ABSTRACT: The purpose of this article is to provide speech-language pathologists (SLPs) with a framework for assessing children with known or suspected reading disabilities. Although our knowledge of reading disabilities has grown exponentially over the past 10 years, direct service delivery to this population through the discipline of speech-language pathology remains limited in scope, particularly in the area of assessment. In this article, Carver’s (1997, 2000) reading model was used as the foundation for addressing core skills associated with reading achievement and that are necessary for inclusion in a comprehensive reading battery. The framework presented in this article highlights the connection between constructs that underlie reading achievement, skills that represent these concepts, and procedures that can be used to measure strengths and weaknesses across these skills. It provides a “template” for assisting SLPs in planning comprehensive assessment protocols for testing children with reading disabilities.

KEY WORDS: differential diagnoses, literacy evaluation, reading assessment, reading processes.
FRAMEWORK FOR EXAMINING READING DISABILITIES

Carver’s theoretical framework for explaining causes of high and low reading achievement (1997, 2000), called rauding theory, was chosen as a framework for addressing the assessment of reading skills because it (a) identifies constructs for understanding the component skills of reading; (b) presents the constructs in a hierarchical relationship to reading achievement, showing those that are more distal and more proximal to reading achievement; and (c) provides a cohesive and heuristic framework for assessing the strengths and weaknesses in reading skills that contribute to overall reading proficiency.

Rauding is a term used by Carver (1977) to describe the process of comprehending language during reading or listening. It is the amalgamation of two words—reading as defined by comprehension of language through print and auding as defined by comprehension of language through listening. The term rauding was developed by Carver (1977) to focus on “the similarity between reading comprehension and listening comprehension when individuals are comprehending sentences in textual materials, without regard for whether the words in the sentences are (a) being read as they are looked at in printed text, or (b) being auded as they are read aloud by someone else” (Carver, 2000, p. 3).

The rauding construct is particularly useful because it identifies the critical contribution of listening comprehension in achieving adequate reading skills and because it shows the strength of relationships between different levels of constructs that underlie reading and reading achievement as defined by timed reading comprehension (Carver, 2000).

The framework that we adapted from Carver’s model is shown in Figure 1. This adaptation retains the constructs and levels from the original model but is modified to show skills that represent these constructs and that should be included in a reading assessment battery. These skill areas are the cognitive-linguistic skills that research has shown to be important for reading (Fletcher et al., 2002; Vellutino et al., 2004). As shown in the figure, the constructs are arranged hierarchically into levels according to their proximity to rauding efficiency (combination of reading and listening skills), a term that Carver uses to describe reading achievement. Level 1 of the model represents environmental/experiential and biological factors that impact learning. Level 2 represents verbal (verbal knowledge), written (pronunciation knowledge), and rapid naming constructs. Level 3 represents reading accuracy (reading vocabulary) and reading rate (speed of reading). Level 4 represents the integration of all previous levels to yield “rauding efficiency/reading achievement” (reading comprehension).

Correlations between levels are strongest for adjacent levels of the model where connections are indicated by arrows. For example, Carver and David (2001) found that at Level 3, verbal knowledge is strongly correlated with reading accuracy ($r = .85$) and only moderately correlated with reading achievement ($r = .49$). Hence, Level 3 constructs correlated most strongly with Level 2 constructs, and Level 2 constructs correlated most strongly with Level 1, reading achievement. This hierarchy of correlations suggests that the constructs represented at each level of the model should be assessed to determine where deficiencies in skills are interfering with reading achievement.

A breakdown in skill efficiency can occur at various construct levels (i.e., Levels 4-2) and skill levels (e.g., word decoding, oral vocabulary) within the framework, resulting in depressed reading achievement. Breakdowns at the earliest levels can be thought of as a waterfall having a cascading effect on the later levels.

At Level 4, environmental and/or biological factors set the stage as underlying causal factors (Vellutino & Fletcher, 2005) that impact a child’s potential for becoming a skilled reader. Hence, lack of exposure to and instruction in literacy activities and/or a biological predisposition for a reading disability such as dyslexia places the child at a serious disadvantage for acquiring reading achievement. At Level 3, a breakdown can occur in verbal knowledge, pronunciation knowledge, naming speed ability, or a combination of these skill areas. As noted in Figure 1, verbal knowledge, pronunciation knowledge, and cognitive speed ability show their own unique relationships to accuracy and rate. Similarly, at Level 2, a breakdown can occur in accuracy of reading, rate of reading, or a combination of accuracy and rate. Difficulties with reading rate and reading accuracy directly affect reading comprehension. We used ovals to indicate the skills for assessment that best represent constructs from Carver’s model. Using this model as a framework to develop an assessment battery for reading helps to ensure that the skills subserving proficient...
reading are identified and assessed to yield a profile of reading skill strengths and weaknesses.

**WORKING THROUGH THE EVALUATION PROCESS—LEVEL BY LEVEL**

The evaluation process begins at Level 4, where teaching/learning/aptitude constructs address the child’s general potential for learning by examining developmental history, family history, and sociocultural factors. At Level 3, subskill areas that represent the constructs of verbal knowledge, pronunciation knowledge, and naming speed are evaluated to assess core reading skills necessary for the Level 2 constructs of accuracy and rate. The types of tasks needed to assess constructs at Levels 1, 2, and 3 of the model are shown in Table 1. For example, verbal knowledge constructs are tested in the skill areas of vocabulary and listening comprehension. The samples of tests shown in the Appendix are not an exhaustive list of appropriate tests for each skill area but they represent measurement instruments that have been used successfully in applied and basic research for identifying reading disabilities in children and adults. Other tests and/or procedures may be used to assess these same skill areas. Below is a brief discussion of the clinical significance of each level for SLPs involved in the early identification and assessment of reading disabilities.

**Level 4: Teaching, Learning, Aptitude**

In recent papers, Vellutino et al. (2004) and Vellutino and Fletcher (2005) underscored the importance of differentiating between children who have reading difficulties primarily due to lack of experiences and instruction in language and literacy and children with specific reading disability due to biologically based difficulties in processing linguistic information. The majority of children who fail to read experience a paucity of early environmental opportunities and/or lack adequate instruction (Fletcher et al., 2002; Vellutino et al., 2004). Hence, the evaluation of Level 4 constructs entails a historical and current day report from either the parent or teacher, and preferably both, to determine variables that may have impacted or continue to impact the child’s preliteracy and literacy experiences. This can often be accomplished in an interview format or through a questionnaire that is completed by or read to the caregiver. Several items are listed in Table 1 to guide clinicians through the process of interviewing and data gathering.
reasons for why this might be so. One reason could be the 

Several research studies have attempted to pinpoint the 

English as compared to European American, middle class, 

nonwhite children, and among nonnative speakers of 

from lower socioeconomic status and poor homes, among 

extends beyond poverty.

illustrates how some children can begin their reading 

spoken and words in print. This study, among others, 

were less familiar with SE might have difficulty discover-

achievement. The authors hypothesized that children who 

American Vernacular English) showed better reading 

students from kindergarten to Grade 2. That is, children 

greater familiarity with School English (SE) highly corre-

society, many children begin school speaking a language 

primary language or dialect the child is exposed to at 

weaknesses

• Information on parent’s and siblings learning strengths and 

• Information on child’s general intelligence

• Information on child’s school placement

• Information on child’s progress in all subject areas

• Information on child’s behavioral characteristics

Level 3: Skill Domains & General Procedures that Affect Reading Achievement

Construct: Verbal knowledge
Skills: vocabulary and listening comprehension

Construct: Pronunciation knowledge
Skills: word decoding, word recognition, word spelling

Construct: Cognitive speed
Skills: naming speed

Level 2: Reading Skills Used to Measure Reading Fluency

Construct: Reading accuracy
Skills: reading vocabulary (understanding meanings of 

words in print)

Construct: Reading rate
Skills: speed of reading (reading words in connected text)

Level 1: Reading achievement

Construct: Reading comprehension
Skills: reading passages and answering questions, reading passages 

and filling in missing information

An important factor to consider at this level is the 

primary language or dialect the child is exposed to at 

home. As is often prevalent in our linguistically diverse 

society, many children begin school speaking a language 

other than English or speaking a nonstandardized dialect. 

Charity, Scarborough, and Griffin (2004) reported that 

greater familiarity with School English (SE) highly corre-

lated with better reading achievement in African American 

students from kindergarten to Grade 2. That is, children 

who were better acquainted with SE (as opposed to African 

American Vernacular English) showed better reading 

achievement. The authors hypothesized that children who 

were less familiar with SE might have difficulty discover-

ing and learning certain correspondences between words 

spoken and words in print. This study, among others, 

illustrates how some children can begin their reading 

instruction due to an environmental disadvantage that 

extends beyond poverty.

The incidence of failure to read is higher in children 

from lower socioeconomic status and poor homes, among 

nonwhite children, and among nonnative speakers of 

English as compared to European American, middle class, 

and suburban children (Lyon, 1998; Snow et al., 1998). 

Several research studies have attempted to pinpoint the 

reasons for why this might be so. One reason could be the 

home literacy environment. Findings indicate that the home 

literacy environment may vary across socioeconomic groups 

(Rashid, Morris, & Sevcik, 2005). Home literacy environ-

ment refers to a wide range of literacy-related activities in 

the home and includes exposure and availability of print 

material, shared reading, frequency of library visits, and 

number of books owned by the parents and child. All of 

these factors contribute to how prepared or unprepared a 

child will be when he or she enters school. Experiential 

and environmental factors responsible for or contributing to 

the child’s deficits should be taken into account because 

these factors can contribute significantly to the acquisition 

of reading.

It has been shown that language learning disabilities 

often run in families (Pennington & Olson, 2005). 

Scarborough and her colleagues (Scarborough, 1989, 1990, 

1991; Scarborough, Dobrich, & Hager, 1991) showed that 

children of parents with reading problems were at greater 

risk for reading difficulties than were their age-matched 

peers whose parents did not have reading disabilities. 

Although estimates of risk vary, the average numbers 

across studies indicate that approximately 40% of the 

offsprings of affected parents have reading difficulties (Flax 
et al., 2003). Children with oral language deficits also have 
documented familial histories (Tomblin, 1989). Furthermore, 
it is well established that children with oral language 
deficits are at risk for reading disorders as well (Catts, Fey, 
Zhang, & Tomblin, 1999; Snowling, Bishop, & Stothard, 
2000; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 
1998). Hence, both developmental and family histories of 
language learning disabilities are causal factors in under-

standing the nature of reading disabilities.

Level 3: Verbal Knowledge, Pronunciation Knowledge, Cognitive Speed Level

Verbal knowledge. To become successful readers, children 
must be able to decode or read printed words and under-

stand what they are reading. Adequate word recognition is 
greatly dependent on adequate vocabulary knowledge. Hart 
and Risley (1995, 2003) showed that high-performing first 
graders knew twice as many words as their low-performing 
peers. Children from low income and disadvantaged homes 
are exposed to fewer words and simpler language than are 
children from middle class and upper income homes. This 
difference, referred to as the “30 million word gap” (Hart 
& Risley, 2003), only widens, and by high school, a high-

performing 12es grader knows four times as many words as 
his or her low-performing peers. A small disadvantage in 
the earlier years turns out to have devastating consequences 
on later reading abilities. In a recent article, Sumutka, 
Brady, and Scarborough (2005) reported that vocabulary 
knowledge facilitates the accuracy and speed of word 
decoding for familiar words that are seen in print for the 
first time.

Verbal skills become crucial when children start to read 
to understand text. Research on vocabulary acquisition has 
shown that adequate reading comprehension is dependent 
on a child knowing between 90% and 95% of the words in
text (Nagy & Scott, 2000). Vocabulary skills not only influence the ability to read accurately and with greater speed, but are strongly correlated with reading comprehension (Chall, Jacobs & Baldwin, 1990; Stahl, 2003); hence, the size of a child’s vocabulary measured in kindergarten is a good predictor of reading comprehension in middle elementary school (Scarborough, 1998). Chall et al. (1990) observed that third graders with limited vocabulary showed a decline in their comprehension scores in their later elementary years. Vocabulary knowledge not only increases comprehension, but also facilitates growth in future learning (Hirsch, 2003).

Language comprehension is a complex skill and generally refers to both reading and listening comprehension. One’s knowledge of vocabulary, semantics, syntax, and pragmatics all contribute to creating a cohesive mental representation and determining one’s level of understanding (Kintsch, 1998; Kintsch & Rawson, 2005; Seidenberg & McClelland, 1989). Children begin the process of comprehension through listening to language and later use the same knowledge to comprehend written text. Reading is a language-based skill and closely parallels spoken language skills (Catts & Kahmi, 1999; Perfetti, Landi, & Oakhill, 2005; Share & Leikin, 2004; Silliman, Butler, & Wallach, 2003). Strong correlations have been shown to exist between listening comprehension and reading comprehension (Kintsch & Kozminsky, 1977; Palmer, McCleod, Hunt, & Davidson, 1985; Trabasso, 1981). de Jong and van der Leij (2002) showed that linguistic comprehension influences the development of reading comprehension from first to third grade. They suggest that as reading acquisition proceeds, reciprocal effects between spoken language (oral vocabulary and listening comprehension) and reading comprehension emerge and become more strongly associated. This hypothesis is consistent with the frequently cited developmental progression of reading skills whereby children learn to read in grades one and two and read to learn by the third or fourth grade (e.g., Whitehurst & Fischel, 2000).

In the early stages of reading, word recognition contributes to reading comprehension in a much greater way, whereas in the later stages, oral comprehension is a greater determinant of reading comprehension (Catts, Hogan, & Fey, 2003; Foorman, Francis, Shaywitz, Shaywitz, & Fletcher, 1997; Hoover & Gough, 1990). As reading progresses, children are required to become more fluent with word recognition. They encounter larger and more difficult vocabulary and more diverse types of text structures (i.e., expository), making the contribution of syntactic, semantic, and pragmatic language skills to reading proficiency even more critical (Whitehurst & Fischel, 2000). Ample empirical data exist to support that word identification abilities are better predictors of reading comprehension in beginning and less skilled readers, whereas oral language skills are better predictors of reading comprehension in more skilled readers (Catts et al., 2003; Foorman et al., 1997; Hoover & Gough, 1990). A comprehensive evaluation at this level of the model should include subskills such as vocabulary and listening/oral comprehension given their important contribution to reading achievement.

### Pronunciation knowledge

Decoding refers to the ability of a person to map graphemes onto phonemes and is a product of a person’s phonological skills. Decoding words requires the ability to pronounce words by segmenting and then blending sounds and is observed most clearly while reading phonetically regular nonwords or phonetically regular unfamiliar words. Decoding is a core strategy in any alphabetic language and is dependent on the phonological skills of the reader. Phonological awareness, one’s sensitivity to and knowledge of the sound structure of words (Adams, 1990; Ball, 1993; Byrnes, 2000; Torgesen, Wagner, & Rashotte, 1994; Wagner & Torgesen, 1987), is important for decoding print because it enables children to discover and exploit the alphabetic principle necessary for decoding (Stanovich, 1986).

Phonological awareness skills can be thought of as lying on a developmental continuum. The **lower end** of the phonological awareness continuum represents skills that require sensitivity to segments of a word, such as syllable structures in English (e.g., ability to tap out the two syllables in cupcake). The **middle** of the phonological awareness continuum represents skills that require sensitivity to smaller segments of a word such as the initial sound or the rime (e.g., ability to detect one of three words that do not rhyme). These lower level PA skills are considered to be prerequisite skills to reading (Bradley & Bryant, 1983). The **high end** of the phonological awareness continuum, typically referred to as phonemic awareness, represents skills that require manipulation of sounds in words. The classic elision task (e.g., “say cup, now say it again but leave off the /k/ sound”), where words are changed after deleting and reblanding specific sounds, is a good example of this skill, along with spoonerisms and pig latin tasks. This level of phonemic ability shows a reciprocal relationship with decoding in the initial stages of learning to read and spell (Stanovich, 1987).

Decoding skills typically develop between 6 and 8 years of age (Clark, 1988) during the initial stages of reading acquisition in an alphabetic language. As children progress through the stages of reading, they become less reliant on phonological decoding. As words become more familiar after repeated exposure to print (Gough, 1984), decoding becomes reserved primarily for low-frequency words or unfamiliar words. Good phonemic decoding skills are also required for forming accurate memories for the spelling patterns of words, thereby providing the foundation for sight word recognition (Ehri, 1995).

Spelling words is a skill that is closely related to word decoding and word recognition skills (Ehri, 1980, 2000). Children learn to spell in stages beginning with scribbling letters to communicate something, to phonetic spelling, and finally to morphophonemic spelling (Moats, 1995). In order to be able to read and spell, children need to have explicit awareness and knowledge of the sound–symbol structure of the language. After children have learned to spell phonetically, they are ready to learn the morphophonemic rules required to spell words (Moats, 1995).

As explained so succinctly by Ehri (2000), “The major task in learning to read and spell is to become sufficiently familiar with the spellings of words so that information
about their letters is retained in memory and enables them to be read or spelled easily” (p. 20). Both beginning and advanced readers are able to store the spellings of words in memory without a great deal of practice (Ehri, 2000), whereas spelling difficulties are often found in children with language learning disabilities (Moats, 1995) and serve as a hallmark characteristic of dyslexia (Frith & Frith, 1983; Snowling, 1981). Developmental patterns of misspellings have been identified and are found in Treiman (1993). Generally, children with spelling deficits show qualitatively different error patterns than those of normally developing children (Moats, 1995).

Word recognition is an essential part of becoming a skilled reader (Ehri, 1992, 1995, 2005). Sight word reading is a faster and more efficient way of reading words than decoding. Word recognition is the ability to access pronunciations automatically for familiar letter sequences and word units (e.g., come, have), particularly those that do not have predictable sound-letter patterns (e.g., island, yacht). In alphabetic languages, frequent associations between letter strings and their corresponding pronunciations facilitate sight word reading. Word recognition enables a reader to recognize words as whole units, which in turn facilitates increased reading speed (Ehri, 1980). Initially, proficient readers learn to do this by noticing that words share common patterns by way of analogy (e.g., nation, ration, station). Hence, when they see words containing these patterns, they pronounce specific letter sequences as units instead of mapping sounds on to individual letters. With repeated exposure to the similar orthographic patterns, children learn to read most words rapidly by sight, such that a familiar word is perceived as a whole. In short, sight word recognition is a process used by readers that allows for rapid access of pronunciations they have already been exposed to without segmenting or blending letters sequentially (Ehri, 1998). Studies comparing skilled and less-skilled readers have shown that the latter group typically lacks the ability to recognize words automatically, a skill that is a characteristic of skilled readers (Ehri & Wilce, 1983; Perfetti & Roth, 1981). Hence, orthographic decoding facilitates word recognition and is essential for the development of immediate word recognition, which in turn is a prerequisite for reading efficiency (e.g., Aaron et al., 1999; Compton & Carlisle, 1994; Ehri, 1992).

The developmental shift from phonologically mediated word recognition to automatic and rapid word recognition typically occurs between 8 and 10 years of age (Clark, 1988), resulting in increased reading speed and fluency. de Jong and van der Leij (2002) found that the speed of word recognition influences the development of reading comprehension from first to third grade. Hence, it is the speed with which a person is able to match the orthography of a word to its pronunciation that is the hallmark of high-level reading achievement.

In addressing the spiraling effect of weaknesses in decoding and word recognition, Torgesen (2004) underscored the devastating consequences of early weakness in emergent literacy skills on later reading fluency. Understanding the interconnectedness of core elements in reading is central to building a comprehensive protocol for assessing the core skills needed for proficient reading.

**Naming speed.** Rapid naming, a reading-related skill that is most frequently measured on timed tasks for naming familiar items such as colors, objects, letters, and numbers, has been associated with reading deficits for many years (Denckla & Rudel, 1976a, 1976b). Several authors since have addressed the predictive strength of rapid naming tasks in grade school children (Meyer, Wood, Hart, & Felton, 1998; Scarborough, 1998; Wolf, Bally, & Morris, 1986).

Wolf (1999) pointed out that rapid automatic naming, or naming speed, uses the same visual, auditory, and motor processes as reading but at a less complex level. Thus, slow naming speed, a more basic skill, may be an early indicator of potential problems with reading, a more complex skill. In an 8-year longitudinal study, Wolf (1997) found significant differences in naming speed for children with severe reading disabilities (i.e., dyslexia), concluding that, “naming-speed deficits are a powerful, predictive, and diagnostic indicator of severe reading disabilities” (p. 73). Wolf and Bowers (1999a) proposed the “double deficit” hypothesis to emphasize the unique contribution of naming speed to reading. The term double deficit is used to refer to children with deficits in both phonological processing and rapid naming. Because many children with reading impairment present deficits in phonological processing and rapid naming, and rapid naming has been shown to contribute unique variance to reading skill (Allor, 2002), the issue of whether naming is a separate construct from phonological processing continues to be debated (e.g., Vellutino et al., 2004). Wolf and Bowers (1999a) contend that phonological processing and naming deficits can co-occur, and that each deficit type can occur in isolation, yielding different subgroups of impaired readers. Wolf and her colleagues (Bowers & Wolf, 1993; Wolf, 1991; Wolf, Bally, & Morris, 1986; Wolf & Bowers, 1999a, 1999b) maintain that the most severe dyslexics exhibit deficits in both phonological processing and rapid automatized naming, whereas less severe dyslexics exhibit a single deficit in one of these domains. Severity appears to be related proportionately to the amount of effort the reader needs to expend on lower level skills (i.e., decoding) that compete with the resources needed for reading comprehension. When words are not recognized automatically, a conscious effort must be made to decode words, draw analogies to known words, and make inferences from the context or meaning of the passage (Wolf, 1991). Allor (2002) summarized the findings of various studies aimed at answering the question of the unique role played by phonemic awareness and rapid naming to reading development and concluded that rapid naming accounts for a proportion of variance to reading after considering the variance accounted for by phonemic decoding.

**Level 2: Reading Accuracy and Reading Rate**

There is debate about what constitutes fluency in the context of reading. A broad definition of reading fluency takes into account both reading accuracy and reading speed.
Meyer and Felton (1999) defined reading fluency as the ability to read connected text “rapidly, smoothly, effortlessly, and automatically with little conscious attention to the mechanics of reading, such as decoding” (p. 284). After reading words (at Level 3) either using decoding as a strategy or through word recognition, one enters the fluency stage, where word recognition and reading connected text becomes more automatic. Level 2 constructs include the assessment of reading accuracy and reading rate skills. In the reading education literature, the concept of accuracy typically represents the number of errors (miscues) made while reading connected text, and reading rate is assessed by the speed with which a person reads.

In the reading model, however, accuracy is used to refer to one’s ability to read words accurately in conjunction with understanding the meaning of the words. Reading accuracy is determined by the reader’s knowledge of the meanings expressed through words and larger linguistic units in text. The emphasis of meaning in the construct of accuracy is particularly important in light of Stahl’s (2004) report that oral reading accuracy (i.e., correct words read) appears to be important for reading comprehension only in the early grades, whereas vocabulary and use of comprehension strategies are important for reading comprehension in later grades. Knowing the meaning of words is central to reading comprehension (Perfetti et al., 2005) and hence should be included in our assessment of accuracy. This is well represented in Figure 1. Both verbal knowledge and pronunciation knowledge make important contributions to the construct of reading accuracy. Pronunciation knowledge (word decoding and word recognition) aids in accurate reading of words, and verbal knowledge (vocabulary and comprehension of language) assists in accurate comprehension of words in print. Deficient vocabulary, difficulty with decoding, and poor sight word recognition hinders a person’s ability to accurately identify words in text, interferes with reading speed, and ultimately affects reading comprehension.

Reading rate typically is measured by the number of words read correctly per minute (wcpm). A considerable degree of variance exists in the range of normal oral reading rates for children at different grade levels (e.g., Carver, 1990; Rasinski, 1990) because rates may be calculated at different times in the school year and with different parameters such as syllables per minute rather than words per minute. Rasinski and Padak (2005) provide guidelines for wcpm for Grades 1–8, reading their graded paragraphs during the fall, winter, and spring. For example, children in the fall semester for third grade should be reading in the range of 50–110 wcpm; these same children should be reading in the range of 80–140 wcpm at the end of third grade.

The speed with which a person reads impacts his or her ability to comprehend written text. Comprehension is dependent on effective lexical access or word recognition (Just & Carpenter, 1983). Slow word reading interferes with comprehension because information-processing resources typically used for accessing and integrating meanings from text are relegated to the more basic skill of word identification (Perfetti & Roth, 1981; Wolf, & Katzir-Cohen, 2001). Both reading accuracy and reading rate are necessary skills for reading fluency.

**Level 1: Reading Comprehension**

The end goal of reading is the derivation of meaning. Although decoding print is necessary to read, it is not adequate for proficient comprehension (Hoover & Gough, 1990). As shown in the model, Level 1 comprehension is the culmination of the reading skills addressed in Levels 4, 3, and 2. To read efficiently, the reader must be able to identify words accurately and quickly and understand their meanings in text. A breakdown in comprehension can occur because of a bottleneck at any of the levels below (i.e., decoding, word recognition, vocabulary, fluency). In the reading model, reading achievement is measured by having the examinee answer questions based on a paragraph that is read silently under timed conditions.

What is meant by timed reading comprehension? Students’ reading proficiency generally is measured by state-mandated tests such as the Florida Comprehensive Assessment Test (FCAT), a format similar to ones used on nationally standardized tests such as the Scholastic Assessment Test (SAT). On the FCAT, comprehension is assessed by having students answer questions following the reading of a passage in a certain time frame. When teachers assess reading in the classroom, they subjectively assign a certain amount of time for their students to read a given passage and answer questions, probably based on their experience of the average time it takes a student to complete a task of this nature. Similarly, Carver and David (2001) defined reading efficiency as a measure of “the highest difficulty level of text that can be read accurately by an individual when the text is read at a rate commensurate with the level of text difficulty” (p. 108). For example, when a child is in 12th grade, he or she is expected to read a text accurately at the 12th-grade level of difficulty under timed constraints.

Children with specific reading disability or dyslexia typically show better reading comprehension than decoding skill once they learn to read (Frith & Snowling, 1983). However, these children are always compromised in reading comprehension to some degree because of their deficits in decoding and/or rapid word recognition.

Children who exhibit marked deficits in reading comprehension, with or without poor decoding, frequently have a history of language impairments (Bishop & Snowling, 2004). Typically, the reading comprehension problems of these children are not restricted to their comprehension of text (e.g., Nation, 2005; Oakhill, 1982; Stothard & Hulme, 1992, 1995). Comprehension deficits usually extend to both the oral and written tasks, suggesting that depressed comprehension frequently occurs across modalities and represents a more global language deficit in a subset of persons with reading difficulties (Stothard & Hulme, 1992). Some commonly used tests for assessing reading comprehension in clinical settings are listed in the Appendix.

**CONCLUSION**

With the additional responsibility for assessing and treating children with reading disabilities, the first step for SLPs is to work from a conceptual framework that addresses core
skill areas for reading. The adapted rauding model as described in this article is designed to guide the clinician in (a) using an empirically based model for approaching the assessment of reading, (b) understanding the major constructs (e.g., pronunciation knowledge) that underlie reading efficiency, (c) developing a knowledge base of the skill areas (e.g., word decoding, word identification) that support these constructs, and (d) accessing standardized test measures that can be used to evaluate these skills. Four levels of constructs were described to demonstrate how skills at each level assist in developing a profile of the child’s strengths and weaknesses in the component skills of reading.

First, Level 4 observations should help to determine the primary factors that contribute to a child’s reading disability. At this level, the influence of environmental and biological factory on reading acquisition and development is considered. Evaluation at this level will aid in differentiating children whose reading difficulties stem mainly from cognitive and biological causes from those children whose difficulties stem mainly from experiential and instructional causes (Vellutino et al., 2004). Many children who are not reading at grade level due to lack of exposure and/or instruction in literacy may be able to “catch up” in a scientifically based core reading classroom program with a minimum of 90 min of instruction per day, whereas children with severe reading disabilities are likely to need intensive, multisensory, and explicit reading instruction in addition to their classroom instruction (Torgesen, 2004).

Level 3 and Level 2 foundational skills will provide direction regarding the greatest areas of linguistic weakness (vocabulary, decoding, etc.) and strengths. Information gathered at this point will assist in tailoring intervention to meet the specific needs of an individual student.

In kindergarten, assessment of early literacy skills, phonemic awareness, and vocabulary should sufficiently identify children who are at risk (Torgesen, 2002, 2005). Evaluations of children in early elementary school should include assessing the child’s decoding and sight word recognition skills in both reading and spelling. From third grade on, reading fluency and comprehension need to be evaluated thoroughly in addition to decoding, word recognition, and spelling. For children with additional deficits in vocabulary and/or other domains of expressive language, spoken language skills, particularly in the area of semantic and syntax, also will need to be targeted.

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### APPENDIX. EXAMPLES OF MEASUREMENT INSTRUMENTS

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<th>Construct</th>
<th>Sample tests</th>
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#### Verbal Knowledge

**Vocabulary**

- Antonyms, Synonyms — Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk, 1999)
- Peabody Picture Vocabulary Test—3 (PPVT–III; Dunn & Dunn, 1997)
- Expressive Vocabulary Test (EVT; Williams, 1997)
- Spoken Analogies, Spoken Vocabulary — Illinois Test of Psycholinguistic Abilities—3 (ITPA–3; Hammill, Mather, & Roberts, 1998)

#### Listening Comprehension

- Listening Comprehension, and Sentence Comprehension — CASL (Carrow-Woolfolk, 1999)
- Understanding spoken paragraphs — Clinical Evaluation of Language Fundamentals—4 (CELF–4; Semel, Wiig, & Secord, 2003)

#### Pronunciation Knowledge

**Word decoding**

- Word Attack — Woodcock Reading Mastery Test—Revised (WRMT–R; Woodcock, 1987)
- Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999)

**Word recognition**

- Word Identification — WJ–III Tests of Achievement (Woodcock et al., 2001a)
- Reading — Wide Range Achievement Test—3 (WRAT–3; Wilkinson, 1993)

#### Spelling

- Spelling — WRAT–3 (Wilkinson, 1993)
- Test of Written Spelling—4 (TWS–4; Larsen, Hammill, & Moats, 2002)
- Spelling Performance Evaluation for Language and Literacy (SPELL; Masterson, Apel, & Wasowicz, 2002).

#### Naming speed

- Rapid Automatized Naming (RAN; Denckla & Rudel, 1976b).
- Rapid Letter Naming, Rapid Digit Naming — CTOPP (Wagner et al., 1999).

**Reading fluency (rate + accuracy)**

- Gray Oral Reading Mastery Test—4 (GORT–4; Weiderholt & Bryant, 2001).
- Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999).
- Reading Vocabulary: Analogies — WJ–III Tests of Achievement (Woodcock et al., 2001a)
- Reading Fluency — WJ–III Tests of Achievement (Woodcock, McGrew, & Mather, 2001a)
- Leveled Reading Passages (LRP) Assessment Kit (Houghton Mifflin, 2001)

#### Reading comprehension

- Passage Comprehension — WJ–III Tests of Achievement (Woodcock et al., 2001a)
- Passage Comprehension — WRMT-R (Woodcock, 1987)
- Gray Oral Reading Mastery Test-4 (GORT-4; Weiderholt, & Bryant, 2001).
- Nelson-Denny Reading Test (Brown, Fishco, & Hanna, 1993)