) can raise the volume of words encountered in text, it should result in expanded reading vocabulary and faster word recognition. We still must determine whether extensive text practice by itself is sufficient to improve fluency, especially for students who do not learn words easily. For these students, some portion of reading instruction may still need to be reserved for word study. How should such word study by conducted to maximize its effects by focusing on words misread in text; words that have been categorized in ways to make spelling and pronunciation patterns more explicit; or subword units (Mercer, Campbell, Miller, Mercer, & Lane, 2000)?

Even though important questions remain unanswered about how best to promote reading fluency (e.g., an emphasis on repeated readings practice or on wide reading), teachers can make fluency an instructional focus. A short list of sensible actions follows:

Building Fluency: Sensible Actions

1. Find ways to make text reading easier for students with RD, using various forms of assisted reading (audiotapes, computer programs, choral reading, and partner reading).
2. Experiment with texts of various levels of difficulty.
3. Motivate students to read more by taking into account their interests, the variety of reading materials available to them, and the personal, linguistic, and cultural relevance of texts. Consult with the school librarian or someone knowledgeable about children and literature.
4. Develop areas of interest and teach students to feed those interests through reading.
5. Experiment with supplements to text reading such as word and subword study, word lists, and the proportion of time devoted to text- and word-level practice.
6. Measure students' text fluency regularly to inform instructional decision making.

Final Thoughts

Our understanding of RD derives primarily from an amalgamation of stage and verbal efficiency theories that link phonological processes to alphabetic reading skill to orthographic reading skill to language and reading comprehension. Empirical backing for the theoretical framework consists mainly of correlational research, supplemented with experiments that invite causal interpretations. This theoretical framework guides much of the research on early identification and early intervention for students with R/LD. Although we have learned much about early identification and treatment of young children with R/LD, we still have far to go. We know that some level of phonemic awareness is necessary for acquiring decoding skill, and that decoding skill is necessary for acquiring the enormous sight vocabulary needed for fluent reading. We also know that the majority of students with reading disabilities are weak in phonemic awareness, have difficulty decoding, and lack fluency.

However, it is fair to ask, have the assessment and instructional practices derived from this framework led to better outcomes for students with R/LDs? In our view, the answer is a qualified yes. "Yes," because early assessment of phonological awareness has increased our accuracy in identifying children who subsequently exhibit reading problems; because early training of phonological awareness facilitates decoding; and because explicit decoding instruction produces better orthographic reading skill. Nevertheless, we must qualify our "yes" answer because of lingering questions about the long-term benefits of early phonological training, explicit decoding instruction, and fluency training. For example, early intervention researchers report strong effects for phonological awareness training on decoding when measured immediately after phonological training, but statistically negligible effects 18 months later. Immediate effects resulting from a specific treatment approach are educationally important only if teachers can exploit them to produce long-term advances in reading skill.

Another cause for concern is the sizable number of children who exhibit small or indiscernible response to early intervention. Besides students who respond weakly to our interventions, we may also find children who respond well by learning the foundation skills that are the targets of early intervention, yet still fail to grow in reading ability at rates that keep them within the range of normal reading development over time. We may find other children who with ongoing, intense intervention by research or school staff can keep pace with peers in first or second grade, but falter as reading demands become more complex in the middle elementary years. Other students may struggle with reading throughout their schooling and into adulthood—regardless of early identification, early intervention, and relentless support. For some individuals, reading disability may be a chronic condition.

Finally, even with the explosion of early intervention research in R/LD, the practical knowledge derived about intervention is far more modest than many had hoped for. The good news is that researchers have been able to document a variety of specific intervention approaches that yield significantly better outcomes. Examples of interventions that surpass generic classroom instruction include Blachman's five-step instructional program for struggling first graders (Blachman et al., 1999); O'Connor's experimental multilevel intervention program (O'Connor et al., 2001); *Peer-Assisted Learning Strategies* (Fuchs et al., 2001); Open Court's *Collection for Young Scholars* (Foorman et al., 1998); Phonological Awareness plus Synthetic Phonics (Torgesen et al., 1997), *Read, Write, and Type* (Torgesen, Wagner, Rashotte, & Herron, undated); *Spell Read P.A.T.* (Rashotte, MacPhee, & Torgesen, in press); and *Sound Partners* (Vadasy et al., 2000). These approaches which incorporate instruction in phonological awareness, explicit phonics, text reading, and spelling/writing lead to two generalizations. Classroom instruction and specialized interventions (e.g., tutoring) that include these elements (in particular, explicit phonics) reduce the number of children who demonstrate an R/LD profile at the end of treatment (kindergarten, first grade, or second grade). Longer and more intense treatments tend to give stronger effects, though some children still struggle with reading.

Without minimizing the importance of these generalizations, we cannot overlook the fact that similar generalizations existed before the current rash of early intervention studies. Decades ago, major studies of beginning reading instruction (Chall,1967; Bond & Dykstra, 1967; Becker & Gersten, 1982) concluded that beginning reading instruction characterized by explicit phonics, ample amounts of text reading, and spelling/writing produces better reading outcomes for novice and at-risk learners. Moreover, few practitioners would be startled by the conclusion that longer and more intense interventions lead to better outcomes for at-risk learners.

Alternative Approaches to Understanding and Treating Reading/Learning Disability

Are there alternative conceptualizations of reading acquisition that have potential for guiding interventions for students with R/LD? Granted, any alternative must make room for direct code instruction. The overwhelming volume of research attesting to its benefit has erased doubts about the role of explicit phonics instruction. Teachers are on board; Baumann, Hoffman, Duffy-Hester, and Ro (2000) report that more than 99% of primary-grade teachers believe explicit phonics instruction is essential. This is an important milestone.

Although word reading constitutes the primary roadblock for children with R/LD, special educators would commit a serious error were they to focus exclusively on word-level reading, shortchanging other aspects of reading competence. Word reading is not the end goal of literacy instruction; teaching phonics, even if combined with fluency-oriented instruction, will not suffice (i.e., there are limits to the amount of reading improvement possible from word-level training alone). Children must also gain proficiency in reading purposefully and selectively; reading between the lines; integrating text information with background knowledge; linking ideas within and across texts; establishing standards for coherence; monitoring and evaluating comprehension; repairing comprehension failures; finding, explaining, and learning information from text; and appropriating authors' ideas and discourse conventions for talking and writing about text. Fortunately, students need not accomplish all these skills in the primary grades, any more than they need to fully master decoding or fluent reading, but they should get a start on becoming mentally active, strategic readers and on learning how reading is used to cultivate knowledge, accomplish tasks, and enrich the mind.

Remaining alert to the larger goals of reading instruction compels us to think beyond teaching alphabetic and orthographic reading skills, necessary and critical though they be, to consider the nonphonics, nonfluency, text-level component of literacy instruction. How much emphasis should the text-level component receive in the early grades? What theoretical model should guide text-level instruction? Are there approaches to teaching text-level skills and dispositions that produce better outcomes for students with R/LD? Far less attention has been paid to this aspect of literacy learning and teaching, especially as it relates to students with R/LD.

Some of the most promising research from an alternative conception derives from a social constructivist perspective, exemplified in Englert and colleagues' Early Literacy Project (ELP; Englert, Raphael, & Mariage, 1994; Englert et al., 1995). Relative to instructional approaches derived from phonological processing and verbal efficiency perspectives, the ELP gives minimal consideration to explicit teaching of phonological awareness, phonics instruction, and fluency building. Although the ELP supplements literacy lessons and activities with phonics teaching, most code instruction is embedded within writing activities. The instructional emphases of phonologically driven, information-processing approaches, and social-constructivist teaching models show remarkably little overlap, each focusing on different but equally important aspects of literacy. Each approach has potential for complementing the other.

Success rates, even for state-of-the-art early intervention programs are not so high that researchers and practitioners can afford to dismiss alternative theoretical perspectives. The sizable number of unanswered and partially answered questions that we catalogued earlier testifies to our limited understanding of early intervention. Successful treatment and prevention of R/LD is the goal. Achieving that goal will take all our best ideas. Remaining open to different theoretical perspectives is both sensible and necessary, especially in the face of children who do not respond satisfactorily to conventional intervention approaches. Creative, responsive, relentless instruction will be needed for these children, and it must arrive before children with R/LD give up on the reading enterprise.

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Figure 1

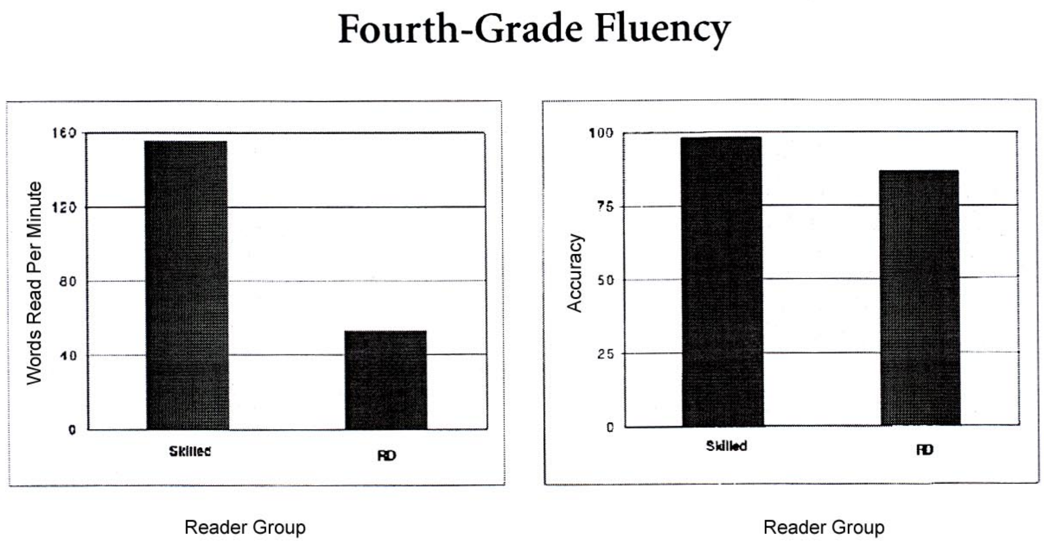


Figure 1. Accuracy and fluency of fourth graders.

Figure 2

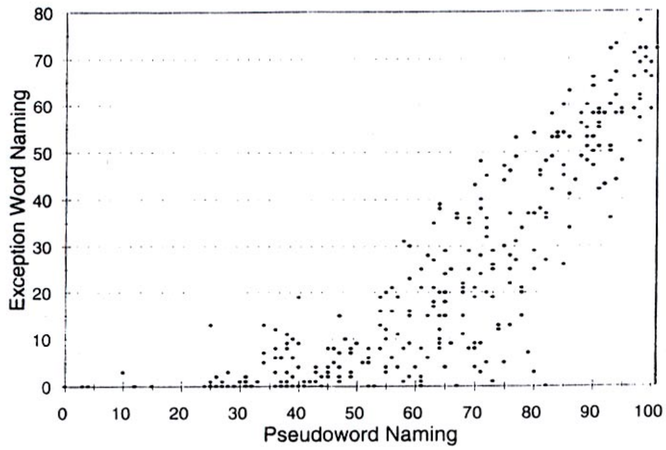


Figure 2. Scatterplot of pseudoword naming and exception word naming.

Figure 3. Relationship between phonemic segmentation skill and decoding.

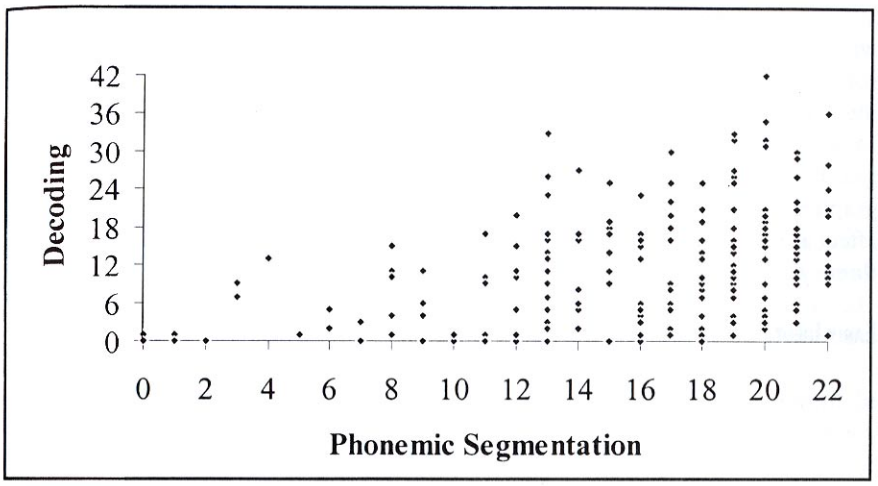
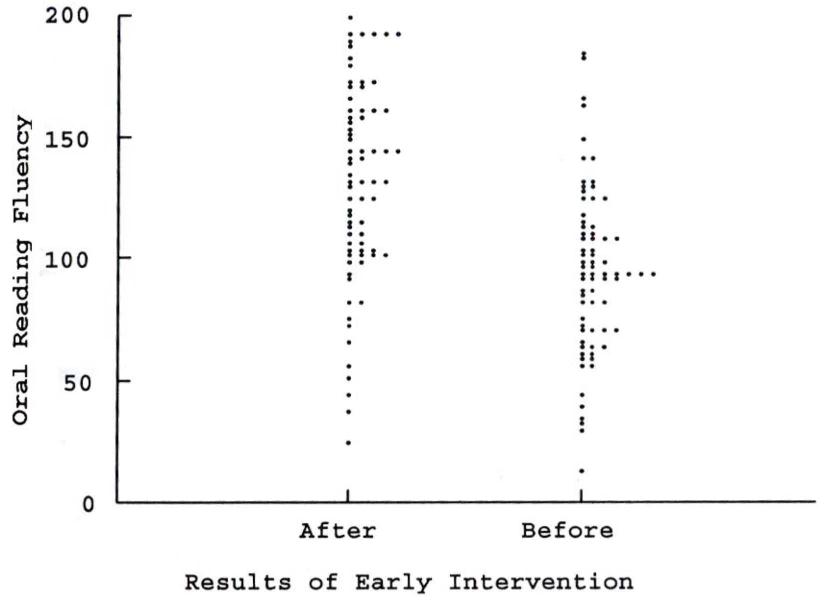


Figure 4.


200
150
100
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Oral Reading Fluency
After
Before
Results of Early Intervention