CLINICAL JUDGMENTS IN IDENTIFYING AND TEACHING CHILDREN WITH LANGUAGE-BASED READING DIFFICULTIES

Barbara W. Wise & Lynn Snyder, University of Colorado

I. INTRODUCTION

Expert educators continuously evaluate their students' performance, adapting instructional programs to be as effective as possible for each child. This paper considers the information educators need to make these adaptations. The term *educator* refers here to professionals along the whole cascade of teaching services, from general classroom teachers, to learning specialists in smaller reading or special education settings, to therapists and specialists working one on one with the student experiencing difficulty. Because of reading's critical role in learning and because of the prevalence of reading problems in children referred for special education, the paper focuses on decisions educators make about children with specific reading disabilities (SRDs), with specifically poor comprehension, or both. We consider these separately, because different kinds of language deficits underlie the two kinds of reading problems.

Research from the last twenty years clearly suggests how to screen, identify, teach, and evaluate children with language-based reading difficulties. We refer to some of this research in this paper. However, the chapter mainly considers the clinical judgments that expert educators add to this knowledge to recognize children with learning disabilities and to construct and evaluate their educational programs. We explore some training and classroom management ideas to help teachers work towards this goal without exhaustion. The chapter closes by recommending that educators and researchers collaborate to evaluate and improve treatments and scale up the best treatments, so that more and more children will receive effective methods and practices for their needs.

II. ISSUES IN IDENTIFICATION

Given the potential social stigma (Sapon-Shevin, 1987; Smith & Nagle, 1995) and sometimes reduced teacher expectations (Tauber, 1998) that can be caused by labeling a child as having a learning disability, why do we still advocate using the label? Clearly, labels can be justified only if they are reliable, valid, and useful (Pennington, 1991). A label is reliable if it identifies a learning difference that remains stable across many tests and settings. A label of a learning disability is valid if it identifies a learning difference related to processes intrinsic to the learner. It is valid and instructionally useful if children with that label benefit from treatments theoretically compatible with the identified underlying processes more than from other treatments. Demonstrated advantages for such treatments are indeed what justify and require the continued identification of children with valid, instructionally useful labels. Many labels (e.g., visual or auditory closure difficulties) that were applied in the early 1970s and the treatments that accompanied those labels did not prove either valid or helpful, and they have thankfully fallen out of use (Hammill, 1972; Vaughn, Gersten, & Chard, 2000).

In this paper we focus on variability within two major learning disability labels, both involving reading difficulties, because reading is so crucial for success in schools and because reading disabilities are so prevalent in special education settings (Langenberg, 2000). Much well-controlled research covered in this report identifies core deficits underlying many cases of reading disabilities and indicates reliable tests that can discriminate children with and without the deficits. Research has also identified aspects of theoretically valid programs that help such children more than other programs do. All this research yields practical recommendations about screening, teaching, and evaluating the progress of these children.

We focus first on SRD, often called dyslexia (Lyon, 1995), the most prevalent learning disability. It is usually based on underlying core deficits in phonological (or speech-sound based) processing. Problems in phoneme awareness (the ability to identify and manipulate sounds inside syllables) and phonological

decoding (the sounding out of words) are abilities that suffer when phonological processing is weak, and these weaknesses lead directly to problems in word reading. Children with weak phonological processes also struggle secondarily with reading comprehension, for two reasons. First, comprehension suffers when they misread words. Second, comprehension can still fail if remedied word reading remains so slow and effortful that it uses too much attention (Perfetti, 1985). Children whose reading comprehension is hindered solely by phoneme awareness and decoding comprehend well when listening to stories, but have problems when reading the stories themselves.

On the other hand, a less common group of children with specifically poor comprehension struggle with formulating main ideas, summaries, and inferences both when they listen to stories and when they read them themselves. The difficulties appear despite these children's normal phoneme awareness and decoding skills. These comprehension problems seem usually to relate to underlying core deficits in higher-level language skills, such as difficulties with non-literal meaning, vocabulary, and syntax.

Of course, real children with language-based reading problems present with unique profiles with different combinations of deficits and strengths that should affect the design of their optimal instructional program. Their abilities vary in phonological processes (phonemic awareness, memory, and naming speed, discussed later), with or without problems in higher language skills. Their profiles and their programs should also vary depending on strengths and weaknesses in other reading-related abilities such as orthographic memory, attention, and motivation. Verbal IQ, vocabulary, educational background, emotional and behavioral factors, and the home literacy environment also affect each child's profile.

Are there other ways to have difficulty with reading that are not based on language-based learning disabilities? Certainly there are! Other causes of reading difficulties include attention problems, inconsistent education, and problems due to learning to read in a second language. Other children struggle with reading due to mental retardation, sensory deficits, or emotional problems. These children's classroom behaviors, screening, diagnosis, and treatment differ from those of the children with learning disabilities who are the focus of this paper. Their reading should be instructed concurrently with or following the treatment of their primary deficit.

III. Research in Identification and Instruction for Specific Reading Disabilities

Identification

The last three decades of research have yielded a positive history and an optimistic future for the identification and treatment of SRDs. Research in the 1970s moved away from definitions and treatments based on underlying perceptual deficits, such as "visual or auditory closure or figure-ground difficulties" (Hammill, 1972; Vaughn et al., 2000; Vellutino, 1979). Later research moved the field beyond the "exclusionary" definition of Public Law 94-142, which said all that reading disabilities were not but not what they were (Lyon, 1995). The current working definition of SRD results from the work of seven professional organizations, including the National Institute of Child Health and Human Development (NICHD). It identifies a core deficit in phonological or analytic language processes, involving awareness and efficiency in using speech-based codes, underlying most cases of SRD (Lyon, 1995). According to this research-based, working definition:

> Dyslexia is one of several distinct learning disabilities. It is a specific language-based disorder of constitutional origin characterized by difficulty in single word decoding, usually reflecting insufficient phonological processing. The difficulties in single word decoding are often unexpected in relation to age and other cognitive abilities; they are not the result of generalized developmental disability or sensory impairment. Dyslexia is manifested by variable difficulty with different forms of language, often including, in addition to problems in reading, a conspicuous problem with acquiring proficiency in writing and spelling.

Twin and family studies in behavioral genetics (e.g., Gayan et al., 1995; Olson, Forsberg, Gayan, & DeFries, 1999; Scarborough, 1990) and research in the function and structure of the brain (Frith, 1997; Hynd & Hiemenz, 1997; Shaywitz, 1996; Zeffiro & Eden, 2000) both suggest a constitutional origin for SRDs. Reading-level match studies support a causal role for phonological deficits, since older children with SRD perform worse in phoneme awareness and phonological decoding than do younger normal readers who read real words at equivalent levels (Olson, Wise, Conners, Rack, & Fulker, 1989; Rack, Snowling, & Olson, 1992). Furthermore, phoneme awareness in kindergarten is one of the strongest predictors (along with letter knowledge) of reading through elementary school (Adams, 1990). Finally, intervention studies validate training in phoneme awareness and decoding. This training, when integrated and applied to reading accurately in context, leads to gains beyond phonological skills into reading itself (Hatcher, Hulme, & Ellis, 1994; Lovett et al., 1994; Torgesen, Wagner, & Rashotte, 1997; Wise, Ring, & Olson, 2000).

It is important to note that the phonological deficits underlying SRDs, and indeed the category itself, are a matter of degree, as with all cognitive processes. No absolute level of phoneme awareness clearly defines how many children have SRDs. The percentage of children that will be identified depends entirely on the criteria set. Research estimates in the 1980s tended to include the lowest 10% of readers with average or above-average IQ. More recently, Lyon cited findings by the Shaywitz's and other researchers to suggest that as many as 20% of children have phonological skills weak enough that reading is one of the most difficult tasks they will have to master in school (Lyon, 1999). The criteria chosen for identification will depend on how many children society decides it can afford to provide with the intensive, individualized instruction required by the appropriate special education that has been so eloquently described by Zigmond (1997).

We propose that the more educators know, the stronger their programs become, and that the better supported they are by technology and personnel, the more children can be identified early and helped efficiently. Lyon (1999) describes strong advantages for early intervention: 90–95% success for students who begin remediation before third grade versus 25% success for children who do not begin until nine years of age. Thus, the earlier children are recognized for risk, the more children can be helped, whether with appropriate instruction in the classroom, with supplemental intensive small group instruction, or with remedial special education services.

What Instruction for Children With SRD Should Include

Research suggests that interventions for children at risk for SRD should at least improve their deficient phoneme awareness, decoding, and fluency (Kame'enui, Simmons, & Coyne, 2000). We now report research on the remediation of these deficits as well as problems in comprehension that result for children with reading disabilities.

Improving deficient phoneme awareness and decoding. Research has not identified a "best" method to improve phoneme awareness (Wise, Ring, & Olson, 1999; Wise, Ring, Sessions, & Olson, 1997) or decoding or fluency (Hall & Moats, 1999). However, these studies do suggest components that should be included in programs for children with phonological deficits. These children need first to recognize and manipulate sounds easily within words (phoneme awareness), in order then to learn and use the "alphabetic principle" at the base of the English sound-to-print system (Liberman & Shankweiler, 1985). If a child cannot easily analyze the difference in the order of sounds in, for example "fist" vs. "fits," the child must memorize each word as a whole unit. After children have improved in phoneme awareness, they can learn to decode the English print-to-sound system and master decoding and word reading.

Aiming for transfer of phonological training. The studies cited above and the experiences of educators suggest that well-structured phonological training should help children make substantial gains in phonological decoding and accurate word reading. The fact is that many researchers and educators are indeed succeeding in helping more and more poor and non-readers become accurate readers. Justified satisfaction from this progress should not, however, lead us to be smug. Yes, many studies have found impressive differential effects in phonological and word level skills from interventions with explicit vs. less

explicit phonological training (Hatcher et al., 1994; Lovett et al., 1994; Torgesen et al., 1997; Wise, Ring, & Olsen, 2000). However, these studies had difficulty showing similar differential gains in reading rate and in comprehension. These researchers also reported a discouraging lack of transfer of differential gains one and two years after treatment ended, relative to the less explicit treatments. Other researchers suggest that children need to apply the skills in well-structured programs, balancing foundation-level skills with work in automaticity and application in accurate reading for meaning in context (Brady & Moats, 1997; Snow, Burns, & Griffin, 1998).

Educators who work one on one, who are able to individualize their instruction, and who can keep students as long as they need to ensure independent use of self-correction and comprehension strategies have some students who maintain gains after treatment (Uhry, 1997; Wise, 2001). However, designing studies of long-term transfer can raise ethical concerns, if researchers must withhold the most effective treatment for a comparison control condition long enough to show follow-up differences two or five years later. If progress from treatments differs significantly after one year at post-test, is it ethical to withhold the better treatment from a control group? On the other hand, the research community needs long-term follow-up to be sure that treatments differ. The research and clinical communities need to grapple with this dilemma to find creative solutions and to consider how to interpret current studies that have not attempted long-term follow-up (Viall, 2001).

Improving fluency and automaticity. The research reported in the last section converges with other research findings to suggest that mastering phoneme awareness and decoding are necessary, but not sufficient, components of early reading instruction (Wise, 1999). If a child labors at decoding words accurately, s/he will not do so when reading for pleasure. Indeed, until foundation-level skills become automatic, most children with reading disabilities will experience more work than pleasure in reading.

In pilot studies, Wise, Olson, and Ring (2000) were surprised how suddenly and completely engaged children with reading disabilities became with very simple programs that speeded practice with words the children had previously mastered for accuracy. Many researchers are using computer programs to practice repeated speeded readings of high frequency words and sub-word units to improve automaticity (Blok, Oostdam, Otter, & Overmaat, in press; Lewin, 1997; Van Daal & Van der Leij, 1994; Wolf, Miller, & Donnely, 2000). Computer programs seem to be ideal to help reading become automatic. Future research may suggest which children will profit most from this kind of instruction.

Improving comprehension for students with specific reading disabilities. Vaughn and colleagues have studied comprehension instruction in small groups of students with learning disabilities, with large effect sizes (Vaughn et al., 2000). Vaughn and her colleagues (2000) and Williams (1993) emphasize extensive practice *at appropriate instructional reading levels* for children with decoding difficulties. Except for adjusting reading levels for decoding difficulties, their research is relevant for children with comprehension problems without word recognition problems. Therefore, we report the studies later, in the section on specific comprehension difficulties.

Effects of naming speed deficits. While the above research suggests ways to improve word recognition, automaticity, and comprehension for most children with learning disabilities, some children retain a slow reading rate. Certainly it is good that such children read better than they did before remediation, but their continued slow reading reduces their enjoyment of reading and probably hampers comprehension. These children may be those that are most resistant to treatment, with "double deficits" in phoneme awareness and in "naming speed" (Felton, 2001; Wolf, 1999). They currently challenge researchers and teachers.

Naming speed tasks typically require children to name as many pictured objects, colors, or letters as quickly as they can. Poor naming speed can exist alone or coexistent with poor phoneme awareness or with the higher-level language problems of specifically poor comprehenders reported in the next section. Wolf believes that children with good phoneme awareness but slow naming speeds are not only slow readers, but also poor comprehenders (Wolf, Bowers, & Biddle, 2000). Research has not yet clarified exactly what underlies slow naming speed, but it is surely language related. It appears to depend at least on slow speech rates and probably on slow lexical access (Scarborough, 1998b; Wolf, Bowers, & Biddle, 2000).

It is interesting to puzzle through how these underlying language skills predict progress in reading. Phoneme awareness is the strongest predictor of reading progress through elementary school (Wagner, Torgesen, & Rashotte, 1994). Scarborough (1998a) also found that phoneme awareness ability in kindergarten predicted success at the end of second grade in reading. Scarborough also concurs with many other researchers (e.g., Felton & Brown, 1990) who have shown that those who are poor readers in first and second grades tend to remain poor readers into junior high. Predicting forward from second grade testing, Scarborough found that simple literacy scores predicted eighth grade reading better than any other variable. Interestingly, adding phoneme awareness or phonological decoding to the equation at second grade did not improve these predictions. Only when rapid serial naming in second grade was added to second grade literacy did the prediction become more precise about who would struggle with reading and comprehension in eighth grade. This fits Wolf's picture that phonological deficits are more amenable to remediation, while children with "double deficits" in phoneme awareness and naming speed seem more resistant to treatment. On the other hand, phoneme awareness ability in second grade was the best predictor of eighth grade *spelling* ability.

These kinds of recent findings have turned researchers' attention to naming speed, with a resulting increase in the number of studies on rapid serial naming. Two important questions arise: Can rapid naming be improved, and if so, will its improvement affect reading performance? Suppose naming speed is impossible to change. If that proves to be the case, researchers and educators will look to revising instructional programs to accommodate slow reading and naming speed. In current practice, such revised programs encourage using assistive technology for reading and writing, reducing amounts of printed work, and providing alternative methods of demonstrating learning for children who read and write slowly and with great effort.

On the other hand, it is not yet time to give up on improving the reading rates of children who are slow at serial naming. Most of the research field has been aware of the significant effects of naming speed for less time than it has been aware of the importance of phonological deficits. It is certainly worth seeing what the field can come up with to help these children. Wolf, Denckla, Bowers, and Felton have suspected the importance of naming speed for far longer than most researchers (Wolf, Bowers, & Biddle, 2000). Repeated readings and guided reading have been shown to improve fluency, but rapid naming was usually not measured in these studies (Felton, 2001). Wolf, Miller, et al. (2000) are devising computer programs that they hope will help improve reading rates by working on fluency and on elaborating vocabulary. They believe that the more routes a child has to retrieve a word, the faster his retrieval may be, though this reasonable conjecture has not yet been proven.

The previous discussion suggests that the expert educator will assess, teach, and monitor progress in fundamental skills, build automaticity with speeded practice, and provide extensive opportunities to apply skills in context at instructional levels. S/he does this while teaching and supporting comprehension and while encouraging independent reading and writing away from the classroom to ensure transfer. Accomplishing this in individualized programs is the goal of the expert educator, who begins to sound like a superhero! In a later discussion on modifying instruction to meet individual needs, we examine research and suggest how s/he may accomplish this with neither supernatural powers nor exhaustion. Before considering these ideas in practice, we want to contrast the profiles of children with specifically poor comprehension to those of the children we have been discussing thus far.

IV. The Identification of Children With Specific Comprehension Problems

Gough and Tunmer's (1986; Gough, Hoover, & Peterson, 1996) simple model of reading describes reading as interactions among decoding and language comprehension skills. The majority of research on children with reading disabilities, summarized in the previous section, has focused on their poor decoding skills, the weak phonological representations that underlie them, and their resulting secondary problems in reading comprehension. On the other hand, a growing body of research has identified a group of children who have normal decoding skills but whose comprehension is nonetheless weak, demonstrating a specific weakness in the other half of Gough's equation. However, researchers debate the identity of this group and the

deficits that underlie their reading comprehension problems.

Building an Understanding of a Text

Children with good comprehension build the "gist" or overall meaning of a text as they read, while children with specific problems in reading comprehension do this less readily. Many researchers studying reading comprehension here in the United States have focused on children with more generalized reading deficits, a group whose performance lagged both in decoding and comprehension (e.g., Snyder & Downey, 1991). Consequently, as Stothard and Hulme (1996) point out, studying reading comprehension combined with generalized deficits may have obscured the understanding of the nature of many children's specific reading comprehension problems. In contrast, a group of colleagues from "across the pond," in the United Kingdom, have focused their research on children with deficient reading comprehension despite normal decoding skills. They refer to this group of children as poor comprehenders or what we will term children with specific comprehension problems or difficulties.

In one of the early studies conducted by this group, Yuill and Oakhill (1991) found that when children with specific comprehension problems listened to short stories, they recalled verbatim details as accurately as their peers with good comprehension did. However, the same children lagged behind their peers in describing the gist of the stories. Over time, this body of research has characterized the language and processing strengths and weaknesses of these children with increasing clarity and precision (Nation, Adams, Bowyer-Crane & Snowling, 1999; Nation & Snowling, 1998a, 1998b; Oakhill, 1983, 1993; Stothard & Hulme, 1992, 1995, 1996; Yuill & Oakhill, 1988a, 1988b, 1991).

Problems Constructing Inferences

Oakhill's early work (1984) compared aspects of the reading comprehension of children with good and poor reading comprehension, all of whom demonstrated normal decoding skills on standardized measures. She found that the children with poor comprehension were less accurate than the skilled readers at answering questions about text they had read, both for information stated explicitly in the text and for information that was implicit and required the construction of inferences. When the text was made available to the children during questioning, children with poor comprehension improved in their ability to answer questions about explicit information, but remained deficient in answering questions that required the construction of inferences. It is worth noting that inspection of the types of inferences used in this study revealed that many of them were lexical inferences that relied on context for interpretation.

Constructing inferences requires drawing from a fund of general knowledge, so it is conceivable that children with poor comprehension simply lack basic information. Cain (1994), however, found that these children failed to construct the inferences needed to understand a text even when the relevant knowledge was made available to them. Similarly, Cain and Oakhill (1998) found that even when children with poor comprehension could demonstrate the general knowledge necessary for inferences, they could not draw relations between sentences. Further, their performance was significantly worse than the performance of children matched to them on either comprehension or on chronological age, who did not differ from one another.

In other studies, poor comprehenders also showed difficulty resolving pronominal reference to antecedents in text (Oakhill & Yuill, 1986; Yuill & Oakhill, 1991). This occurred with and without memory loads and with and without gender cues. The children struggled to provide pronouns in a gap-filling response, though they did this better for simple than for complex inferences. These findings suggest that the difficulty these children experience may reside at least partly in a failure to attend to or use available pronominal cues, such as gender.

In sum, the research suggests that children with specific comprehension problems have difficulty constructing inferences and handling pronominal reference. The latter difficulty may be related to the construction of inferences, because pronouns provide cohesion in connected text (Halliday & Hasan, 1976) as do inferences. These findings, then, may be symptomatic of the same underlying deficit in constructive

processing.

Problems of Specifically Poor Comprehenders Are Not Related to Short-Term Memory

Countless studies in psychology suggest that verbal short-term memory is supported by phonological processes (Conrad, 1964; Gathercole & Baddeley, 1993). The weak phonological processes of children with SRD, described earlier in the chapter, result in poor decoding and limit their available resources while reading text and also make their phonologically based short-term memory less efficient. Perfetti's (1985) "bottleneck theory" suggests that these children need to deploy so many resources to decoding that insufficient resources remain in a limited capacity system to construct a well-formed understanding of text. On the other hand, children with specifically poor comprehension are defined as having phonological decoding skills that are within normal limits, and one would suspect should also have efficient short-term memory. Indeed, Oakhill (1982) found no significant differences between children with poor and good comprehension on forward or backward digit span tests.

Perfetti, Marron, and Foltz (1996) noted that many of the studies conducted by our British colleagues characterized "normal" decoding skills on the basis of the *Neale Analysis*, a measure that assesses word decoding within connected text. They observed that in one study using the *Neale,* Yuill and Oakhill (1991) found that their poor comprehenders did not lag behind normal readers in speed or accuracy for reading real words, but did differ in reading non-words, usually defined as phonological decoding. This decoding difference confounds the findings for this sample. On the other hand, research from Stothard and Hulme (1992, 1996) and others (e.g., Nation et al., 1999) provides ample evidence that children do exist with poor comprehension without underlying phonological deficits. These samples of children with poor comprehension demonstrated similar performance on reading rates and on many phonologically related tasks (including non-word reading, spoonerisms, and spelling) as chronological age matches who were skilled at comprehension. Yet, their comprehension skills were significantly lower, as were their higher-level verbal skills, than those of their age matches. Perfetti's objections to Yuill and Oakhill's use of word reading in context as a phonological measure were well reasoned. Nevertheless, the above studies by Hulme and Snowling and colleagues constitute considerable evidence supporting the existence of children with specifically poor comprehension without the phonological and short-term memory deficits characteristic of children with SRD.

Lexical and Semantic Language Processing Deficits

The recent work of Nation and colleagues (Nation et al., 1999) sheds considerable light on the underlying language and processing weaknesses of children with specifically poor comprehension. Looking at the phonological and semantic contributions to short-term memory in children with poor and good comprehension, these researchers found that children with poor comprehension resembled children with good comprehension in their ability to recall real and non-word strings. They also demonstrated similar word and non-word reading accuracy. Their recall of abstract words, however, was considerably worse than the recall of children with good comprehension. Further, their spatial but not their listening spans were similar to those of children with good comprehension. Nation et al. suggest that their poor recall of abstract words and poor listening spans for sentences suggests an underlying, non-phonological language impairment.

In recent years, a common theme has emerged regarding the underlying language weaknesses of children with unique deficits in reading comprehension. Increasing evidence points to deficits in lexical and semantic processing skills. Stothard and Hulme (1996) found that children with poor comprehension had significantly lower verbal IQs on the Wechsler Intelligence Scale for Children–Revised (WISC-R) than either their age peers with good comprehension or their younger comprehension-level matches. On the other hand, they did not differ from their peers in performance IQ. Closer inspection of the data showed marked differences in their scores on the Vocabulary and Similarities subtests of the WISC-R, both of which are highly related to lexical-semantic knowledge. This profile was quite different from that of children with SRD. Nation and Snowling's (1998b) study of lexical priming in children with specific

comprehension deficits also demonstrated an effect of poorly developed semantic knowledge. They found that children with specifically poor reading comprehension demonstrated priming effects for highly associated word pairs (e.g., *cat-dog*), but not for pairs with lower association strength. Further, the findings of Nation et al. (1999) discussed earlier demonstrated significant differences in these children's ability to recall abstract words. These findings all underscore what seem to be impoverished lexical and other semantic representations.

Lastly, Nation and Snowling (1998a) also examined the degree to which three groups of children were able to use context to facilitate their comprehension. They found that children with specific comprehension problems were poor at using context to facilitate reading comprehension, in contrast to children with decoding problems or to children with normal reading. In sum, accruing evidence points to impoverished lexical and other semantic representations in children with specific comprehension problems. These problems affect their ability to build a coherent and cohesive understanding of stories and other text, the very bedrock of reading comprehension.

Is This Just a Matthew Effect?

Cain and Oakhill (1998) suggested that the poor inferential skills of children with specific comprehension deficits could reflect another instance of Stanovich's Matthew effect (1986), that the "rich get richer and the poor get poorer." Cain and Oakhill reasoned that poor comprehenders probably read less and certainly with worse comprehension than normal readers do, because of their difficulties integrating information within a coherent text structure. Reduced exposure to reading would further delay the development of inferential text processing skills and elaboration of new vocabulary, since both lexical and inferential skills increase with increased reading exposure. Yet these children have been shown to perform worse in constructing inferences than younger children who comprehend at the same level (Cain & Oakhill, 1998). Since the older poor comprehenders would likely have more exposure to print than their younger matches, as well as more time for words to elaborate within their lexicons, this finding contradicts the Matthew effect and any effect exerted by chronological age. These poor comprehenders struggle with constructing well-formed, coherent representations from what they read, more likely due to reduced or sparse lexical and other semantic representations.

A Clinical Profile

The studies discussed here provide increasing support for underlying semantic-lexical language deficits in children with specific comprehension problems. Accruing evidence supports a clinical profile of impoverished semantic representations, especially at the lexical level, that underlie poor comprehension, in the face of normal decoding skills and normal short-term phonological memory. Educators and clinicians expert in this area will thus be sensitive to those children who show difficulties with story recall, summarization, and discussion whether listening to or reading stories. The informed educator will evaluate their ability to construct the gist of what has been read, handle pronoun reference, and draw inferences. The educator will check for weaknesses in their lexical abilities, particularly with abstract words. Also, if an IQ test has been administered revealing a low verbal IQ in contrast to performance IQ, the educator will watch for the above difficulties.

V. Research on Instruction for Children With Poor Comprehension

Researchers and educators have studied the reading problems of children with SRDs for many years. They have used this time to refine a working definition of SRD to include the converging evidence supporting underlying core deficits in phonological processes. While most intervention research with children with SRDs has focused on improving their deficient phonological and word reading processes, some studies have focused on improving comprehension among these students or on students with general learning disabilities. Vaughn and her colleagues have taught metacognitive, self-questioning strategies in small groups to improve comprehension for students with learning disabilities, with large effect sizes (0.98 to 1.33; Vaughn et al., 2000). These researchers also reviewed others' comprehension training programs.

They synthesized the important components of the most successful programs, including:

> 1....teaching students how to summarize key points in a paragraph in their own words (Jenkins, Heliotus, Stein, & Haynes, 1987),
> 2....asking questions to activate relevant background information (Billingsly & Wildman, 1988),
> 3....teaching self-monitoring (Graves, 1986),
> 4....teaching students to ask questions about the structures of stories (story grammars) and to tell the main theme of a story (Williams, Brown, Silverstein, and deCani, 1994), and
> 5....small group instruction (Vaughn, Hughes, Moody, & Elbaum, in press), with extensive practice at reading levels that ensured successful word recognition were also important in improving comprehension. Follow-up results were not reported in this synthesis.

Williams and colleagues (Williams, 1993; Williams et al., 1994; Wilder & Williams, in press) studied the effects of teaching diverse samples of students with severe learning disabilities to identify themes. Set within a paradigm of explanation and modeling by the teacher, with guided and with independent activities, this training taught students to identify plot components and then to identify themes of stories being read. Not only did the students with learning disabilities experience significant gains, but in this study they also maintained these gains over the long term.

Promising work in reading comprehension instruction "anchored" with multimedia presentations and computer and Internet explorations is being conducted by a large team of researchers at Vanderbilt University. For example, Kinzer and Cammack (2001) extended this work to study its viability to support comprehension for children with learning disabilities. In their study, groups of children analyzed multimedia "anchors" to help segment, organize, discuss, write about, and publish documents about elements in a unit of study. In this study, children with learning disabilities in inclusion classrooms increased their understanding of the material and their ability to participate in class with this kind of support.

Given their more recent identification, intervention studies that have focused specifically on children with comprehension problems without significant word-reading problems have also been more recent. The field has not yet fully converged on how to identify such children, nor on the deficits that underlie the problem. Consequently, relatively few studies have explored the effects of treatment for children with specific comprehension deficits. Most of these studies conducted thus far have been by Yuill, Oakhill, and their colleagues.

In an initial treatment study, Yuill and Oakhill (1988b) compared the effects of three different types of training for children with specific comprehension deficits. They studied the effects of three approaches: one that encouraged the development of inferential skills, one that had children answer comprehension questions about stories they had read, and one that emphasized the decoding of words in text. The inference-focused approach provided activities that emphasized developing lexical inferences, generating questions about the text, and formulating predictions about missing information. After two months of training, children given inference training improved significantly in reading comprehension compared with the other two groups who showed no significant improvement in comprehension. These techniques seem quite compatible with those suggested by Vaughn and colleagues (2000) for children with reading disabilities. Similarly, they are consistent with Swanson's (2001) meta-analysis of training studies using strategy instruction vs. direct instruction with diverse samples of students with learning disabilities. He found that strategy instruction, using techniques such as questioning and elaboration, was effective in improving comprehension among children with problems in comprehension. On the other hand, direct instruction of the skills that support decoding was most effective in improving word recognition for children with deficits in word reading.

Another early study by Yuill and Josceleyne (1988) studied the effects of providing organizational cues and cueing strategies (using pictures, captions, and book titles to enhance comprehension) on the reading comprehension of children with good and poor comprehension. Children with specific comprehension deficits improved their reading comprehension markedly following this treatment. In a different type of

treatment study, Yuill (1996) compared the effect of training using riddles to resolve ambiguities for children with specific comprehension deficits and for skilled readers. She found a significant effect of ambiguity training on reading comprehension for both groups of readers.

In short, focused intervention that uses strategies to address skills related to semantic memory seems to improve reading comprehension performance for children with specific comprehension deficits. Research in this area, though promising, has been limited and does not consider the question of enduring post-treatment gains. Recall also that Perfetti et al. pointed out that the test for reading words in context used by Yuill & Oakhill (1991) did not rule out phonological deficits in one of their samples. Since this test is widely used by these researchers from the United Kingdom, their samples may have included some children with mild phonological deficits. Training studies with more precisely defined samples such as those of Stothard and Hulme (1992, 1996), and Nation et al. (1999) will help identify the most effective techniques for these children. The lexical and semantic deficits indicated in the best of the research reviewed above suggest that work on vocabulary—particularly non-literal meaning, pronominal reference, and inference construction—should be valuable aspects of remediation for these children.

VI. Clinically Recognizing Children With Language-Based Reading Disabilities

This section of the paper deals with how the expert educator uses classroom behaviors and miscue analysis to recognize children who have language-based reading disabilities, either in decoding or in poor comprehension. It also identifies the screening measures the educator might want to use next. We expect that teachers easily notice those students who act out, act extremely discouraged, fail to pay attention, or fail to turn in assignments, and that they would therefore look at these students further. In the following section, we discuss what to look for in the reading and writing of these students and of other more compliant students whose frustrations from learning difficulties may be less apparent. It is our belief that modifications to instructional programs can begin immediately from these observations and screening. Continued observation of problems despite program modifications should lead to a referral for further testing by trained diagnosticians, to refine and modify treatment design. For instance, some children may have attention deficits not just secondary to their reading problems, but as primary ones, which may benefit from behavior management or medication. How much overlap exists between reading disabilities and attention deficits depends on the criteria used for assessment of each problem (DeFries, Filipek, Fulker, Olson, Pennington, et al., 1997; Pennington, 1991) and we will discuss this later in the paper. Yet we also concur with Fuchs and colleagues, that the best instruction will use continuing inductive assessment based on classroom performance, rather than limiting expectations and prescriptions to what is found by the best of diagnostic pretesting (Fuchs, Fuchs, & Hamlett, 1994).

Recognizing Language-Based Learning Disabilities from Classroom Behaviors

Do teachers recognize children at risk for language-based reading disabilities? How effective are classroom teachers at recognizing children at risk for learning problems? Gresham, MacMillan, and Bocian (1997) found that teachers were quite successful at differentiating "at-risk" students from control students from referred samples, with 95% accuracy, which would result in 5% of children being falsely identified as at risk. Within the at-risk group, however, the teachers could not differentiate children with IQ-discrepant learning disabilities from "slow learners" whose low achievement was consistent with their 76 or higher IQ. On the other hand, most researchers (e.g., Shaywitz, Fletcher, Holohan, & Shaywitz, 1992; Siegel, 1992; Stanovich, 1991) suggest that IQ discrepancy is not a crucial distinction, because both groups of children respond similarly to appropriate, intensive reading instruction. A later study by Gresham and colleagues (Bocian, Beebe, MacMillan, & Gresham, 1999) confirmed that teachers identified most children at risk for poor behavior and performance, even if they did not always fit IQ-discrepant definitions. Another study with 612 students found that using a WISC profile did not separate children with learning disabilities from children without them, nor did it robustly predict academic achievement among children with learning disabilities (Watkins, Kush, & Glutting, 1997). All these studies suggest that teachers are actually better at predicting children with learning problems than are diagnoses that rely on performance

discrepancies from IQ.

The fact that many teachers reliably recognize children at risk is hopeful. Screening test data and miscue analyses of reading and spelling can only help them refine their instructional programming for children at risk for different kinds of reading problems, until or unless further testing becomes available. For a long time, Siegel (1992) and Stanovich (1991) have suggested that poor phonological performance should dictate who gets phonological training, rather than IQ discrepancy formulae. Siegel found that children with phonological problems benefited from phonological training, regardless of IQ within an educable range. Siegel suggests looking for children who read nonsense words worse than they read real words, rather than those who read lower than their IQ expectation. Similarly, finding children with good decoding who do not "get" the gist of stories or passages should be the clue for recognizing children at risk for specific comprehension problems.

Recognizing children with phonological deficits from miscue analysis. Sensitive teachers will inspect children's behaviors in oral reading and in classroom dictation to see which children need intensive phonological work. Errors in weekly spelling tests will reveal many children with phonological problems. However, teachers must realize that some children may be able to memorize words for the weekly test, but show bizarre spellings in their daily work. These children may have high motivation and a strong orthographic memory. Strengthening their underlying phonological foundation and phonics skills will provide a more balanced system as well as help them remember spellings beyond their weekly tests.

What kinds of errors might reflect only inexperience or use of contextual strategies, and not necessarily relate to phonological deficits? Many children without processing deficits sometimes guess a word in reading from its first sound and context, either from their own lack of experience, from inattention to earlier instruction, or from applying a strategy they have been taught to use. Many children with average phonological skills may make vowel errors in reading and spelling, either because they have had little or no background in phonics, or they have not paid attention during phonics lessons. Moats (1995b) suggested that older children's vowel spelling errors and problems knowing when to double letters in spelling do not necessarily indicate phonological problems. Percentages of vowel and doubling errors were not higher among children with phonological deficits than children with milder problems. Learning to master vowel spellings and consonant doubling is a part of spelling development typical of all children. On the other hand, Post, Foorman, and Hiscock (1997) did find that younger (second and third grade) children with phonological difficulties did show more problems in the accurate production of vowels and the perception of vowel distinctions than normally reading children. Thus, vowel errors probably deserve a second look. Children with spelling errors only in doubling or suffix rules should benefit from learning about phonics and word structure, but probably do not require intensive work in phoneme awareness.

What characterizes the errors of children with phonological deficits? Recall that such children have trouble analyzing, segmenting, and blending sounds within syllables. Their phonological system appears indistinct or poorly specified (Elbro, Borstrom, & Petersen, 1998; Snowling, 2000). If this is so, their word reading and spelling errors should reflect less distinct phonological representations in the kinds of errors they make and the kinds of sound combinations that give them trouble. Children who cannot easily hear the order of sounds in words are likely to leave sounds out or get them out of order in reading and especially in spelling. Moats (1995b) found that the spelling errors of most children with dyslexia seemed to follow similar developmental patterns as very early spellers (Treiman, 1993). Moats also examined the quality of the spelling errors of adolescents with severe phonological deficits compared to children with less severe deficits. She found that children with severe deficits had much higher percentages of errors of consonant omissions and substitutions, sound order changes, and difficulties with morphological endings of *–ed* and *–s*. The less deficient spellers had higher percentages of errors in doubling consonants, using familiar orthographic patterns, or using silent *e*. Sawyer, Kim, and Wade (2000) found that for most students, spelling and reading abilities tend to be at similar levels. Students with phonological deficits had spelling profiles that tended to lag further and further behind their reading levels. However, Sawyer et al. did find errors similar to Moats (1995a, b) among their most severely deficient spellers, reflecting systematic consonant coding errors seemingly linked to poor phoneme differentiation and/or production. They

recommended that these most severely deficient spellers might benefit from instruction targeting how sounds are articulated in association with phonics.

Let us sum up some things a teacher may notice in reading and writing behaviors that suggest phonologically-based learning difficulties, in students who have and who have not shown behavioral frustrations or lack of attention. In reading, teachers can look for children who comprehend much better when listening to stories than when reading stories at the same level of difficulty. In reading, they are likely to guess words from context, to have poor decoding, to be slow, and to avoid reading. Examining daily written work or giving a classroom dictation with unknown words that contain consonant clusters and more than one syllable may also help teachers identify these children. In free, unstudied spelling, teachers can look for sound substitutions, additions, omissions, and sounds out of order, especially from phonologically difficult consonant blends containing nasals *(m, n, ng)*, liquids *(l, r),* or fricatives *(f, v, th, s, z, sh)* (Moats, 1995). These errors are not diagnostic for first graders, but they become more so as children grow older.

Recognizing the Varied Profiles of Children With Phonological Deficits

Again, real children have a whole variety of strengths and challenges that all affect their performance and their optimal program. What differences in abilities affect how a child with a phonological deficit will appear? Of course, the severity of the deficit and the presence of other language strengths matter. Children with mild deficits may be close to grade level in reading and with some reversals and omissions in their spelling. They may respond very well in small group instruction in class and indeed may serve as good peer tutors for other children.

Children with high vocabulary and syntax but very low phonological processing. Children may have severe phonological deficits but very high vocabulary and other higher-level language skills. These children may be grade level readers with atrocious spelling. They are often missed by special education, because their deficits are not devastating in terms of keeping up with class work. But their spelling and reading both benefit remarkably from improving their phoneme awareness, phonics, and knowledge of word structures with much practice in application into writing. Children who can spell and write fluently generally enjoy writing more (Berninger, Vaughn, Abbot, Abbott, Rogan, et al., 1997). Such children can also help with using small group instruction well in a classroom setting, by helping with individualization in phonics small group work, because they often learn the material rapidly and enjoy acting as tutors or coaches in small group activities.

Children with attention deficit as well as phonological deficits. While all children with reading disabilities will have profiles that vary depending on other deficits and strengths, a commonly sighted overlap is the "comorbidity" of attention deficits with SRDs (DeFries et al., 1997; Pennington, 1991; Pennington et al., 1993). Classroom observation of differences can be very difficult here. Many children with SRDs may quit paying attention and start acting out due to frustration with not being able to read. Indeed, recent research suggests that many children with attention deficit without hyperactivity may have this problem secondarily to reading disabilities (Pennington et al., 1993). On the other hand, many children with attention deficits with hyperactivity may read poorly because they have been unable to focus on and remember what has been taught. Both sets of children will profit from a well-structured approach to reading, but children with adequate phoneme awareness will not need the intensive phonological work. Screening for phonological deficits and examining errors for consonant omissions and reversals will suggest who does and who does not require intensive phonological training. If phonological training is done well and intensively, and the child does not respond well to this treatment and does not retain what s/he is taught, this may suggest attention problems. Such a child should be referred for further diagnosis, with an eye towards possible use of medications or other modifications.

Children with deficits in phonological memory. Most, though not all, children with deficits in phoneme awareness have poor phonological recoding in working memory. These children have problems with following more than two directions at a time and with math facts, and many have problems with ordered concepts such as the alphabet, months, seasons, and days of the year. A recent training study by Van Kleek,

Gillam, and McFadden (1998) demonstrated that training in phonemic awareness results in improved phonological memory, unlike an alternative training program in rhyming. Many teachers find that work with concrete manipulatives and mnemonic devices aids memory, though we cannot cite specific research supporting this practice. Providing children with appropriate "assistive technology" can scaffold for poor memory, whether that technology is as simple as number lines and math facts tables or as advanced as using calculators and electronic reminder systems.

Children with poor orthographic memory. Although all children with severe reading disabilities require extensive practice for success, those with poor orthographic memories require phenomenal amounts of practice (Van Daal & Reitsma, 1993). Computer technology, repeated readings, and using visualization tricks for spelling may all be helpful additions to programs for such children. Children with stronger orthographic memories and high vocabularies can look like miracles with the speed of their progress, once the phonological deficits are remedied and they are given lots of opportunity for practice to get their new skills applied and automatic.

"*Treatment resisters*." Children with weak rapid naming, phoneme awareness, memory, and decoding in screening and testing appear to be those who turn out to be most "resistant to treatment" (Felton, 2001; Scanlon & Vellutino, 1997; Torgesen et al., 1997; Wolf & Katzir-Cohen, 2001). Most programs have helped these children improve their decoding, but they have not helped them achieve grade-level reading rates or comprehension. These children are our biggest continuing challenge. In class, they may have an especially hard time coming up with words in oral language. Current research suggests that speeded practice, vocabulary elaboration, repeated reading, and computer-assisted speeded practice may improve reading speed and comprehension (Wolf, 1999; Wolf, Bowers, & Biddle, 2000). Further research is certainly needed to clarify how best to help these children. For now, these children are prime candidates for programs modified to include reduced printed work and assistive technology for reading and writing and note-taking, such as Kurzweil Readers, TextHelp, or Dragon Dictate. They should also be allowed alternative ways to demonstrate competence besides written tests.

Recognizing Children With Specifically Poor Comprehension

How will the teacher recognize the student with specific comprehension deficits from their classroom behaviors? These children will often have problems following directions. Their oral reading performance will be appropriate for their age and grade level, but they will struggle retelling the stories they have read. They can often remember details in stories, but have a hard time constructing gist, so they do very poorly at summarizing or drawing inferences (Oakhill & Yuill, 1991). Children with this difficulty are often identified at later grade levels than children with phonological deficits. This happens because many of the stories read at first and early second grade have very simple plots and characters and do not provide much opportunity for drawing inferences from implicit information. These children may also demonstrate other problems handling nonliteral meaning. Often, they may not understand jokes or riddles (Yuill, 1996), laughing later than the other children in the class, not at all, or at surprising times. Similarly, they may not understand multiple meanings of words. In fact, they may seem quite concrete in their thinking relative to other children, especially by the third or fourth grade. They will also have trouble with arithmetic word problems, both in tracking the succession of facts and in constructing the problem space.

Screening for Reading Disabilities

Many school-based literacy programs screen kindergartners and first graders for possible risk of failure in reading. The reasoning behind this practice is that there is mounting evidence that by the end of third grade most students who have been identified as poor readers fail to catch up with their peers with normal reading skills (Lyon, 1999). In fact, some educators contend that we must identify children at risk for failure in reading and begin intervention no later than kindergarten (Kame'enui et al., 2000). Because this sensitive window of time in which educators may best be able to make a difference in these students' lives seems rather short, the concern is how to best identify at-risk students this early in their school experience.

Screening programs are designed to be the first step in the process of identifying children at risk for reading

failure. This first step is a coarse-grained sifting of all students to pull out those with some degree of risk, who are likely to fall in the lower two standard deviations of the normal distribution. Not all of these children will demonstrate SRD or be at risk for specific comprehension problems. Rather, the screening process will also identify students who are at risk because of inadequate exposure to print and other aspects of literacy for a wide variety of reasons such as cultural differences, the effects of language impairment, and histories of hospitalization.

The purpose of screening is to pull out students thought to be at risk, to provide them with extra intensive instruction, and to conduct additional assessment for more specific identification if they lag behind peers in this instruction (Badian, 2000). Screening is neither a comprehensive nor complete process and does not, in itself, constitute the diagnostic process. Furthermore, screening measures will also misidentify some children as being "at risk" for reading failure who performed poorly for other reasons, e.g., coming down with a cold, having insufficient sleep the night before, and so on. Such identifications are considered "false positives." On the other hand, the screening may fail to identify some children who are at risk, but who scored better than expected because the child may have overheard another student's answers or because the screening measure was not sufficiently discriminating or was administered incorrectly. These "passes" are called "false negatives." A good screening measure minimizes the occurrence of both. In fact, screening measures should provide information on their "hit rates," that is, the percentage of false negatives and false positives obtained during their standardization testing. The expert teacher looks for a screener that reports this type of information and that minimizes both types of risk. Logic helps in this process: choose the screener that minimizes the false negatives, which miss children who need treatment. The expert teacher knows that false positives can always be weeded out with diagnostic assessment or formative evaluation at a later date.

Screening for potential problems of any kind typically involves testing students for proficiency in skills prerequisite to success in that area. For example, when speech and language therapists screen kindergartners for speech and language disorders, they sample each child's ability to understand and produce age-appropriate vocabulary and grammar and to discriminate and produce age-appropriate speech sounds. Similarly, screening for risk of reading failure involves sampling each child's ability to perform at some level on the skills thought to be fundamental in learning to read.

In the last decade, journals have reported large-scale prospective longitudinal studies of children (Scarborough, 1991) and well-developed screening and diagnostic studies with longitudinal follow-up (Badian, 2000; Wagner et al., 1994). Converging findings have identified clearly the foundation-level skills that are key to success in reading and that are compromised in children who struggle with learning to read. The consensus seems to be that phoneme awareness, alphabet knowledge, and automaticity with the code are crucial to learning to read. For this reason, most screening programs sample at least the first two of these skills. Many researchers also advocate the inclusion of a test of rapid naming (e.g., Wagner, Torgesen, & Rashotte, 1999), based on the findings of Scarborough (1991) and Wolf (1999).

A recent kindergarten screening study (Catts, Fey, Zhang, & Tomblin, 2001) has taken the steps necessary to assemble the type of screening for risk of reading failure that meets the standards we have just discussed. Catts and colleagues used a large prospective sample (more than 1,600 children) and sampled many foundation-level skills. Next, they identified the variables that best predicted success in reading at the end of the second grade and used them to form a composite score. They reported levels of hit rates with different weightings of the key variables in this composite. Most helpfully, they provided a weighting by hit rate report, which allows expert teachers to determine how to screen with some sense of security in the outcome. The key variables identified in this screening include measures of serial rapid naming, phonemic awareness, letter identification, verbal memory (sentence imitation), and maternal education level. This cluster of testing and the formula provided to construct a composite prediction score appears to be the most comprehensive, simple, and reliable screening available to date.

The majority of the screening studies from the last 20 years indicate that at the kindergarten level, letter identification from screenings is consistently one of the most potent predictors of later success in learning

to read. Consistent with this observation, Catts et al. found in their (2000) screening study that much, but not all, of the variance in reading scores at the end of the second grade was accounted for by children's early letter identification scores.

In addition, considerable research supports that phonemic awareness is crucial to the child's ability to crack the code and read text. As we indicated earlier, most of the prospective studies using comprehensive assessments found that phonemic awareness is the other strongest predictor of later reading. There are several measures of phonemic awareness that are easy, quick, and reliable to administer. These include Rosner's (1975, 1993) phonemic elision task, Catts' (1993) version of the same task, and Wagner et al.'s (1999) tests of phonemic awareness.

An important caveat in this discussion is that screenings are unlikely to find all students at risk for failure. The expert teacher should thus be alert to identifying additional children during the ongoing formative evaluation that is part of good teaching. Looking for specific comprehension problems has not been considered in most screenings, perhaps because these problems are usually recognized in more advanced reading, in third grade or above. An astute teacher might keep an eye open for younger children with relatively weak vocabulary or other semantic difficulties. Research can soon consider how and when best to screen children for lexical and semantic difficulties.

In summary, screening is only a first step in the identification process, and it comes with risks related to hit rates. Recent studies like the one by Catts and his colleagues provide a new level of confidence in screening for reading disabilities with an empirically based decision-making matrix that includes hit rates and sensitivity indices. Despite this new information, screening is still not a perfect science. To be useful, it should be followed by teachers' ongoing formative evaluation with supplemental intensive instruction and by diagnostic assessment if the evaluation shows a child's progress still lagging behind peers. We will briefly discuss how expert educators use the information from diagnostic assessments, before we give fuller coverage to ongoing formative evaluation in the classroom and resource room.

Diagnostic Assessment of Reading Disabilities

Like screening, diagnostic assessment is not a perfect science. Unlike screening, assessment allows more time with students and larger samples of all their reading-related skills and behavior. This additional detailed information offers further precision and security in identifying children with reading disabilities, characterizing their problems, and designing appropriate programs. These issues are covered at length in other white papers presented at the Learning Disabilities Summit. Because diagnostic assessment requires time and resources, we concur with many of the authors in this book that referral for special education diagnosis follow failure to respond to supplemental treatment variation based on observation and screening. This kind of decision can be made only with ongoing formative evaluation.

We would like to discuss here factors that influence how expert teachers interpret and use findings from a student's diagnostic assessment, in light of the profiles identified for children with SRD vs. specific comprehension problems. The crux of this concern centers on distinctions made among different profiles of children with specific reading disabilities and the remarkably different clinical profile of children with comprehension problems. These profiles also vary against a background of general intelligence and basic communicative language skills.

In many states, children with reading disabilities are currently identified with a discrepancy formula, where the student's performance on one or more measures of academic achievement is significantly discrepant from performance on a test of general cognition. Earlier in the paper, we discussed how the validity of the basic assumption that underlies using IQ to establish a significant discrepancy has been called into question and debated over the last decade (Gresham et al., 1997; Shaywitz et al., 1992; Siegel, 1992; Stanovich, 1991; Watkins et al., 1997). A consensus is growing recommending the abandonment of an IQ discrepancy from definitions of learning disabilities.

The cognitive criteria look somewhat different for children with specific comprehension problems. Earlier,

we noted that these children, in fact, often have verbal IQs that are significantly lower than their performance IQs. Thus, children with poor comprehension may have even more problems meeting a discrepancy criterion than do children with phonological deficits. Nation et al. (1999) contend that these children may, in fact, have specific language impairment (SLI) and not a reading disability per se. If so, these children certainly have a specific subtype of SLI not typically seen in school-age children. On the other hand, the lexical and other semantic memory and integration deficits reported for these children are certainly deficits in language processing, and the deficits clearly compromise their reading comprehension. Thus, while both types of disabilities are language-based, a diagnostic distinction between SRD and a subtype of SLI is justifiable in terms of our earliest discussion, in that it identifies children who have different instructional needs. It is also clear that evaluating poor listening comprehension and related verbal abilities can yield perfectly adequate markers for specifically poor comprehension without requiring IQ testing.

VII. Implementing Clinical Judgments in Evaluation and Modification of Instruction

Improving Teachers' Expertise

The expert teacher attends to each child's needs, based on the strengths and weaknesses observed from screening, ongoing classroom observation, and diagnostic testing. For teachers to make the kinds of judgments and modifications we have been advocating, they clearly need a strong knowledge base in language and in all aspects of reading. Brady and Moats (1997) and many others support continuing education to help teachers learn as much as they can about reading and language. Indeed, McCutchen (1997) found that the more teachers knew about the structure of language, the better progress their students made in reading. By definition, special education should be specially individualized for each child's profile and instructional level (Zigmond, 1997). Teachers who can individualize and use guided directed questioning can help children become actively engaged in all aspects of reading, so they in effect learn to become their own teachers (Swanson, 1999). Vaughn and colleagues (2000) caution that "teachers need to plan and reflect on their instruction to ensure that it is explicit and intensive, so that students with LD are not robbed of valuable learning time."

However, many special education teachers have not been observed to implement "best practice" systematic phonological instruction for children with reading disabilities, even though the same teachers spoke of its importance more than they had three years previously (Moody, Vaughn, Hughes, & Fisher, 2000). More shockingly, these researchers found that though the resource teachers they observed taught in small groups, they did not individualize instruction even by selecting appropriately leveled reading material for the children in these groups. Clearly, many teachers also need to learn more about how to individualize instruction.

Schools of education can begin to offer and require more courses in language, reading, and individualizing instruction for all elementary teachers and all special education teachers. School districts can provide inservice training for teachers to help support and enrich their knowledge in this area. CASELINK is an exciting attempt by the Office of Special Education Projects to provide further training via the Internet to help teachers discuss particular case management, using problem-based learning (Gerber, English, & Singer, 1999). We believe similar web-based instruction can improve teacher education and support in areas of improving expert knowledge about phonology, comprehension, reading, and composition to help more teachers become experts.

Individualizing Instruction With Ongoing Assessment

Meta-analyses have highlighted the most important components of remedial programs for children with learning difficulties. Effective programs sequence materials at appropriate individualized levels to ensure success, use directed questioning that promotes thinking aloud about strategies, include extensive practice, and instruct children in groups of six or less at a time (Swanson, 1999; Vaughn et al., 2000). Vaughn

reports interesting studies that suggest that a one-to-three teacher-student ratio with highly qualified teachers can be as effective as one-on-one (Vaughn et al., in press), and that paired reading and peer-tutoring small groups are quite effective ways of managing small groups (Elbaum, Vaughn, Hughes, Moody & Schumm, 2000). Interestingly, students with learning difficulties especially benefited by taking the role of tutor in peer-tutoring situations, either with younger or with same-age tutees. These ideas, along with the possibilities of using easily individualizable computer programs and learning kits, suggest ways that may help teachers provide the kind of sequenced instruction at levels guaranteed for success that these articles recommend.

The clear educational goal for children with learning disabilities, as outlined by Swanson (1999) and Vaughn et al. (2000), is to design instruction for small groups of children, working at instructional levels, with lots of appropriate practice, and with directed questioning that helps them discover and use appropriate learning strategies. This is no easy feat in resource rooms of three to nine children, nor certainly in classrooms of up to 30 diverse learners. Different researchers are studying how to help teachers use classroom-based assessment to modify and to adapt instruction continuously to the needs of their students.

In 1984, Fuchs and Fuchs found that teachers are not particularly adept at assessing student performance from informal assessments of children's classroom work, usually tending to overrate their abilities. Also, the continual adjustment of assessment to accomplish the goal of providing appropriately leveled instruction can be overwhelming in time demands: up to 148 minutes a day! These kinds of problems led the Fuchs and their colleagues to devise computer assessment programs that not only helped teachers assess progress, but offered "expert" advice about modifying programs for students not making progress (Fuchs, Fuchs, & Hamlett, 1994). Expert systems considered information about students' work habits and teachers' curricular priorities, availability of additional teacher time, use of aides and peers with stronger skills, and other implementation concerns of the teacher. The systems also analyzed students' performance. In reading, students were assessed on the quality of decoding, fluency, and comprehension performance. The system identified up to two instructional strategies for each area. About 33 teachers each participated in fields of math, spelling, and reading. One third of the teachers used no software, one third used the curriculum-based measurement without the expert advice, and one third used computer-based measurement plus computerized expert advice. Students in the computer conditions interacted twice a week with the computer for learning assessment.

Results of the studies suggested that computerized assessment was helpful to teachers and students. At least in math, children whose teachers used the software made more progress than children in control groups did, and students whose teachers used the expert as well as the measurement software achieved the most. In reading, the computerized measures led to teachers adjusting their teaching more and led to greater gains than the control condition. However, the expert advice led to an advantage only on one reading recall outcome measure. It seems possible to us that the "expert" assessment and programming advice can be improved to achieve a similar result in reading with deeper knowledge about the structures of English phonology, orthography, morphology, semantics and grammar; it is certainly a worthy goal for further research.

While this use of technology seems extremely promising, it is also enlightening to read of Kame'enui and colleagues' (2000) work in helping teachers apply continuous assessment and adaptive education at the level of a school system without the benefit of technology. The schools in a system in western Oregon decided how to teach phoneme awareness, decoding, and automaticity to children at risk for failure, within the limits of each "host school's" needs. Kame'enui agrees that we need to consider the needs of the individual child, which is certainly the goal of the ideal teacher. Yet he reminds us that if the aim is long-lasting improvements, we must set programming changes within a schoolwide improvement model.

Kame'enui et al.'s (2000) program had schools agree on how to analyze individual performance and plan instruction groups, design interventions, and meet biweekly to monitor progress and adjust instruction. Teachers monitored beginning readers (kindergarten to third grade) in fall, winter, and spring and assessed at-risk children monthly. They measured kindergartners on onset recognition, phonemic segmentation

fluency, and nonsense word fluency. All children received direct instruction in reading for at least 30 to 45 minutes, with at-risk children receiving a double dose. Intensive intervention groups had no more than five students in each. While this study had no control group, we include it to see how Kame'enui has taken on the idea of scaling up the ideas from single-setting research to affect an entire school system. We have also been quite excited to learn in this Initiative of other scaled-up systems that include (1) early screening for children at risk, (2) "best practices" of intensive direct instruction in phonology and reading in kindergarten and first grade, with (3) extra time in intensive small group work for those children at risk (Grimes, 2001; Marston, 2001). Special education referrals in these systems occur only after failure to respond to this extra intensive instruction, and the systems are reporting great success in reading and reductions in referrals to special education.

We have mentioned how computer technology can help teachers with formative assessments, but technology can also play an important role in individualizing instruction. In the last decade, different studies have demonstrated that well-designed computer programs can help improve different skills including phoneme awareness, decoding, spelling, supported text reading, comprehension, and automaticity, by assessing ongoing performance and reviewing or advancing students based on pre-programmed criteria for success (Kinzer & Cammack, 2001; Segers & Verhoeven, 2001; Verhoeven & Irausquin, 2001; Wise, Ring, et al., 2000; Wolf, Miller, et al., 2000). This literature has most recently been reviewed and meta-analyzed by Blok and colleagues (in press) in the Netherlands, where almost half the studies that passed the criteria for his meta-analysis were conducted. Computers are ideal for the repeated and speeded practice that many children with learning difficulties need. Some programs already marketed in this country successfully individualize instruction in phonological skills, speed skills to automatic levels, and some offer speech-support for reading in context. The most powerful products available at this time, however, are those in assistive technology that can read text aloud to help children with slow reading skills, that can help with writing or spelling with ever-improving ability to turn speech to text, and that can help with study skills.

It seems clear that educational technology of the future will build on the researched and the marketed successes of this last decade. Advances in computer animation, speech recognition, and speech recognition within specific domains will empower future software. This kind of technology is now being developed and evaluated at the Center for Spoken Language Research (CSLR) at the University of Colorado, directed by Cole. The authors of this paper are members of the development team, along with other researchers from five sites and with teachers and administrators from Colorado, who help design and evaluate the programs.

The CSLR project is designing engaging tutorial activities that improve foundation-level skills and automaticity in ways that integrate fully with interesting, interactive books. The books practice, assess, and prescribe skills for instruction or review with the tutorials. The tutorials assess and practice foundation-level skills to mastery and then to automaticity and assign choices of books where students apply the patterns they have mastered. Tutorials and books have animated coaches who give intelligent hints and ask directed questions to encourage strategic thinking about word reading, vocabulary, and comprehension. The programs report children's errors and progress to teachers and provide copies of some books and of successfully read or spelled word lists to take home to read to a parent (see the CSLR web site at the University of Colorado). Programs like these and others (e.g., Kinzer & Cammack, 2001; Wolf, Miller, et al., 2000) should help teachers individualize and work in small groups and help researchers study which methods work best, for which children, and for how long.

Cole estimates that reliable speech recognition for children's reading of single words may materialize within five years, with recognition of specific errors in reading in context a bit further off. Whenever scientists accomplish this, computerized instruction will be able to reach new heights of helping children detect errors and actively engage in focused problem solving. All this will help extend the resources of the overstretched expert teachers we discuss in this paper. It will expand their knowledge of students' performance, allowing them to modify and tailor their students' programs with confidence, based on information about daily performance and with newly freed time for individualized and small-group work.

VIII. Summary and Future Challenges

Current knowledge about the needs of children with language-based learning disabilities is strong enough to support teachers in recognizing children with different needs in reading and in selecting and adapting programs for them that have been shown to be helpful. Clearly, teachers of reading, whether in the general classroom, in Title I programs, or in special education, can all improve their effectiveness by continuing to expand and deepen their knowledge of reading, language, and how to individualize instruction. It also seems obvious that well-trained aides and technical support can already extend the resources of teachers.

Future research should improve our understanding of specific comprehension deficits and should refine our understanding of the best practices for particular children with varied reading profiles. That research will be more effective and applicable if teachers and researchers collaborate to design and evaluate the effectiveness of programs for different children in different settings. Studies cited earlier by the Fuchs' (1994) and by Kame'enui and colleagues (2000) seem to point the way for effective collaboration that will expand and refine our ability to deliver the optimal program for each student.

In the meantime, however, enough knowledge and resources exist to move more of us to expert levels. The studies summarized in this paper suggest or are consistent with the following guidelines for those who teach reading to children:

1....Screen and identify children early, to modify children's programs as early as possible for the best chances of success.
2....Give extra intensive small group instruction with "best practices" to all at-risk children as early as possible, so only those who do not succeed with this instruction need to receive special education in later years.
3....From treatments that are consistent with research, choose those that you can teach with understanding and excitement.
4....Evaluate and modify programs as you go, based on children's performance.
5....Ground reading instruction in your deep and expanding knowledge of language.
6....Teach, read, and write with children in a rich environment that encourages the exploration of language, expansion of vocabulary, and active problem solving and construction of meaning, in small groups where children themselves have learned to provide positive focused hinting and questioning support for each other.
7....Practice and practice newly instructed skills and strategies accurately in and out of context, aiming first for mastery and then for application, fluency, and automaticity.
8....Encourage children to transfer their knowledge and skills in activities, puzzles, and reading for enjoyment beyond the school environment.
9....Encourage a culture of reading, thinking, and learning in and beyond your classroom.

Each incipient expert teacher has the power to impact not only the children s/he teaches, but also colleagues, who will recognize the impact of instruction that is individualized to meet student needs and modified with repeated assessment as students progress. Impassioned and informed teaching, coupled with imaginative and well-designed research, will help us meet the challenge of helping every child to become an independent and eager reader.

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