Few topics in reading have inspired more controversy than have learning disabilities (LDs). Traditionally, LDs, and in particular reading disability (RD), have been viewed as serious learning impairments that require early identification and treatment. However, RD also has been described in very different terms as a social category that justifies school failure (Christensen, 1998), a subjective diagnosis that harms children and public education as a whole (Skrtic, 1999), and even a ruse for obtaining certain educational entitlements (Shalit, 1997).

Although criticisms of RD—both as a construct and as an area of education—often have been warranted, and although I have made more than a few such criticisms myself (Spear-Swerling, 1999; Spear-Swerling & Sternberg, 1996), the concept of RD captures some important truths about a subgroup of children who experience reading failure. Specifically, there are children who have unusual difficulty learning to read and whose reading problems cannot be accounted for by other disabilities, broad intellectual limitations, impoverished home environments, or generally inadequate instruction. Although the number of these children is likely much smaller than the number currently identified in schools as having RD, many of these children do require ongoing, intensive educational support in order to learn to read.

Somewhat ironically, research on prevention, identification, and treatment of RD has provided at least as much insight into typical reading development and poor reading in general as it has into RD. This article begins by considering research-based and educational definitions of RD. I make the argument that an analysis of the overall cognitive profile typical of RD, as well as four specific cognitive patterns within this profile, provides a more educationally relevant and research-based way of conceptualizing RD than do conventional educational definitions. The cognitive profile characteristic of RD also is contrasted
with common cognitive profiles found among other poor readers. Although this article makes a distinction between RD and other types of reading problems, it is important to note that all reading difficulties merit timely and effective intervention. Next, I discuss possible causes of RD, including both intrinsic (biological) and extrinsic (experiential or environmental) causes. Many of these causal influences are important to understanding not only RD but also poor reading in general. Third, I review approaches to instruction and intervention. Again, these instructional approaches can be applied to children with a variety of reading problems as well as to those with RD. The article concludes with a consideration of possible future directions for research.

What Is Reading Disability?
Historically, a number of concepts have been central to RD, including the ideas that RD involves intrinsic, presumably biologically based, learning difficulties (as opposed to reading failure associated with poverty, for example), as well as a specific cognitive deficit or set of deficits (as opposed to generalized learning problems). Thus, genuine cases of RD have been viewed as involving “unexpected” reading failure that cannot be accounted for by other disabilities, generalized cognitive–linguistic weaknesses, or obvious environmental causes, including a lack of appropriate instruction.

Educational and Research Definitions of Reading Disability
Many current educational guidelines subsume RD under the umbrella category of LDs. The U.S. federal definition, found in the Individuals With Disabilities Education Act (IDEA) (1997), defines LDs as “a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written” that is not primarily the result of “visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage” (Code of Federal Regulations, 1997, 300.7, C10). The other disability conditions or environmental factors are termed exclusionary criteria. Measures of “psychological processing” used in education can involve a wide variety of tests, including those of visual and auditory processing, memory, and language. Educational guidelines generally also specify that individuals with LDs must have a severe discrepancy between intellectual ability (often measured by intelligence quotient [IQ] tests) and achievement in at least one of seven areas, two of which involve reading: basic reading skill (e.g., word recognition) and reading comprehension. IDEA further stipulates that a child cannot be identified as having a disability if the reason for the child’s difficulties involves lack of instruction in reading or limited English proficiency. Individual states typically have their own educational guidelines—strongly influenced by IDEA and previous federal legislation—for identifying LDs.
In the United States, LDs currently constitute by far the largest single category of special education. After a period of rapid growth in the late 1970s and 1980s, the percentage of children classified as learning disabled remained relatively stable from 1990 through at least 2000: approximately 45–46% of all children served in federally supported programs for the disabled and 5–6% of all K–12 children in public schools (National Center for Education Statistics, 2001). By comparison, during the 1990s the next largest category of special education—speech or language impaired—involved 17–21% of all disabled children served, and about 2.3% of all K–12 children. Most children classified as learning disabled have problems in reading or reading-related areas such as spelling and written expression (Moats & Lyon, 1993).

Educational guidelines on LDs, and especially the discrepancy requirement, have met with numerous criticisms from researchers (e.g., Fletcher et al., 1994; Moats & Lyon, 1993; Siegel, 1988, 1989; Spear-Swerling & Sternberg, 1996; Stanovich, 1991; Stanovich & Siegel, 1994). These criticisms include concerns about (a) IQ tests being used as measures of overall “potential” for learning, (b) children who lack discrepancies being excluded from educational services, (c) psychometric problems such as regression effects, (d) lack of consistency in methods of determining discrepancy across districts and states, and (e) the fact that discrepancy criteria make early identification of reading problems difficult. Poor readers who fail to meet discrepancy criteria may be viewed erroneously as lacking the capacity for improvement. Perhaps most important, the discrepancy approach provides little insight into the best way to help children with reading difficulties.

An alternative proposal for defining RD involves the concept of treatment resistance (e.g., Berninger & Abbott, 1994; Fuchs & Fuchs, 1998). This view suggests that children with RD are those who are relatively unresponsive to well-designed, research-based interventions—that is, those who experience persistent reading difficulties over time, despite intervention that is generally effective with most children. The percentage of treatment resisters varies somewhat across studies but frequently involves about 30% of treated research samples. For example, Vellutino and Scanlon (2002) studied a group of first graders identified as severely impaired readers through a combination of teacher ratings and individual testing of word-recognition skills. The children also met exclusionary criteria; that is, those with problems such as serious emotional disorders, broad intellectual disabilities, and socioeconomic disadvantages were excluded from the sample. A semester of daily one-on-one tutoring brought 67% of these children to average or above-average reading levels, with 33% still below average. Similarly, Torgesen, Morgan, and Davis (1992) found that about 30% of kindergartners failed to respond to a short-term intervention involving phonological awareness training. Approaches to and length of intervention undoubtedly influence the percentage of children who are deemed treatment resisters (Blachman, 1994). A longitudinal project involving the use of peer-mediated literacy
strategies in kindergarten and first grade classified only 7% of treated children as unresponsive (Al Otaiba, 2001). The peer-mediated strategies involved pairing high- and low-achieving children in dyads to work together on a variety of basic reading activities, with both children in a dyad alternating as “coach” and “player” (Fuchs, Fuchs, Thompson, et al., 2001). The children were supervised closely by the teacher, who provided corrective feedback when necessary.

In a survey of researchers, Speece and Shekitka (2002) found that the majority of them favored defining RD in terms of treatment resistance rather than in terms of an IQ-achievement discrepancy. Most surveyed researchers also favored retaining exclusionary criteria, especially mental retardation, inadequate instruction, and sensory impairment. However, they disagreed about abandoning the discrepancy concept entirely; researchers were almost evenly split on the issue of whether RD should be defined as involving a discrepancy between listening comprehension and reading comprehension, and a significant minority of researchers, 32%, favored the retention of an IQ-achievement discrepancy.

Scruggs and Mastropieri (2002) have argued that criticisms of LD identification would be better addressed by attention to local implementation of educational guidelines (e.g., greater consistency of eligibility criteria across states and greater adherence to existing guidelines) than by elimination of discrepancy criteria. Schools frequently ignore not only discrepancy requirements but also other criteria in determining eligibility for LD services (MacMillan & Speece, 1999). Determination of eligibility often is driven by practical considerations such as the need to provide assistance to struggling students. If special education is, or is perceived to be, the only avenue for extra help, then children tend to be funneled into special education whether or not they meet eligibility guidelines. Moreover, because LD may be perceived as a less-pejorative category compared to others in special education (e.g., emotional disturbance), this phenomenon may be especially likely to occur for children identified with LDs and RD.

Professional development for and prereferral intervention by teachers appear to be promising ways to reduce inappropriate referrals of children for LDs services. For instance, Drame (2002) examined contextual influences on teachers’ referral decisions when the teachers were given descriptions of children with academic or behavioral difficulties. Teachers at schools with well-defined prereferral intervention programs, such as those involving multidisciplinary or consultative models, were less likely to recommend children for LDs evaluations than were teachers at schools without such intervention programs. Likewise, teachers’ instructional preferences appeared to influence referral decisions; teachers who preferred whole-class groups for teaching reading were more likely to refer children for LDs evaluations than were those who used a combination of grouping methods, perhaps because individual differences are more difficult to accommodate in large groups. Unfortunately, however, many states do not mandate prereferral intervention or do not provide training for profes-
sionals who participate in the prereferral process (Buck, Polloway, Smith-
Thomas, & Cook, 2003).

In current educational practice, distinguishing genuine cases of RD from
more experientially based reading problems often is impossible (Spear-Swerling,
1999). Although it is not yet clear whether treatment-resister models accurately
distinguish cases of RD, these models are more educationally useful than
the discrepancy approach because they are framed in terms of levels of inter-
vention. In addition, an analysis of the specific cognitive patterns typical of chil-
dren with RD, and of the cognitive profiles found in other poor readers, is
extremely helpful for early identification and for planning instruction. An im-
portant foundation for interpreting cognitive patterns and profiles involves un-
derstanding the development of normally achieving readers.

**Abilities Involved in Typical Reading Development**

A number of reading development models emphasize the importance of two broad
types of abilities in reading: oral language comprehension and word recognition
(e.g., Adams, 1990; Chall, 1983b; Hoover & Gough, 1990; Samuels, 1994, see #40
this volume). Each of these two broad areas includes numerous component abili-
ties. For instance, oral language comprehension includes vocabulary knowledge
and grammatical understanding, whereas word recognition includes knowledge of
letter–sound relationships, the ability to decode unfamiliar words, and automatic
as well as accurate recognition of words. Reading text fluently requires not only
automatic word recognition but also integration of a range of important subword,
word-, and comprehension-level processes (Fuchs, Fuchs, Hosp, & Jenkins, 2001;
Good, Simmons, & Kame’enui, 2001; Wolf & Katzir-Cohen, 2001).

One central set of linguistic processes in reading involves phonological
processes, which require the use of phonological codes (abstract mental repre-
sentations of speech sounds), or of actual speech, in a variety of cognitive and lin-
guistic tasks, including memory and oral language as well as written language
(Scarborough & Brady, 2002). Phonological processes play a key role in word
recognition, especially in an alphabetic language such as English, in which the
printed letters primarily correspond to sounds in spoken words. For example,
phonemic awareness, which involves awareness and manipulation of individual
sounds in spoken words (e.g., being able to segment a spoken word such as fish
into three separate sounds, /f/, /i/, /sh/), greatly facilitates learning to decode print-
ed words. Phonological awareness is a more rudimentary level of phonemic
awareness that includes the ability to perform tasks such as rhyming and alliter-
ation. Phonological decoding (i.e., word decoding or word attack) involves using
phonological skills to read unfamiliar words. This ability may be measured by
having the individual read out-of-context words that are either pseudowords,
such as trayn, or real words that are unfamiliar to the individual (i.e., not common
words recognized by sight).
Other phonological processes play a direct role in comprehension. For instance, phonological memory involves the ability to use phonological codes in memory when reading or listening to a text. If phonological memory is faulty or inefficient and the individual cannot hold words in his or her memory long enough to integrate the meaning of the text, then comprehension may be impaired. Considerable evidence suggests that phonological processes are a core problem in RD and often in other cases of poor reading as well (Adams, 1990; Fletcher et al., 1994; Rack, Snowling, & Olson, 1992; Stanovich & Siegel, 1994).

Most models of reading reflect the idea that the importance of various cognitive processes shifts with development. Although many abilities are ultimately important in learning to read, abilities involved in word recognition (such as phonemic awareness and knowledge of letter–sound relationships) tend to be especially important in the early elementary grades when word-recognition skill is developing most rapidly and the comprehension demands of most texts are relatively low. By grade 4, most typically developing children already have acquired reasonably automatic, accurate word recognition, and the comprehension demands of texts escalate substantially, so oral language comprehension begins to account for correspondingly more of the variance in reading comprehension (Chall, 1983b; Rupley, Willson, & Nichols, 1998). Furthermore, in many models (e.g., Chall, 1983b; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991) development is conceptualized as involving a series of phases that nearly all children pass through in the same sequence—though at varying rates—to develop reading proficiency. Within a phase, children’s general approaches to most words and reading tasks are similar. Transitions between phases involve changes in children’s understanding of reading and in the development of specific cognitive abilities that underlie reading.

A Model of Typical Reading Development

An extensive research base exists on the cognitive processes involved in reading development, and the model I will discuss owes much to the work of other researchers (e.g., Adams, 1990; Carver & David, 2001; Chall, 1983b; Ehri, 1991, 1992; Frith, 1985; Gough & Juel, 1991; LaBerge & Samuels, 1974; Perfetti, 1985; Rupley et al., 1998; Stanovich, 2000). The model was developed collaboratively by me and Robert Sternberg (Spear-Swerling & Sternberg, 1994, 1996) and involves a series of six phases that constitute a “road” to proficient reading. The version of the model presented here, both the part pertaining to typical development and the part involving patterns of RD to be described in the following section, is generally similar to earlier versions. However, this model contains some additions to earlier versions, as well as some changes in terminology and conceptual details, primarily reflecting the ever-expanding research base on reading.

Table 1 displays the phases of typical reading development in the model, which also appear on the left-hand sides of Figures 1 and 2. These phases are
# TABLE 1

Phases of Typical Reading Development

<table>
<thead>
<tr>
<th>Phase</th>
<th>Defining Feature(s)</th>
<th>Additional Features</th>
<th>Approximate Age (Grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual-Cue Word Recognition</td>
<td>Child uses visual cues (e.g., word shape, color, or a familiar logo), rather than phonetic cues, in word recognition.</td>
<td>Child • lacks understanding of the alphabetic principle; • often lacks phonological awareness and knowledge of letter–sound relationships; • makes very heavy use of context in word recognition; and • has age-appropriate oral language comprehension but extremely weak or nonexistent reading comprehension, primarily because of very limited word recognition.</td>
<td>2–5 years (preschool to early kindergarten)</td>
</tr>
<tr>
<td>Phonetic-Cue Word Recognition</td>
<td>Child uses partial phonetic cues (e.g., first and last letter of a word) in word recognition.</td>
<td>Child • grasps the alphabetic principle; • has at least some knowledge of letter–sound relationships and rudimentary phonological awareness; • still relies on context to aid word recognition; and • has age-appropriate oral language comprehension but much lower reading comprehension, primarily because of limitations in word recognition.</td>
<td>5–6 years (kindergarten to first grade)</td>
</tr>
<tr>
<td>Controlled Word Recognition*</td>
<td>Child makes full use of phonetic cues in word recognition and is generally accurate, but not automatic, in reading common words.</td>
<td>Child • has more advanced level of phonemic awareness; • may rely on context to speed word recognition; and • has age-appropriate oral language comprehension but lower reading comprehension, primarily because of limitations in word recognition.</td>
<td>Beginning at 6–7 years (later first to second grade)</td>
</tr>
</tbody>
</table>

* These phases overlap in time, with students in later phases of reading continuing to acquire controlled recognition of some new words, make refinements in automatization of word recognition, and develop strategic knowledge.
### Phases of Typical Reading Development (continued)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Defining Feature(s)</th>
<th>Additional Features</th>
<th>Approximate Age (Grade)</th>
</tr>
</thead>
</table>
| Automatic Word Recognition* | Child recognizes common words automatically (without effort) as well as accurately. | Child:  
• does not usually rely on context to aid or speed word recognition;  
• makes use of larger letter-pattern units in word recognition;  
• integrates automatic word recognition with comprehension processes for fluent text reading; and  
• has age-appropriate oral language comprehension, with reading comprehension still somewhat lower than oral comprehension.  
Limits on reading comprehension now begin to revolve more around factors such as vocabulary, background knowledge and strategy knowledge than word recognition. | Beginning at about 7 to 8 years (second to third grade) |
| Strategic Reading*     | Child routinely uses at least some comprehension strategies (e.g., using context to determine word meanings, summarization, and knowledge of text structure) to aid reading comprehension. | Child:  
• has well-developed, accurate, automatic word-recognition skills  
• usually does not rely on context for word recognition but frequently uses context to aid comprehension (e.g., to help determine word meanings);  
• uses reading easily and extensively as a “tool” for gathering information;  
• gains increasing vocabulary and background knowledge from reading; and  
• has age-appropriate oral language comprehension, with reading comprehension becoming comparable to oral language comprehension in the middle of this phase.  
Late in this phase, reading comprehension may surpass oral comprehension for some types of texts (e.g., technical or dense informational texts). | Beginning at about 8 to 9 years (third to fourth grade) |
<table>
<thead>
<tr>
<th>Phase</th>
<th>Defining Feature(s)</th>
<th>Additional Features</th>
<th>Approximate Age (Grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proficient Reading*</td>
<td>Individual has higher-order comprehension skills.</td>
<td>Individual • has highly accurate and automatic word recognition; • uses a wide range of strategies to aid reading comprehension; • evaluates and integrates information across a variety of sources; • reads critically; and • has age-appropriate oral language comprehension, with reading comprehension comparable to oral language comprehension. For some types of texts (e.g., technical or dense informational texts), reading comprehension may surpass oral comprehension.</td>
<td>Beginning in later adolescence (later high school or college)</td>
</tr>
</tbody>
</table>

* These phases overlap in time, with students in later phases of reading continuing to acquire controlled recognition of some new words, make refinements in automatization of word recognition, and develop strategic knowledge.
intended to be specific to English, with the age and grade ranges in the table approximations based on research involving mainly samples of middle class English-speaking children. Research on other alphabetic languages, such as German, Swedish, Spanish, and Portuguese (e.g., Cardoso-Martins, 2001), suggests that children learning a variety of alphabetic languages progress through a series of phases roughly similar to those in Table 1. Furthermore, many of the cognitive processes underlying reading, such as phonemic awareness, appear similar across alphabetic languages (e.g., Durgunoglu & Oney, 2002). However, an important difference among alphabetic languages involves transparency, that is, whether letter–sound relationships are relatively straightforward and consistent (transparent), as in German or Spanish, or more complex (opaque), as in English. For instance, the pronunciation of English vowels can vary substantially depending on the vowel position in a word, the letter that follows the vowel, and so forth. In transparent alphabetic languages, children may advance more rapidly through the initial phases of learning to read than do children learning English (Cardoso-Martins, 2001; Landerl, Wimmer, & Frith, 1997).

Oral language comprehension—including semantic knowledge (e.g., vocabulary), syntactic knowledge (e.g., understanding of grammatically complex sentences), and pragmatic knowledge (e.g., understanding the social uses of language)—develops prior to and simultaneously with word-level reading abilities, beginning during the early preschool years and continuing into adulthood. As noted in the following discussion, oral language comprehension substantially exceeds reading comprehension for most children until about seventh or eighth grade (Biemiller, 1999). Even among typical readers, individual differences in oral language comprehension exist that influence and set limits on reading comprehension, especially after word-recognition skills have developed. Moreover, children’s own reading experiences and volume of reading exert important influences on their oral language development. Thus, oral language and reading development interact and are mutually facilitative.

Visual-Cue Word Recognition. This phase of reading, termed visual-cue word recognition by Ehri (1991, 1992), is characteristic of very young children, primarily preschoolers. Children do not yet grasp the alphabetic principle—the fundamental insight that written English involves a code in which printed letters map onto speech sounds in spoken words—and also often lack phonological awareness and knowledge of most letter–sound relationships. Instead, young children rely on a salient visual cue, such as a distinctive logo or word shape, to recognize words and are heavily dependent on context in word recognition. For instance, a typical preschooler might recognize the word stop on a red, octagonal sign or the word McDonald’s from the golden arches but would not recognize those words if they were written in ordinary type on a page. Because of their lack of alphabetic insight, visual-cue readers also have been termed pre-
alphabetic readers (Ehri, 1997). In this phase, children’s oral language comprehension far exceeds their reading comprehension, which is very restricted or non-existent because of limitations in word recognition.

**Phonetic-Cue Word Recognition.** Ehri (1991, 1992) uses the term *phonetic-cue word recognition* for a second phase of reading. This phase is typically seen in K–1 children but also may be seen in some preschoolers, especially those who have had extensive exposure to literacy. Phonetic-cue readers can use partial phonetic cues in word recognition because they grasp the alphabetic principle, have at least a rudimentary level of phonological awareness (e.g., recognizing spoken words with similar beginning or ending sounds), and know at least some letter–sound relationships, especially for single consonants such as *m* and *s*. Often, they attend to the first few letters of a word, or to the first and last letters, but not to the middle part of a word. Hence, they may confuse similarly spelled words such as *boat* and *boot*. Because they do not make full use of all the letters in a word, phonetic-cue readers remain dependent on context, such as pictures or sentences, to aid word recognition. Children in this phase also have been termed partial-alphabetic readers (Ehri, 1997). They continue to have oral language comprehension that substantially exceeds their reading comprehension, primarily because of inaccuracies in word recognition.

**Controlled Word Recognition.** Children in this phase of reading development, typically those in late first grade to second grade, can read a variety of common words accurately. They make full use of phonetic cues in word recognition; therefore, this phase has been termed full alphabetic (Ehri, 1998). Children with controlled word recognition have more advanced levels of phonemic awareness than do children in previous phases of reading, and they know a wide range of letter–sound relationships, including not only those for single consonants but also those for vowels and common vowel patterns (e.g., *ay*, *ee*, and *oo*), as well as for other common letter patterns (e.g., *sh*, *th*, and *ck*). However, they must expend mental effort to recognize many words, so their word recognition is not automatic. Children in this phase may continue to rely on context cues, especially to speed word recognition. Their reading comprehension still lags behind oral language comprehension, often because the effort they must put into word recognition tends to drain mental resources from comprehension.

**Automatic Word Recognition.** In this phase, children can recognize a wide range of common words automatically as well as accurately. Automatic recognition of words appears to be facilitated by consolidation and use of larger letter patterns such as prefixes, suffixes, and common rimes (e.g., *ight*). Hence, this phase is roughly analogous to one that has been termed consolidated alphabetic (Ehri, 1997). Children in this phase integrate automatic word recognition with a variety of comprehension processes to achieve fluent, and increasingly rapid,
reading of text. Children with automatic word recognition, usually second to third
graders, depend on context only infrequently to aid their word recognition, which
is accurate, fast, and effortless. Although their reading comprehension contin-
ues to be lower than their oral language comprehension, limits on their reading
comprehension now begin to revolve more around general language abilities
and knowledge (e.g., vocabulary, background knowledge, and strategic knowl-
dge) than around word recognition.

**Strategic Reading.** Strategic readers have the ability to use routinely at least
some reading comprehension strategies. Examples include “fix-up” strategies for
when comprehension fails, such as rereading part of a text that did not make sense (Anderson, Hiebert, Scott, & Wilkinson, 1985); summarizing what has been
read; and using context to determine a word’s meaning (as opposed to using con-
text to recognize words). For instance, a strategic reader reading the sentence
*Her scarlet cape flashed red in the crowd* would be able to recognize all the words
in the sentence accurately and easily, including *scarlet*, but would concurrently
use sentence context to figure out that the word *scarlet* means *red*. Children may
develop and use some comprehension strategies in listening well before the strate-
gic reading phase. However, what distinguishes strategic reading is children’s rou-
tine use of strategies in their reading as well as their listening—an achievement
facilitated by automatic word recognition, which allows children to focus more
of their mental resources on comprehension of the text. Early in this phase, chil-
dren’s reading comprehension is only beginning to approach their oral language
comprehension, with the two areas of comprehension generally becoming com-
parable in about seventh or eighth grade (Biemiller, 1999). Late in this phase,
reading comprehension actually may exceed oral language comprehension for cer-
tain types of texts, such as dense informational texts or complex narratives, largely
because written text can be reread but information presented orally usually
cannot be reviewed. Children can now use reading extensively as a tool for gath-
ering information, and their own reading contributes increasingly to develop-
ment of vocabulary and background knowledge (Cunningham & Stanovich,
1990). Strategic reading typically begins around the middle elementary grades
(third to fourth grade) and continues to develop in subsequent grades.

**Proficient Reading.** The primary distinction between strategic reading and
proficient reading involves the development of higher-order comprehension abil-
ities, such as the ability to read critically and reflectively, understand and appreci-
ciate more profound literary themes, and evaluate and integrate different kinds of
information. For example, a student who is writing a research paper might need
to evaluate information from different sources, decide which sources are most
credible, reconcile apparent conflicts among sources, and synthesize all this in-
formation in a coherent way. Increases in background knowledge fueled in part by
reading volume may influence performance on a range of basic information-
processing tasks (Ceci, 1990). Although reading volume certainly affects back-
ground knowledge in previous phases of reading, its cumulative effects are
largest in this final phase. Thus, over time, reading volume may contribute to
growth in verbal intelligence and to overall cognitive development (Stanovich,
2000; Stanovich & Cunningham, 1993). Oral and reading comprehension are
comparable, and reading comprehension may even exceed oral comprehension for
certain types of texts, as noted previously. Proficient reading typically begins in
later adolescence (high school or college) and continues throughout adulthood.

Several general points should be made about the preceding model of typi-
cal reading development. First, the term *development* is not intended to imply that
learning to read unfolds spontaneously—largely independent of experience or
instruction—as does learning to walk, for instance. As I will discuss further in the
next section, experience and instruction have substantial influences on both read-
ing development and reading difficulties. Second, although this article’s focus
is on reading, many of the cognitive processes typical of a given phase of reading
also are revealed in children’s spelling (see Ehri, 1997, for a detailed discussion).

Third, as Table 1 illustrates, although beginning readers often rely on con-
textual cues to supplement faulty word recognition, progress in reading is char-
acterized by decreasing reliance on context to aid word recognition. That is,
skilled reading involves the development of increasingly accurate and autom-
ic word recognition, which frees mental resources for use in comprehension—not
the continued use of multiple cueing systems for recognizing words. It is useful
to distinguish the use of context in *word recognition* from its use in *comprehen-
sion*, as when determining the meanings of unfamiliar vocabulary words. Good
readers use context to aid comprehension and have more mental resources free
for doing so because their word recognition is automatized. However, using
context to aid word recognition is the hallmark of unskilled, not skilled, reading
(see, e.g., Adams, 1998).

Fourth, the various phases in the model are not independent of the words or
reading tasks themselves. For instance, a child in the phase of controlled word
recognition might recognize automatically a few very common words; a profi-
cient adult reader who recognizes the vast majority of words automatically might
use controlled processing for very unusual or technical words, such as unfamil-

A Road Map for Understanding Reading Disability
is achieved in the fourth phase, automatization and text fluency also continue to develop in later phases. Likewise, by the strategic reading phase, children have acquired the ability to use routinely at least some comprehension strategies in reading, but further development in strategy knowledge and strategy application continues into the proficient reading phase.

**Cognitive Patterns of Reading Disability**

This part of the model (Spear-Swerling & Sternberg, 1994, 1996) conceptualizes RD as involving deviations from the path to proficient reading at one of the first four phases in development. (See Figure 1, which depicts both the model of typical reading development discussed in the previous section and the patterns of RD to be discussed in this section.) Depending on the point at which a reader goes astray, RD may involve four patterns of difficulty, listed in the first four rows of Table 2 and also shown in the center of Figure 1 as four branches off the road to proficient reading. The model incorporates the idea that the further children go off track (e.g., falling increasingly behind their age cohort because of lack of intervention), the harder it is for them to get back on the road to proficient reading. For all four patterns, the negative consequences of reading failure, such as decreased motivation, practice levels, and expectations—shown on the right-hand side of Figure 1—tend to complicate reading difficulties. These complications may begin as early as first grade (Chapman & Tunmer, 1997; Stanovich, 1986, see #17 this volume).

Again, this part of the model has been influenced strongly by the work of many researchers, including Fletcher et al. (1994), Frith (1985), Lovett (1987), Mann and Liberman (1984), Shankweiler, Crain, Brady, and Macaruso (1992), Siegel (1988, 1989), Stanovich (1986, 1990), Stanovich and Siegel (1994), Torgesen, Wagner, and Rashotte (1994), Vellutino and Scanlon (2002), and Wolf and Bowers (1999), to name only a few. The patterns of RD, as with phases of normal reading development, describe those seen in poor readers who speak English. RD appears to be a cross-linguistic phenomenon (Grigorenko, 1999), and there certainly are similarities in patterns of RD across different languages, especially alphabetic languages. However, factors such as the transparency of the language also seem to be important (e.g., Landerl et al., 1997).

As shown in Figure 1 and Table 2, the model conceptualizes RD as involving a specific word-recognition deficit (SWRD) profile rather than generalized oral language problems, with deviations from typical reading development occurring in the early phases pertaining to word recognition. This conceptual emphasis is based on evidence that many children with RD have a core phonological deficit that affects word recognition much more severely than oral language comprehension (e.g., Rack et al., 1992). It also is consistent with traditional views that RD involves unexpected reading failure rather than more generalized cognitive–linguistic difficulties. That is, when children have good oral language comprehension and no
FIGURE 1
A “Road Map” for Understanding Patterns of Reading Disability

Highly Proficient Reading
- Increasing higher-order comprehension abilities; reading comprehension equals or sometimes even exceeds listening comprehension

Strategic Reading
- Routine use of comprehension strategies in reading; increasing vocabulary and background knowledge acquired through reading

Automatic Word Recognition
- Delayed Readers: Too-slow acquisition of word-recognition skills, impaired reading comprehension
- Nonautomatic Readers: Accurate but effortful word recognition, impaired reading comprehension
- Inaccurate Readers: Inaccurate word recognition, impaired reading comprehension
- Nonalphabetic Readers: Very inaccurate word recognition, very impaired reading comprehension

Controlled Word Recognition
- Consolidation and use of larger letter patterns

Phonetic-Cue Word Recognition
- Alphabetic insight; increasing letter-sound knowledge
- Listening far exceeds reading comprehension

Visual-Cue Word Recognition
- Steadily decreasing reliance on context in word recognition

Context-Free Word Recognition
- sharply increasing text fluency and comprehension

Rudimentary Phonological Awareness
- Ongoing oral language development, increasingly influenced by reading experience and volume

Increasing letter-pattern knowledge and phonemic awareness

Consolidation and use of larger letter patterns

Increasing higher-order comprehension abilities; reading comprehension equals or sometimes even exceeds listening comprehension

Negative consequences of reading failure:
- Lowered motivation, lowered levels of practice, and lowered expectations

Ongoing oral language development, increasingly influenced by reading experience and volume

Routine use of comprehension strategies in reading; increasing vocabulary and background knowledge acquired through reading

Consolidation and use of larger letter patterns
<table>
<thead>
<tr>
<th>Profile</th>
<th>Pattern</th>
<th>Word-Recognition Skills</th>
<th>Oral Language Comprehension</th>
<th>Reading Comprehension</th>
<th>Use of Comprehension Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Word-Recognition Deficit (SWRD)</td>
<td>Nonalphabetic</td>
<td>No phonological decoding skills. Uses visual cues in word recognition.</td>
<td>Approximately average or better</td>
<td>Extremely weak because of very limited word recognition.</td>
<td>Very limited or nonexistent</td>
</tr>
<tr>
<td>Traditional Reading Disability/ &quot;Unexpected&quot; Poor Reading</td>
<td>Inaccurate</td>
<td>Has some phonological decoding skills, but these are inaccurate. Relies on contextual cues, such as pictures or sentence context, to supplement weak word recognition.</td>
<td>Approximately average or better</td>
<td>May perform adequately in relatively undemanding materials. Has difficulty when comprehension demands escalate because word recognition consumes too many mental resources.</td>
<td>Very limited or nonexistent</td>
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<tr>
<td></td>
<td>Nonautomatic</td>
<td>Has accurate word-recognition skills, but these are effortful, not automatic. May rely on sentence context to help speed word recognition.</td>
<td>Approximately average or better</td>
<td>May perform adequately in relatively undemanding materials. Has difficulty when comprehension demands escalate because word recognition consumes too many mental resources.</td>
<td>Very limited or nonexistent</td>
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<td></td>
<td>Delayed</td>
<td>Has accurate and automatic word-recognition skills, but lagged well behind peers in acquisition of those skills.</td>
<td>Approximately average or better</td>
<td>Weak, with impaired use of reading comprehension strategies Child was not &quot;ready&quot; for comprehension instruction at the time it was delivered because he or she was still struggling with basic word recognition.</td>
<td>Very impaired strategy use</td>
</tr>
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<tr>
<td>Specific Comprehension Deficit (SCD)</td>
<td>Nonstrategic</td>
<td>Has reasonably accurate and automatic word-recognition skills, apparently acquired on schedule.</td>
<td>Sometimes below average</td>
<td>Weak, with impaired use of reading comprehension strategies (but not associated with a history of word-recognition problems)</td>
<td>Very impaired strategy use</td>
</tr>
<tr>
<td>Suboptimal</td>
<td>Suboptimal</td>
<td>Has reasonably accurate and automatic word-recognition skills, apparently acquired on schedule.</td>
<td>Sometimes below average</td>
<td>Lacks higher-order comprehension skills, but functions at a somewhat higher level than a nonstrategic reader.</td>
<td>Basic strategy use but may lack higher-level strategies</td>
</tr>
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obvious disabilities such as sensory or broad intellectual impairments, one would not expect them to have reading difficulties. Nevertheless, children with generalized language problems involving both oral language comprehension and word recognition—sometimes termed garden-variety poor readers (Gough & Tunmer, 1986)—appear to be on a continuum with children who have a specific phonological deficit (Fletcher et al., 1994; Stanovich & Siegel, 1994).

Nonalphabetic Readers. Nonalphabetic readers experience difficulty early in the process of reading development, in the phase of visual-cue word recognition. Like normally developing readers in this phase, they do not grasp the alphabetic principle and must rely solely on visual cues, such as word shape, to recognize words. Like normally developing readers, they also generally lack phonological awareness and knowledge of letter sounds. Unlike normally developing readers, however, they do not progress beyond this phase but fail to develop alphabetic insight and increased letter-sound knowledge. They may have been resistant to treatments (instructional interventions) that were successful with normally developing readers. Because it is not possible to progress very far in an alphabetic language, such as English, without understanding the alphabetic code and acquiring at least some ability to use phonetic cues, nonalphabetic readers have extremely impaired word recognition and reading comprehension. They are often young children and may be especially likely to be noticed because of the severity of their difficulties. Nevertheless, even adults can be nonalphabetic readers (Byrne, 1992).

Inaccurate Readers. These children go off track in the phase of phonetic-cue word recognition. They have grasped the alphabetic principle, have some knowledge of letter sounds, and perhaps have a rudimentary level of phonological awareness, which enables them to use some phonetic cues in attempting to read words. They are similar to normally developing readers in this phase because they do not make full use of phonetic cues in reading words, and therefore their word recognition is inaccurate. However, unlike normally developing readers, they may remain stuck in this phase because of difficulties in using phonetic cues, which may be related to poor phonemic awareness, insufficient knowledge of letter–sound relationships, or both. Inaccurate readers may continue to rely on context cues, such as pictures or sentences, to aid word recognition. They may achieve good reading comprehension sometimes, especially in relatively easy texts; however, as the text demands escalate in the middle and upper grades, both in terms of comprehension demands and the sheer volume of reading required in school, it will become increasingly difficult for inaccurate readers to compensate effectively for their poor word recognition, and their reading comprehension will likely be impaired.

Nonautomatic Readers. Nonautomatic readers go astray in the phase of controlled word recognition, failing to move forward to other phases. As with nor-
mally developing readers in the controlled word-recognition phase, nonautomatic readers generally have accurate but effortful word reading; however, perhaps because nonautomatic readers fail to move on to the use of larger associated letter patterns, their reading speed may remain very slow. Their use of mental resources to speed word recognition (e.g., via use of context cues) tends to impair reading comprehension, especially in more demanding texts. Nonautomatic readers may have underlying deficits in rapid serial naming of letters or digits (e.g., Sunseth & Bowers, 2002; Wolf & Bowers, 1999). However, the interpretation of naming speed deficits, especially whether or not such deficits reflect a core phonological weakness, remains a matter of dispute (Scarborough & Brady, 2002). Adult poor or marginal readers—especially those with a history of childhood reading difficulties—sometimes are nonautomatic readers (Davidson & Strucker, 2002; Fowler & Scarborough, 1993; Sabatini, 2002). For example, college students with RD frequently complain that if they read at a comfortable pace, they have good reading comprehension but cannot keep up with the reading volume required in their classes; if they try to force themselves to read faster, they lose comprehension.

Delayed Readers. Delayed readers have the only pattern of RD with reasonably accurate and automatic word-recognition skills. However, delayed readers have reading comprehension weaknesses, especially in the use of reading comprehension strategies. In the model, this pattern of RD is conceptualized as involving delayed development of word-recognition skills and not poor oral language comprehension (i.e., the “delay” pertains specifically to word recognition, not overall cognitive–linguistic development). In other words, delayed readers have a history of word-recognition difficulties that they eventually overcame, but at a cost: While delayed readers struggled to develop word recognition, they missed out on other kinds of reading experiences and instruction important to the development of reading comprehension. Moreover, the use of comprehension strategies requires a proactive rather than passive stance on the part of the reader (Garner, 1990), in addition to task persistence (Gersten, Fuchs, Williams, & Baker, 2001). Thus, strategic weaknesses in poor readers sometimes may reflect maladaptive attributional patterns, such as learned helplessness or a tendency to give up easily when confronted with challenging reading tasks, not a true inability to develop or use strategic knowledge (Borkowski, Carr, & Pressley, 1987).

Key Points About the Patterns
The model involves an interactive perspective on reading development and RD (Spear-Swerling & Sternberg, 1996). That is, both good and poor reading are viewed as involving an interaction between children’s intrinsic characteristics (e.g., innate abilities, temperament, and motivation) and extrinsic factors (e.g., experience, home environment, and instruction). Although the four patterns are
described in terms of deviations from the path of typical reading development, children with RD differ from typical younger readers in some important respects. For instance, children with RD may compensate for deficient phonological skills in ways uncharacteristic of younger, normally achieving children matched to them on word-recognition level (Greenberg, Ehri, & Perin, 2002), and they certainly have a host of negative experiences with reading—such as repeated failure—not typical of younger good readers. The road map metaphor and the right-hand box, labeled “negative consequences of reading failure,” shown in Figure 1, attempt to capture these distinctions between children with RD and normally achieving but younger readers. Finally, both intrinsic characteristics and extrinsic factors may contribute to some variations within patterns. For example, an inaccurate reader with exceptionally strong oral language comprehension may be better at compensating for weak phonological decoding than is an inaccurate reader with average oral language abilities. Nevertheless, inaccurate reading likely will cause problems for both readers, as the comprehension demands and volume of reading increase across grade levels.

Other Broad Profiles of Poor Reading

The preceding model of RD focuses on children who have (or, in the case of delayed readers, have had in the past) a specific word-recognition deficit (SWRD) coupled with approximately average or above-average oral language comprehension. This profile of unexpected reading failure traditionally has been viewed as typical of RD. However, at least two other broad deficit profiles may be possible among poor readers: children with weaknesses in both word recognition and language comprehension—sometimes called garden-variety poor reading (GVPR)—and children who have comprehension weaknesses coupled with adequate word recognition. The last profile is sometimes termed a specific comprehension deficit (SCD). All three profiles are summarized in Table 3. Research suggests a nontrivial prevalence of each profile (Badian, 1999; Catts, Fey, Zhang, & Tomblin, 1999; Leach, Scarborough, & Rescorla, 2003; Nation & Snowling, 1997; Spear-Swerling, in press; Yuill & Oakhill, 1991), but their relative frequency varies across studies depending on methodology (e.g., whether SCD is defined in relation to reading or listening comprehension, the specific measures used to assess reading and language, and the cutoffs for defining poor performance), as well as on the age of the population studied. In particular, a specific word-recognition deficit (i.e., traditional RD) and GVPR are more likely to be identified in the early grades, whereas SCD typically emerges in the middle or later grades. For example, Leach et al. (2003) found that SCD—defined in terms of reading comprehension—constituted only about 6% of reading problems identified in third grade or earlier, whereas SWRD and GVPR involved approximately 49% and 46% of reading difficulties in third grade or earlier, respectively. However, late-identified reading problems were highly heterogeneous, with
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<th>Profile</th>
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<tr>
<td>Specific Word-Recognition Deficit (SWRD)</td>
<td>Yes</td>
<td>Deficient word recognition: nonalphabetic, inaccurate, nonautomatic, and/or delayed</td>
<td>Approximately average or better. Child performs well on age-appropriate comprehension tasks presented verbally.</td>
<td>Usually weak, resulting from deficient word recognition. May perform adequately in undemanding materials.</td>
</tr>
<tr>
<td>Garden-Variety Poor Reading (GVPR)</td>
<td>No, because GVPR involves generalized language problems as well as word-recognition difficulties. However, GVPR may cause serious problems in school.</td>
<td>Deficient word recognition: nonalphabetic, inaccurate, nonautomatic, and/or delayed</td>
<td>Below average. Child experiences difficulty on age-appropriate comprehension tasks even when they are presented verbally.</td>
<td>Usually weak, resulting from deficient word recognition and below-average oral language comprehension. May perform adequately in undemanding materials.</td>
</tr>
<tr>
<td>Specific Comprehension Deficit (SCD)</td>
<td>No, because SCD does not involve specific word-recognition difficulties and may involve generalized language problems. However, SCD may cause serious problems in school, especially at upper grade levels.</td>
<td>Approximately average or better, with apparently normal progress in the early phases of learning to read</td>
<td>Some readers are below average; some are not.</td>
<td>Usually weak. Often results from (1) below-average oral language comprehension and/or (2) lack of knowledge or application of reading comprehension strategies. May perform adequately in undemanding materials.</td>
</tr>
</tbody>
</table>
proportions of SWRD, GVPR, and SCD roughly similar for cases identified after grade 3 (i.e., each profile constituted about one third of the poor reading group).

Similar to children with RD, children with GVPR and SCD also may be understood in relation to the road map metaphor. The basic processes implicated in typical reading development, the overall sequence of development, and an interactive perspective all are relevant to understanding GVPR and SCD as well as RD. Likewise, children with GVPR or SCD are affected by the negative consequences of poor reading, although for the latter profile, these consequences may come somewhat later in the course of formal schooling rather than in the primary grades. Although GVPR and SCD do not constitute RD as traditionally defined by unexpected poor reading or a specific word-recognition deficit, they may seriously impede success in school and adulthood. Thus, all three profiles require timely intervention and remediation.

**Garden-Variety Poor Reading.** Garden-variety poor readers, like children with RD, experience difficulty in the early phases of reading development, primarily because of poor word recognition and phonological weaknesses. Unless their oral language weaknesses are particularly severe, in the early grades the word-recognition difficulties of garden-variety poor readers may be more obvious than are their comprehension problems, because the comprehension demands of beginning texts often are fairly low (Chall, Jacobs, & Baldwin, 1991) and because reading comprehension cannot even come into play without a basic level of word recognition. However, children with GVPR can be expected to have difficulties in reading comprehension even after their poor word recognition has been remediated because their reading comprehension difficulties relate partially to generalized language comprehension problems. In contrast to children with RD, who generally perform well with material presented verbally (e.g., class discussions of material read aloud by the teacher), children with GVPR may have obvious comprehension difficulties in listening as well as in reading. They may appear to respond to intervention targeting word recognition in the early grades, only to fall behind again in the later grades (e.g., Slavin et al., 1996). Thus, children with GVPR require remediation in both word recognition and language comprehension.

**Specific Comprehension Deficit.** In contrast to children with GVPR and RD, children with SCD have apparently normal reading development and acquisition of word-recognition skills in the early grades. For instance, Badian (1999) studied a group of late-emerging poor readers who had average word-recognition, phonological, and comprehension skills at grade 2, and who continued to have average phonological skills in grade 6, but whose reading comprehension fell below average in grades 5 through 8. Similarly, the children with SCD studied by Leach et al. (2003) had good word recognition and appar-
ently good reading comprehension in the early grades, but they dropped sharply in reading comprehension after grade 3. This later emergence of comprehension difficulties may relate in part to increases in vocabulary and comprehension demands across grades. For example, Chall et al. (1991) followed a group of low-income children who showed adequate reading progress in the early grades but appeared to lack the more abstract vocabulary important to good reading comprehension in the upper-elementary grades. Children’s vocabulary weaknesses started to become apparent in grade 4 but did not begin to have a significant impact on reading comprehension until about grade 6 or 7, with a progressive deterioration in reading comprehension thereafter.

Interestingly, Chall et al. (1991) found that a deceleration in vocabulary scores also was associated with a deceleration in word-recognition and spelling scores in the later grades, perhaps in part because morphemic and vocabulary knowledge become especially important to word recognition and spelling at these advanced levels (Ehri, 1992, 1997). For instance, a pure decoding process can yield an approximation of words such as *capillary* and *esophagus*, but some oral familiarity greatly facilitates accurate recognition and pronunciation of these kinds of words, and print exposure is important for accurate spelling of the words.

In this article, SCD is conceptualized in relation to reading comprehension rather than listening comprehension, similar to the conceptualization of Leach et al. (2003). Oral language comprehension weaknesses (e.g., a poor vocabulary) would be one common reason, but not the only possible reason, for SCD; another common reason would involve lack of knowledge, or lack of application, of reading comprehension strategies (e.g., Anderson et al., 1985; Garner, 1990; Kletzien, 1991). Other factors, such as limited background knowledge, also may underlie SCD. In terms of the model of typical reading development, children with SCD might be conceptualized as progressing normally into the phase of automatic word recognition before they experience difficulties. Then, they might go astray at two points, (1) in the automatic word-recognition phase, becoming nonstrategic readers, or (2) in the strategic reading phase, becoming suboptimal readers. These two patterns of SCD are shown in the top center portion of Figure 2 and in the last two rows of Table 2.

Nonstrategic readers fail to develop routine use of reading comprehension strategies and thus are very impaired with regard to strategy use and comprehension. Suboptimal readers go astray somewhat later in the process of reading acquisition and lack higher-order comprehension abilities; although they have the ability to use at least some reading comprehension strategies, they may lack some higher-level strategies. Thus, the two patterns of SCD differ primarily in onset and degree of reading comprehension impairment, with suboptimal readers somewhat less impaired than are nonstrategic readers. However, at advanced levels of schooling, such as high school and college, suboptimal reading may still create serious difficulties.
FIGURE 2
Patterns Involved in a Specific Comprehension Deficit (SCD) Profile

Highly Proficient Reading

Suboptimal Readers: Apparently normal prior development of word recognition, impaired higher-order reading comprehension

Nonstrategic Readers: Apparently normal prior development of word recognition, impaired use of reading comprehension strategies, impaired reading comprehension

Phonetic-Cue Word Recognition

Controlled Word Recognition

Automatic Word Recognition

Strategic Reading

Increasing higher-order comprehension abilities; reading comprehension equals or sometimes even exceeds listening comprehension

Routine use of comprehension strategies in reading; increasing vocabulary and background knowledge acquired through reading

Consolidation and use of larger letter patterns

Steadily increasing text fluency and comprehension

Ongoing oral language development, increasingly influenced by reading experience and volume

Rudimentary Phonological Awareness

Context-Free Word Recognition

Negative consequences of reading failure

Lowered motivation, lowered levels of practice, and lowered expectations

Increasing letter-pattern knowledge and phonemic awareness

Alphabetic insight; increasing letter-sound knowledge. Listening far exceeds reading comprehension

Increasingly decreasing reliance on context in word recognition

Steadily decreasing reliance on context in word recognition

Increasing letter-pattern knowledge and phonemic awareness

Increasing higher-order comprehension abilities; reading comprehension equals or sometimes even exceeds listening comprehension

- Increasing letter-pattern knowledge and phonemic awareness
- Alphabetic insight; increasing letter-sound knowledge
- Listening far exceeds reading comprehension

Phonetic-Cue Word Recognition

Visual-Cue Word Recognition

Rudimentary Phonological Awareness

Context-Free Word Recognition

Highly Proficient Reading
The model differentiates nonstrategic readers from delayed readers, who constitute one of the four patterns of RD. Both types of readers go astray at the same point in reading acquisition but for different reasons. Delayed readers have a delay in acquiring word-recognition skills, which has secondary effects on their acquisition of strategic comprehension skills. Nonstrategic readers make apparently normal progress in the early phases of learning to read but fail to acquire reading comprehension strategies for reasons other than a word-recognition delay. These other reasons could include inadequate comprehension instruction or reading experiences, broad oral language comprehension weaknesses, or lack of engagement or motivation.

Many comprehension strategies—for example, summarization and prediction—can be applied to listening as well as reading. Therefore, students with strategic weaknesses often show impairments in both listening and reading comprehension, especially if the listening measure involves text and tasks highly similar to the reading measure (e.g., Badian, 1999; Nation & Snowling, 1997). However, this is not always the case. For example, the children with SCD studied by Leach et al. (2003) functioned well within average range on a listening comprehension measure and had listening comprehension far above their level of reading comprehension. Furthermore, some children might show impairments on relatively narrow measures of listening comprehension but still have overall oral language comprehension—vocabulary knowledge, syntactic functioning, and pragmatic understanding—that is within average range.

Although the profile often associated with RD involves a specific word-recognition deficit, the elimination of discrepancy criteria would make poor readers with the other two cognitive profiles more likely to be classified as having RD. In order to obtain an SWRD profile, children must have broad language comprehension that is high compared to their word-recognition skill, which makes it more likely that they also will meet IQ-achievement and especially listening comprehension and reading comprehension discrepancy criteria. If these criteria were eliminated completely in favor of a treatment-resister definition of RD, as many researchers appear to favor (Speece & Shekitka, 2002), then children with other profiles of reading difficulty also could be identified as having RD—assuming that they failed to respond to research-based interventions in word recognition or comprehension.

The use of profiles, as well as the specific patterns of RD and SCD explained earlier, can be very helpful in early identification and intervention planning. For example, as shown in Table 3, all three profiles usually are associated with poor reading comprehension. However, children with poor reading comprehension related to a specific word-recognition deficit require a different kind of instructional program than do those whose difficulty involves a specific comprehension deficit. Furthermore, a child whose word recognition is inaccurate will have different instructional needs than will a child with accurate but nonautomatic word
recognition. Determining the underlying profile or pattern associated with poor comprehension is essential to designing appropriate intervention.

Possible Causes of Reading Disability

Although cognitive patterns and profiles are very useful educationally, they are at the level of psychological description; by themselves, they do not permit conclusions about the ultimate causation of children’s reading problems. For instance, children with SWRD may have intrinsic learning problems—a genuine RD—or they simply may have had inadequate experiences or instruction related to word recognition (Vellutino & Scanlon, 2002). Likewise, SCD may be caused by intrinsic language disorders or insufficient experiences with language. For example, adult, nonnative English speakers sometimes demonstrate a specific comprehension deficit profile in English (Chall, 1994); they may be able to transfer alphabetic skills learned in their native language to English fairly readily but may lack the experience with English vocabulary and broad language skills necessary for higher-level reading comprehension in English.

Knowing about the ultimate causation of individual cases is not necessary for making educational use of cognitive profiles. Poor readers who have deficits in key areas of reading need instruction in those areas, whether their difficulties relate to lack of experience or to intrinsic learning problems. However, knowledge about ultimate causation may have important implications for preventing reading difficulties, improving the effectiveness of intervention, and setting educational policy. Considerable research exists on the possible causes of RD, including both biological and environmental causes, as discussed next. Much of this research is relevant to understanding possible causes of GVPR and SCD as well as RD.

Biological Influences on Reading Disability

Genetic Influences. It has long been recognized that children with a family history of RD are at substantially increased risk of reading failure (Scarborough, 1998). By itself, this increased risk does not provide evidence that RD is genetically based because familial incidence also could be caused by environmental influences such as parents’ inability to provide a supportive home literacy environment for their children. However, recent research in behavioral genetics has provided strong evidence for genetic influences in at least some cases of RD. Behavioral-genetic studies typically have used traditional definitions of RD involving unexpected reading failure; thus, children from poverty environments or whose native language is not English would be excluded from the samples. The studies often have focused on families with a history of reading difficulties and have compared the incidence of RD in identical twins, who share identical genes, with the incidence of RD in fraternal twins, who share half their genes on average—the same as other siblings.
The outcomes of these studies consistently suggest a substantial role for genetic factors in word-level reading difficulties (Grigorenko, 1999; Olson, 1999; Olson & Gayan, 2002). (The possible role of genetic factors in comprehension difficulties has received less attention, but studies are beginning to focus on this area as well.) Genes involved in RD are generally believed to affect specific language abilities, such as phonological skills, that in turn affect reading, typically in more profound ways than they affect oral language comprehension (Olson & Gayan, 2002). Genetic influences appear strongest for higher-IQ poor readers and for readers who have a combination of accuracy and speed deficits in word recognition rather than deficits in word accuracy alone (Olson, 1999). Although research sometimes has implicated particular chromosomes as locations for genes involved in RD, specific genes for RD have not yet been identified, and genetic mechanisms may well vary across families (Grigorenko, 1999). Thus, it currently is not possible to perform a genetic test for susceptibility to RD, although it may be possible to do so in the future.

**Structural and Functional Brain Differences.** Genetic influences may result in differences in early brain development and structure in individuals with RD. Research on structural brain differences has focused on areas of the brain involved in language processing and reading, such as the planum temporale, an area on the surface of each temporal lobe behind the primary auditory cortex. However, research findings on structural brain differences between individuals with and without RD have been inconsistent (Pennington, 1999). Moreover, sometimes these findings have been difficult to interpret because of incomplete knowledge about the range of structural variation in normal individuals and individuals with disorders that may co-occur with RD (such as ADHD).

Shaywitz (2003) maintains that functional, not structural, brain differences characterize individuals with RD. Functional brain differences have been studied using a noninvasive and nonradiological technique, functional magnetic resonance imaging (fMRI). According to Shaywitz (2003), fMRI studies suggest that RD is associated with a “wiring glitch” (p. 82) in posterior brain systems involving phonological aspects of reading and the development of automatic word recognition. Recent work is beginning to examine possible biological antecedents of RD in very young children. For instance, in research using evoked potentials, electroencephalographic (EEG) data are recorded while the participant responds to different stimuli such as flashes of light or spoken words. Because of the noninvasive, nonradiological nature of this technique, like fMRI, it can be used with young children. Researchers interested in RD have even employed the technique with infants. Preliminary studies involving event-related potentials during phoneme discrimination tasks have suggested differences between infants with and without a family history of RD (Leppanen, Pihko, Eklund, & Lyytinen, 1999). In addition, preschool language disorders tend to presage reading
problems (Scarborough, 1998), and research is currently underway to examine whether there is a shared genetic etiology between these kinds of early language difficulties and later RD in school-age children (Olson & Gayan, 2002).

**Other Biological Influences.** Research has implicated some other possible biological influences on reading difficulties, including repeated episodes of otitis media with effusion (middle ear fluid associated with ear infections; Roberts & Burchinal, 2002), very low birthweight due to prematurity or other prenatal problems (Samuelsson, Finnstrom, Leijon, & Mard, 2000), and lead poisoning (Centers for Disease Control and Prevention, 1997). However, many of these influences tend to affect overall language development and cognition; that is, they may be more likely to result in GVPR than in the SWRD profile characteristic of RD. Nevertheless, these kinds of factors are important—and often preventable—causes of reading difficulties.

**Some Caveats.** As the preceding discussion suggests, there is a biological substrate for some cases of RD. However, biological influences do not render intervention pointless. Many behavioral geneticists have emphasized that genes are expressed only in interaction with the environment; indeed, the same evidence that suggests a substantial role for genetic influences in RD also indicates the importance of shared family environment (Olson, 1999). Even if some cases of RD are related entirely to genetic inheritance, RD is not necessarily inevitable in such individuals. For example, an individual may inherit a strong genetic susceptibility to colon cancer but may be prevented from ever developing the disease through frequent screening and removal of polyps. However, genetic testing in such cases of RD could be an important tool for early identification and intervention. Likewise, structural or functional brain differences do not necessarily mean that an individual is condemned to poor reading because the brain has considerable plasticity, particularly in young children. For instance, fMRI studies indicate that struggling readers who are given effective early reading interventions develop patterns of brain functioning comparable to those of good readers (Shaywitz, 2003). Experience and learning influence the brain, including the actual physical structure of cells as well as their chemical contents (Grigorenko, 1999).

**Environmental Influences on Reading Disability**

The studies described in the previous section usually focus on a relatively small subset of poor readers whose reading failure seems most likely to relate to intrinsic characteristics (Olson, 1999). Other research using treatment-resister models—in which more diverse groups of poor readers are provided with research-based interventions and reading outcomes are assessed over time—suggests that most cases of reading failure in beginning readers involve experiential or instructional factors rather than intrinsic learning problems (Al Otaiba, 2001; Vellutino & Scanlon, 2002). Of course, even in genuine cases of RD, environmental influences are important. In this
Preschool Influences. Research on early literacy has emphasized the fact that environmental influences on children’s reading begin very early in the preschool period. Individual differences in language- and literacy-related knowledge are well established before children enter kindergarten (see, e.g., Neuman & Dickinson, 2002). One very important set of influences during this period is the amount and quality of adult–child interactions involving language. Hart and Risley (1995) studied language development in a group of socioeconomically diverse children, beginning when the children were under 1 year old. Intensive, extended observations of the children’s family lives revealed that the most striking difference among families was in the sheer volume of language exposure that children received, with children from the highest socioeconomic group hearing, on average, more than three times as many words per hour as those from the lowest socioeconomic group. Although differences in volume of language were linked to socioeconomic status (SES), amount of language stimulation and the nature of adult–child interactions emerged as more critical factors in children’s language development than SES itself. These differences in children’s early experiences with language were strongly associated with differences at age 3 in children’s vocabulary size and growth rate, as well as to differences in children’s school performance at age 9.

Another important set of environmental influences during the preschool period involves children’s early experiences with literacy, such as shared book reading, opportunities to write, and exposure to letters and print. Similar to Hart and Risley’s (1995) findings for oral language development, global indicators of home literacy, such as SES, appear less effective in predicting children’s developmental outcomes than are more direct measures of what adults actually do with children to foster early literacy, such as the amount of shared reading (Burgess, Hecht, & Lonigan, 2002). The two broad areas of early literacy development—oral language and print-related knowledge (e.g., basic print concepts, knowledge about letters, and phonological awareness)—appear to be connected in the preschool period (Dickinson & Sprague, 2002). For example, a threshold level of vocabulary development appears necessary for children to begin to develop phonological awareness (Whitehurst & Lonigan, 2002). However, early literacy experiences are multifaceted and may affect the two domains of development somewhat differently. For instance, reading to children appears to have its primary impact on oral language development, whereas activities involving sounds and letters—such as playing with magnetic letters, rhyming games, and parental attempts to teach the alphabet—may more directly influence print-related knowledge (Burgess et al., 2002; Whitehurst & Lonigan, 2002).

Reading to children appears to be an especially important source of new vocabulary. Hayes and Ahrens (1988) found that preschool children’s books
were much better sources of sophisticated vocabulary than were educational television shows for preschoolers such as Sesame Street; in this age group, books were approximately on par with the everyday language of parents who were college graduates speaking to other adults. As children move into the elementary years, children’s books become substantially better sources of new vocabulary than is parental speech, with even comic books surprisingly good sources for exposure to new word meanings (Hayes & Ahrens, 1988).

Influences During Formal Schooling. Once children enter school, variables related to beginning reading instruction are key influences on their reading achievement. Research has focused especially on word-recognition instruction during the early elementary grades because of the importance of skilled word recognition to success in beginning reading and the prevalence of word-recognition difficulties in poor readers. Moreover, word-recognition instruction is especially relevant in considering possible causal influences on RD, because difficulties in this area are central to traditional conceptualizations of RD.

The strategies that beginners use to read words—not only in English (Byrne, 1992; Seymour & Elder, 1986) but also in more transparent languages such as Portuguese (Cardoso-Martins, 2001)—are influenced strongly by methods of instruction. Most beginning readers do not infer the alphabetic principle or letter–sound relationships automatically simply from exposure to print or even from whole-word teaching. Rather, beginning readers in general, and at-risk children in particular, benefit from explicit, systematic instruction in phonemic awareness and phonics (Anderson et al., 1985; National Institute of Child Health and Human Development [NICHD], 2000; Snow, Burns, & Griffin, 1998). Explicit means that important letter–sound relationships and patterns are taught directly; systematic means that instruction is planful and sequentially organized (e.g., children are not expected to decode long, complex words before they can decode simpler one-syllable words). Manipulative activities—such as sorting word cards with similar letter patterns, building words with letter tiles, and writing letters for sounds—can be very effective ways of teaching phonics to at-risk children (e.g., Juel & Minden-Cupp, 2000, see #13 this volume; McCandliss, Beck, Sandak, & Perfetti, 2003). For many at-risk children, relatively short-term instruction in phonemic awareness and phonics appears to be successful. For instance, the National Reading Panel (NICHD, 2000) concluded that effective phonemic awareness programs often last less than 20 hours in total; Juel and Minden-Cupp (2000) found that at-risk children did especially well with a first-grade teacher who began instruction with a heavy dose of phonics for the initial half of the school year but provided a greater emphasis on vocabulary and comprehension beginning in February.

Another important influence on children’s reading development during formal schooling involves the resources available to schools and how those re-
sources are used. Duke (2000) contrasted the print environments of very low-SES and very high-SES first-grade classrooms and found pervasive differences in children’s exposure to and experiences with print. On average, relative to children at high-SES schools, those at low-SES schools had fewer books and magazines available in the classroom library, fewer opportunities to use the library, fewer opportunities to choose what they read, and less experience with extended forms of text. These differences are especially disturbing because low-SES children also tend to have fewer print resources at home than do high-SES children. In other words, rather than helping to equalize opportunities to learn for children from different SES groups, formal schooling may sometimes serve to exacerbate those differences.

Scarborough (1998) notes that the relation between SES and reading achievement is more complex than is sometimes realized. Specifically, the relation is much stronger at the level of the school than at the level of individual students’ families. In an extensive review, White (1982) found that the average correlation between individual students’ SES and their achievement was a modest .23. However, with data aggregated at the level of the school (i.e., average SES of schools correlated with average achievement at the same schools), the correlation was much higher at .68. These findings are consistent with the idea that differences among low- and high-SES schools are important influences on reading achievement.

Other influences connected to formal schooling may affect reading development in older children. For instance, Snow (1991) found that a group of low-income adolescents—including some who were very able students and avid readers—tended to select undemanding materials for independent reading. Many of the adolescents were in relatively unchallenging courses in high school. Snow argues that wide reading outside of school does not substitute for exposure to higher-level reading tasks and rigorous content in school. Like low-SES students, special education students also may experience barriers to content learning, even when they are included in content area courses. Palincsar and her colleagues (Palincsar, Collins, Marano, & Magnusson, 2000; Palincsar, Magnusson, Collins, & Cutter, 2001) studied the participation and learning of special education students, most of whom were identified as learning disabled, in upper-elementary classrooms during guided inquiry science instruction. They found that identified students did not have equal access to participation, even when they had worthwhile ideas during oral discussions, perhaps because of the stigmatizing effects of their reading difficulties or their labels.

Unlike word-recognition instruction, comprehension instruction has been considered less often as a possible causal influence on RD. Children with RD traditionally are defined as having relatively strong oral language abilities, and the assumption generally has been that, with remediation of their word-recognition difficulties, they would progress normally in reading. However, ineffective
comprehension instruction certainly may exacerbate or complicate RD. In their study of K–5 resource rooms for children with LDs, one group of researchers (Moody, Vaughn, Hughes, & Fischer, 2000; Vaughn, Moody, & Schumm, 1998) found little or no attention to comprehension occurring during reading instruction. Most comprehension activities involved asking children literal questions about material they had read. Teachers often were overwhelmed with groups so large—as many as 19 children at a time, sometimes spanning four or five grade levels in reading achievement—that individualizing instruction was impossible. No significant gains in reading comprehension were made by students during the term of the study. Lack of attention to comprehension in reading instruction might well compound the difficulties of children with RD, particularly as they advance beyond the elementary grades and the texts used in school become more demanding in terms of comprehension. Of course, many special educators recognize the importance of addressing reading comprehension in instruction. For example, Rankin-Erickson and Pressley (2000), in a study of special education teachers nominated by their supervisors as effective teachers of elementary students with RD, found that these teachers reported teaching comprehension strategies and critical thinking as well as word decoding and basic skills.

Comprehension instruction might be a more direct causal influence on the reading difficulties of garden-variety poor readers and those with SCD. For instance, vocabulary is a critical component of comprehension, and children vary tremendously in their exposure to vocabulary in the preschool years, as Hart and Risley (1995) demonstrated. For children with the lowest levels of language exposure, intensive preschool intervention may be warranted. Other children with vocabulary weaknesses might be helped by attention to vocabulary instruction in the early grades, whereas by the later elementary grades, children’s cumulative vocabulary deficits might be very difficult to overcome (Biemiller, 2001). In addition, the observations of Chall et al. (1991) and Snow (1991) suggest that, for some low-SES children who do well in reading in the early grades, insufficient comprehension instruction or reading challenge may contribute to the emergence of SCD in the later grades.

A somewhat different kind of causal influence on children’s reading during formal schooling involves influences stemming from individual differences in reading acquisition. Stanovich (1986, see #17 this volume) has termed these “Matthew effects” in reading, after the Biblical phrase about the rich getting richer and the poor getting poorer. For example, children who are initially successful in reading tend to get more practice reading than do poor readers, both in and out of school. Good readers are more likely than poor readers to have a wide array of experiences that further encourage and foster reading, such as reading interesting books, receiving books as gifts, or being commended for their expertise as readers. Children who are poor readers may become aware of their reading problems quite early and quickly lose motivation for reading (Chapman & Tunmer, 1997).
Because reading itself contributes to the development of important linguistic and cognitive abilities, individual differences in learning to read also may have broad effects on background knowledge and language over time. In fact, Stanovich (1991) suggests that some children with RD eventually may develop a garden-variety poor reader profile as their originally circumscribed word-recognition difficulties have a spreading effect on other areas of language and knowledge. (However, a number of studies have failed to find this spreading effect in individuals with RD; see, e.g., Parker, 2003.) Although these kinds of influences are by definition secondary to the original causes of children’s reading problems, they may sometimes serve to complicate and intensify children’s reading difficulties.

**Different Causal Models of Reading Disability**

In the cognitive literature on RD, debates about causation often have revolved around the issue of unitary versus multiple deficit models of causation. For example, some investigators (e.g., Shankweiler et al., 1992) have argued that the range of difficulties seen in RD—including poor phonemic awareness, serial naming speed, verbal short-term memory, word decoding, and reading comprehension—can be traced to a single underlying phonological deficit, whereas others (e.g., Sunseth & Bowers, 2002; Wolf & Bowers, 1999) view deficits in naming speed and phonemic awareness as somewhat more separable difficulties that may affect different aspects of reading (and perhaps also spelling). In the latter view, children with deficits in one area—phonemic awareness or naming speed—are at increased risk of reading problems, but those with a “double deficit” are at the greatest risk for serious reading difficulties.

Although these debates are important for both theoretical and practical reasons, they do not address *ultimate* causation such as the underlying cause of the phonological deficit. For example, a child might have a phonological deficit because of an underlying genetic vulnerability or lack of instruction in important phonological reading skills. In educational identification of RD, processing measures do not, by themselves, allow educators to determine whether a child has a processing disorder (i.e., an intrinsic learning problem). However, a treatment-resister approach, involving appropriate reading-related measures in conjunction with research-based teaching in deficient areas, might help to rule out instructionally based causes of apparent processing weaknesses.

Interactive models of RD, such as the one discussed here, are by definition multiple-deficit models because even a unitary intrinsic deficit is expressed only in interaction with extrinsic factors. For instance, a child who inherits a genetic vulnerability to RD that is expressed as a unitary phonological deficit might still learn to read well with appropriate intervention and instruction. Therefore, the development of an RD—as well as other cases of poor reading, such as GVPR or SCD—can be understood only by considering both intrinsic and extrinsic causes.
Finally, cognitive researchers interested in RD have observed that, especially in the preschool period, children’s oral language deficit profiles may change over time (Scarborough, 2002). Among the youngest preschoolers, syntactic and speech production abilities tend to be most deficient in the children who subsequently go on to develop reading problems, whereas later in the preschool period, vocabulary and phonological awareness problems are more prominent in these children. Children with a history of early language impairment are at increased risk of reading difficulties even if they appear to have caught up to typically developing peers by the time they enter kindergarten. Scarborough (2002) suggests that these observations might be explained by a unitary, underlying language disorder that manifests itself somewhat differently at different points in development. Apparent changes in children’s language deficit profiles could relate in part to the fact that preschool language development is not linear but rather involves growth spurts and plateaus. Language deficits may be harder to detect if the deficit area is measured during a period when normally developing children are in a plateau, especially in mild to moderate cases of language impairment. Of course, extrinsic variables, such as early language and literacy experiences, also could affect the manifestation of language deficits in different areas.

Reading Instruction and Intervention

Experience and instruction are powerful influences on children’s reading achievement, including the achievement of poor and at-risk readers. Thus, effective general education instruction can play an important role in preventing reading problems, including some cases of RD. Many authorities (e.g., Anderson et al., 1985; NICHD, 2000; Pressley, 1998; Snow et al., 1998) have emphasized the importance of a comprehensive approach that develops a range of abilities known to be important in learning to read, including phonemic awareness, word decoding, oral reading fluency, vocabulary, and comprehension. In addition, the reading curriculum should reflect what is known about the process of reading development rather than putting equal emphasis on the same abilities in every grade. For instance, most children in kindergarten and the beginning of first grade are phonetic-cue readers and will need a much greater emphasis on phonemic awareness and basic letter-sound knowledge than will typical second or third graders. Within a grade, different children also may need different emphases in instruction. For example, unlike typical third graders, a third-grade inaccurate reader still might need work on phonemic awareness and letter-sound knowledge as part of a broader program of reading instruction.

Effective reading instruction requires teachers to have a broad knowledge base about language, literacy, children’s development, and individual differences that may affect learning to read. One line of research has focused on professional development aimed at increasing teachers’ knowledge about various aspects of
reading, including both word decoding and comprehension, with the ultimate goal of improving children’s achievement. Usually these studies have involved inservice teachers with some prior preparation and experience in teaching reading. Several investigators (e.g., McCutchen et al., 2002; McCutchen & Berninger, 1999; O’Connor, 1999) have found that developing educators’ knowledge base about English word structure and phonemic awareness leads to improvements in their students’ phonemic awareness, basic reading ability, and spelling skills. Professional development efforts aimed at comprehension and content learning also can improve student achievement (e.g., Palincsar, Collins, et al., 2000; Palincsar, Magnusson, et al., 2001).

Although effective classroom reading instruction may prevent many cases of reading failure, some children still need more individualized, intensive teaching in order to learn to read. Without intervention, children who experience reading difficulties generally continue to struggle (Juel, 1988), and their reading problems tend to become harder to remediate as the children advance in school. Unfortunately, despite early intervention, some children may continue to need long-term support in reading. Other children’s difficulties may not emerge until the later grades, as in the case of SCD, or may reemerge after an earlier intervention that at first appeared to be successful (Scarborough, 2002). Thus, providing both early intervention efforts and services to older poor readers is essential.

In the remainder of this section, I will discuss a variety of instructional methods and interventions for children with RD and other poor readers to develop a range of reading-related abilities. Linkages between instruction in one particular ability and the rest of a child’s program are very important. For instance, if children are taught word-decoding skills in one component of the curriculum but are not encouraged to apply those skills in reading text, then the word-decoding instruction may be ineffective. This section concludes with some examples of comprehensive programs for helping poor readers, including both young elementary children and older struggling students.

**Early Language and Literacy Skills**

Because individual differences in language and early literacy knowledge are well established by the time children begin formal reading instruction, interventions in recent years have focused increasingly on preschool and kindergarten children. These interventions have emphasized developing oral language abilities, phonological awareness, and print-related knowledge (such as basic print concepts and letter knowledge), especially in at-risk children (e.g., Dickinson & Sprague, 2002; Notari-Syverson, O’Connor, & Vadasy, 1998; O’Connor, Notari-Syverson, & Vadasy, 1998a, 1998b; Whitehurst & Lonigan, 2002). Target children have included those at risk because of poverty, as well as those with mild disabilities or weaknesses in phonological and other linguistic abilities. Teacher professional development frequently is a component of these approaches. The
kinds of activities used in early literacy interventions—such as shared storybook reading, emergent writing, and rhyming or alliterative games—may be especially helpful to some nonalphabetic readers.

Many experimental studies (see Bus & van IJzendoorn, 1999, for a review) have demonstrated that phonological and phonemic awareness instruction benefits children’s basic reading and spelling skills. Phonemic awareness instruction is particularly effective when integrated with teaching of letter–sound correspondences. The meta-analysis of the National Reading Panel (NICHD, 2000) found benefits of phonemic awareness instruction for reading comprehension as well as word reading, and for at-risk and disabled readers as well as typical beginning readers. Effect sizes were especially large at the preschool level (see, e.g., Byrne & Fielding-Barnsley, 1995). Interactive computer programs also show promise as a way to foster phonological awareness in young children (Foster, Erickson, Foster, Brinkman, & Torgesen, 1994).

Overall, research indicates that early literacy interventions can be successful in giving children a better start in reading in kindergarten and first grade. For instance, O’Connor et al. (1998a) demonstrated that their program, Ladders to Literacy, improved the phonological awareness, reading, and spelling skills of both special education and general education children, with benefits sustained over a year after the initial intervention. These kinds of findings are very encouraging given the importance of beginning reading in predicting later reading achievement. However, most early literacy interventions are too new to know whether they prevent reading failure beyond the early grades.

**Word-Decoding Accuracy**

Development of word-decoding accuracy through phonics instruction is a key need for nonalphabetic and inaccurate readers. Phonics instruction may emphasize synthetic blending strategies at the phoneme level (e.g., sounding out *stack* by blending /s/, /t/, /a/, and /k/), utilize larger subsyllabic units such as onsets and rimes (e.g., sounding out *stack* by blending the onset /st/ with the rime /ack/), or teach decoding by analogy (e.g., decoding *stack* based on its similarity to a known word such as *back*). Integration of phonemic awareness instruction with phonics teaching is important and may require particular emphasis for children with RD, who often have deficits in phonemic awareness. After they can decode simpler words, children need to be taught strategies for decoding multisyllabic words, such as structural analysis and looking within words for morphological units (e.g., *un* in *unwise*, or *know* in *knowledge* and *knowledge-able*). Many of these strategies are useful for building vocabulary and spelling knowledge as well as word-decoding skill.

The meta-analysis of the National Reading Panel (NICHD, 2000) found a clear advantage for explicit, systematic phonics instruction as compared to a variety of unsystematic phonics or no-phonics programs. The panel did not find a
significant difference in efficacy between systematic phonics programs emphasizing the blending of individual phonemes and systematic phonics programs emphasizing larger units such as onsets and rimes. Phonics instruction benefited not only children’s word decoding but also their spelling and reading comprehension. Benefits were found for beginning readers in general; for younger, at-risk readers, including those at risk because of poverty; and for older children diagnosed with RD based on discrepancy definitions. Interestingly, older children with a garden-variety poor reader profile were not found to derive these same benefits from phonics instruction, perhaps because their poor reading also related to general language limitations. However, the number of studies addressing this population was relatively small, so lack of power to detect a genuine benefit of phonics for garden-variety poor readers also may have been a factor.

Word-building activities with letter cards or tiles may be very effective in phonics instruction. McCandliss et al. (2003) used a word-building activity requiring weak decoders to focus on minimal contrasts in words. In this activity, children used letter cards to form a series of words where each word differed from the preceding word only by a single letter (e.g., sat to sap to tap to top). Children in the word-building intervention made significantly greater improvements than a control group in phonemic awareness, word decoding, and reading comprehension. Phonics teaching also can include active discovery of word patterns, as in a “word detectives” approach (see, e.g., Gaskins, Ehri, Cress, O’Hara, & Donnelly, 1996/1997). In this approach, children are encouraged to compare unknown words with known words to analyze and talk about word structure, and to form hypotheses about letter–sound relationships based on their observations of words (e.g., when a vowel is followed by the letter r, the vowel sound changes).

Several programs have been developed specifically for children with severe decoding deficits. For instance, the Lindamood Phoneme Sequencing (LiPS) program (Lindamood & Lindamood, 1998) emphasizes the use of articulatory cues (e.g., classifying sounds according to how they are formed with the lips and tongue and whether or not they involve voicing) in developing children’s phonemic awareness and word-decoding skills. Several studies have found the LiPS program effective in improving the word-reading skills of children with RD, including some children with very severe reading difficulties (Alexander, Anderson, Heilman, Voeller, & Torgesen, 1991; Torgesen, Wagner, Rashotte, Alexander, & Conway, 1997). Another program, designed for older students and based on the Orton–Gillingham multisensory approach (see, e.g., Gillingham & Stillman, 1997), is the Wilson Reading System (Wilson, 1996). An extensive review of programs for secondary-level struggling readers (Peterson, Caverly, Nicholson, O’Neal, & Cusenbary, 2000) rated the Wilson Reading System as promising for older poor readers with decoding deficits. Instruction involves a 10-part lesson plan that focuses largely on word decoding, spelling, and reading.
phonetically controlled text, although in the later stages of the program students are expected to read uncontrolled texts.

As compared to younger, normally achieving readers, children with RD often require particularly intensive, structured teaching of phonics and phonemic awareness. It is not yet clear whether these children benefit more from one specific type of systematic phonics approach than from others. Some authorities (e.g., Anderson et al., 1985; Beck & Juel, 1995; Chall, 1983a) have concluded that synthetic blending approaches to phonics are more effective than are analytic (i.e., learning phonics by analyzing whole words) approaches, especially for at-risk populations. However, even for children with RD, the National Reading Panel (NICHD, 2000) did not find an advantage in phonics approaches emphasizing the phoneme level over larger unit approaches. For example, Lovett and her colleagues (Lovett et al., 2000) compared a synthetic phonics program based on Engelmann’s (1980) Direct Instruction model—which emphasizes blending individual phonemes into words—with one adapted from the Benchmark program (Gaskins et al., 1988), which emphasizes larger subword units and decoding by analogy. Both approaches were found to be similarly effective in improving the word-reading and comprehension skills of children (ages 6 to 13) with serious reading difficulties. More recently, Lovett, Barron, and Benson (2003) have argued that a combination of synthetic-blending and larger-unit approaches to decoding is more effective than is either approach alone.

The details of phonics teaching in a given approach (e.g., the extent to which individual phoneme–grapheme relationships are taught directly, whether and how phonemic awareness is taught, the amount of time devoted to various aspects of phonics) undoubtedly are important. Also, children may respond differently to a specific approach depending on their underlying profile of abilities and their phase of reading development. Given the key role of phonemic awareness in learning to read an alphabetic language, as well as the utility of phonemic blending strategies in decoding long words, ultimately it seems essential for children to be able to use these kinds of strategies. Nevertheless, phonics approaches emphasizing larger units, taught systematically, appear very effective with some children, including some with serious reading problems. Moreover, given the nature of the English writing system, which requires attention to letter patterns and to individual letters within words, a combination of phonemic-blending and larger-unit strategies may ultimately be most successful, as Lovett et al. (2003) suggest.

**Reading Fluency**

Nonautomatic readers require an emphasis on developing automatic word recognition and fluent reading. Sufficient reading practice is very important in fluency development. Although poor readers are much less likely than are good readers to read independently, effective teachers can find ways to motivate reading in
students from a range of achievement levels (Ruddell, 1995; Ruddell & Unrau, 1994, see #51 this volume). For instance, teachers can allow choices of reading material, increase students’ familiarity with favorite authors or book series, and encourage peer recommendations of books (Gambrell, Codling, & Palmer, 1996). Because it is very difficult for children to build fluency in texts that they cannot read accurately, poor readers must have access to independent reading materials at appropriate reading levels, as well as from a range of genres and topics.

Some nonautomatic readers, such as those with naming deficits, appear to have particular problems developing fluency. These children may benefit from more focused fluency-building techniques. Two such techniques involve repeated reading of connected text (e.g., Samuels, 1979) and speed drills on isolated words or phrases presented out of context (e.g., Fischer, 1995). In the former approach, students reread an instructional-level passage until they reach a preestablished criterion for rate, with the procedure repeated for increasingly difficult passages. In the latter approach, students read individual words out of context until they meet a predetermined rate criterion, with different or more difficult words used in subsequent trials. The words may involve common sight vocabulary or irregular words, or they may be selected to represent a phonetically regular pattern (e.g., consonant–vowel–consonant words with the vowel a) that children can decode accurately but on which they need to build speed. In both approaches, fluency-training sessions typically are relatively brief, from a couple of minutes for isolated word drills up to 15 or 20 minutes for some approaches using passage rereading.

In a literature review on methods of increasing fluency, Meyer and Felton (1999) conclude that both repeated reading of text and isolated word or phrase drills may be effective in improving fluency. Fluency practice should occur in texts that students can read with at least 90% to 95% accuracy, and texts should be read three or four times for optimal benefit. However, Meyer and Felton found mixed results for transfer of fluency instruction to comprehension. Assessment of gains in comprehension is complicated by (a) the fact that good comprehension draws from many other abilities besides fluency, (b) problems with accurate assessment of reading comprehension, and (c) variables such as children’s age and reading development phase.

Several promising programs specifically target children with fluency difficulties. For example, RAVE-O (Retrieval, Accuracy, Vocabulary, Elaboration-Orthography), developed by Wolf and her colleagues (Wolf & Bowers, 1999; Wolf, Miller, & Donnelly, 2000) and used in conjunction with the synthetic phonics program of Lovett and her colleagues (e.g., Lovett et al., 2000), is a comprehensive approach to building fluency. The RAVE component of the program emphasizes multiple meanings of decodable core words (e.g., bat meaning something used to hit a ball vs. a winged mammal); the O component emphasizes automatic pattern recognition of word parts, such as common rimes, prefixes, and

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suffixes, with the idea that reading speed is facilitated by chunking of word parts. RAVE-O also includes the use of computer games, repeated reading of text, and word webs to build vocabulary and comprehension.

The Great Leaps program (Campbell, 1995; Mercer, Campbell, Miller, Mercer, & Lane, 2000) can be used with a wide range of students from the primary grades through adulthood. The program supplements existing reading instruction and can be used in as little as 5 to 7 minutes daily. Instruction is delivered on a one-on-one basis. Students read isolated word and phrase lists, as well as instructional-level passages, in 1- or 2-minute segments. Tutors provide feedback and model fluent reading. In a study using the Great Leaps program with middle school students identified with LDs, Mercer et al. (2000) found that the program significantly improved students’ reading rate and instructional reading levels as measured by curriculum-based measures.

There is widespread agreement among authorities (e.g., NICHD, 2000; Samuels, 1979; Snow et al., 1998; Wolf & Katzir-Cohen, 2001) that fluency should be addressed directly in reading instruction, along with other important areas of reading. Because accurate word decoding is necessary (though not sufficient) for the development of fluency, many fluency approaches incorporate a systematic phonics component. Even after developing accurate decoding, some children appear to need a greater instructional emphasis on fluency than do others. However, effective techniques for improving fluency do not necessarily require large amounts of instructional time. Investigators have emphasized that, although fluency development plays an important role in reading comprehension, the development of comprehension abilities may also facilitate fluency. That is, the relation between fluency and comprehension may be a reciprocal one—with causality running in both directions (Meyer & Felton, 1999)—similar to the relation between phonemic awareness and word decoding. This view reinforces the importance of integrating fluency instruction into a more comprehensive program that also addresses vocabulary and comprehension.

**Vocabulary and Comprehension**

Vocabulary and oral language comprehension are not core problems for children with the traditional cognitive profile of RD involving a specific word-recognition deficit. However, like all children, children with RD need vocabulary and comprehension instruction as part of a broader program of reading development. Moreover, lack of higher-level reading experiences, inadequate comprehension instruction (e.g., Moody et al., 2000; Vaughn et al., 1998), and limited task persistence that may be a long-term consequence of academic failure (Gersten et al., 2001) all may combine to produce reading comprehension weaknesses in children with RD, even though they have good oral comprehension and even when they are reading material that they can decode accurately. This pattern is typical of delayed readers. In contrast, garden-variety poor readers have difficulties in oral as well
as reading comprehension; these students require additional instructional emphasis on developing vocabulary and comprehension skills in both listening and reading. In the case of students with SCD, including both nonstrategic and suboptimal readers, it would be important to determine whether their comprehension difficulties are associated with generalized oral language comprehension problems and to provide remediation in this area if needed.

For beginning readers and children with RD, oral language is an especially critical vehicle for building vocabulary and comprehension. Some readers with RD may be able to decode only very simple text, which provides little opportunity for exposure to new vocabulary or higher-level comprehension skills. However, the same children may be quite capable of understanding and discussing age-appropriate texts that the teacher reads to them. Oral and written exposure to a variety of text types, including expository as well as narrative text, also is vital. Sensitivity to text structure, which differs across text types, is important to comprehension, and some of the comprehension difficulties of children with LD relate to poor awareness of text structure (Gersten et al., 2001).

Much of the variance in children’s comprehension can be accounted for by individual differences in vocabulary (Stahl, 1999). Some investigators have argued that fostering the ability to infer word meanings from context, during either reading or listening, is a more effective way of developing vocabulary than is trying to teach a large number of specific words (e.g., Sternberg, 1987). However, one problem with learning words from context is that the very children who need to build vocabulary the most may be the least likely to encounter new words through reading (because they do little independent reading) or may be the least skilled at using contextual cues to infer word meanings.

A number of authorities (e.g., Beck, McKeown, & Omanson, 1987; Biemiller, 2001) have found that direct teaching of specific vocabulary words can be highly effective under certain conditions. Beck et al. (1987) suggest that vocabulary development should involve “rich instruction” (p. 149) that requires students to manipulate words in a variety of ways (e.g., relating new words to their own experiences and explaining associations among words), with much discussion of words. As opposed to traditional vocabulary instruction in which students study a set of new words each week from a workbook, rich vocabulary instruction provides students with many encounters with new words and requires them to use words outside vocabulary lessons. Words targeted for rich instruction should be chosen carefully with regard to their general utility and their relation to the overall curriculum. Beck et al. recommend that vocabulary instruction focus on “second tier” words—unusual words that children are unlikely to know but that also have relatively high generalizability across texts. For example, for typical third graders “second tier” words might be discourage and amazement, as opposed to common “first tier” words such as house and kitchen or “third tier” words such as falcon and talons (i.e., unusual words that may be important for understanding
Biemiller (2001) argues that most children can learn vocabulary at normal rates if given the opportunity to do so through systematic teaching of vocabulary beginning in the early grades. He suggests that instruction should emphasize common root words necessary to vocabulary development at various grade levels, as well as focus on deriving word meanings from prefixes, suffixes, and word families.

Another critical aspect of comprehension involves the ability to employ comprehension strategies such as summarization, prediction, inferencing, generating questions, and using graphic and semantic organizers (Pearson & Dole, 1987; Pressley, Harris, & Marks, 1992). Strategy instruction is important for all children, but especially for nonstrategic and delayed readers, who are particularly impaired in this area. For both normally achieving and struggling readers, teaching a combination of strategies appears to be more effective than is relying on a single strategy (Gersten et al., 2001; NICHD, 2000). Teacher modeling, think-alouds, and small interactive groups can be very effective in comprehension strategy instruction. Peterson et al. (2000) provide an excellent review of different approaches to strategy instruction that have been effective with middle school and secondary-level struggling readers.

Gersten et al. (2001) note a shift over several decades from strategy instruction emphasizing structured, explicit teaching of a series of steps (see, e.g., the Strategic Instruction Model described in Peterson et al., 2000) to a more fluid and flexible, but extensive, discussion of text (e.g., Ruddell & Unrau, 1994, see #51 this volume). In the latter approaches, including those such as Questioning the Author (Beck, McKeown, Sandora, Kucan, & Worthy, 1996) and reciprocal teaching (Palincsar & Brown, 1984), strategies such as summarization may be taught, but the emphasis is on careful reading and thoughtful reflection more than on acquisition of specific strategies. In their thorough review of research on comprehension instruction for students with LD, Gersten et al. (2001) conclude that structured, explicit instruction in well-defined strategies appears to be desirable for this population.

However, the optimal approach to comprehension instruction also might vary depending on the underlying cognitive profile of the struggling reader. For instance, students with weak oral language comprehension might require a different approach to reading comprehension instruction than do students with a specific word-recognition deficit but strong oral comprehension abilities. Likewise, students with a specific comprehension deficit who have good oral language comprehension but poor strategy knowledge might benefit from a different approach than do students with SCD who have poor oral language comprehension. Moreover, students whose oral language abilities are weak because of insufficient exposure to vocabulary and language might respond differently, or more rapidly, to instruction than do those with genuine language disorders.

Research using a treatment-resister model and differentiation of poor reader profiles, with a focus on comprehension instruction, could help to clarify these issues.
Examples of Comprehensive Approaches for Remediating Reading Difficulties

Many comprehensive programs that address multiple areas of reading (e.g., word decoding, fluency, and comprehension) exist for remediating reading difficulties. Although an extensive review of these programs is beyond the scope of the article, four programs exemplifying a range of approaches for addressing reading problems will be discussed briefly: Success for All, Reading Recovery, READ 180, and LANGUAGE!

Success for All. Success for All (SFA) is an extensive school reform model originally developed by Slavin, Madden, and their colleagues (e.g., Slavin et al., 1996; Slavin, Madden, Dolan, & Wasik, 1996) at Johns Hopkins University in Baltimore, Maryland. The model has been used most commonly in large, economically needy urban school districts with a history of widespread reading failure. SFA has a Spanish as well as an English version. The reading curriculum—called Roots in the beginning elementary grades and Wings at the upper-elementary level—is highly structured with specific materials, assessments, lesson plans, and time allotments for various activities. Homogeneous grouping, sometimes across grades, is used. Both Roots and Wings involve a 90-minute reading period in which important reading-related abilities, including oral language comprehension, are addressed, with greater emphasis on phonemic awareness and word decoding in Roots and on reading comprehension in Wings. One-on-one tutoring is provided for students continuing to experience reading difficulties in the early grades.

The effectiveness of SFA in reducing special education placement and retention rates, as well as in improving children’s overall reading achievement relative to control groups of economically needy children, is well documented (e.g., Slavin et al., 1996; Slavin & Madden, 2000). Effect sizes of SFA are particularly large for the lowest quartile of children in a class—the population from which most special education children would come—and SFA has been found to reduce referrals of children for LDs services by one half or more (Slavin & Madden, 2000; Smith, Ross, & Casey, 1994). However, SFA has not been without its critics. One area of criticism has involved the fact that, although SFA children perform significantly better than similar populations of children without treatment, many do not perform at grade-appropriate levels on nationally standardized tests, especially beyond the primary grades (e.g., Venezky, 1994). It appears that SFA is most successful at keeping children on track in reading in the earliest grades, when basic word-recognition skills are being acquired, but may be somewhat less successful in the later grades, when vocabulary, broad language skills, and strategic knowledge become more critical to continuing progress in reading.

Another issue in the implementation of SFA involves teachers’ responses to this kind of highly structured and programmed model. For instance, Datnow and
Castellano (2000), who studied two different SFA schools, found that, despite the expectation that teachers would follow prescribed lesson plans and activities closely, almost all teachers made adaptations to the program. Interestingly, despite some dissatisfaction with the constraints of SFA, most teachers supported its continued implementation because they believed (correctly) that it benefited student achievement. However, as Datnow and Castellano (2000) point out, it appears inevitable that teachers will make adaptations to any method. Therefore, it is important to determine which specific features of SFA (or any other program) are most essential to student achievement and how different adaptations may affect student learning.

**Reading Recovery.** Reading Recovery (RR), originally developed by Clay (1985) in New Zealand but now widely used in the United States and elsewhere, is a first-grade intervention program. RR involves 30- to 40-minute tutorial sessions delivered by teachers trained extensively in the method. Tutorial sessions focus on having the child reread familiar books, do letter- and word-identification activities using plastic letters, reassemble a cut-up story, and read a new story. While writing the story, the child is also encouraged to listen for sounds when attempting to spell unknown words. In each session, the teacher obtains a running record of the child’s reading in text for use in instructional decision making. RR is a short-term intervention, approximately 12 to 20 weeks in duration. Children who do not benefit after 20 weeks may be referred for additional help elsewhere, such as to special education or Title I reading programs.

Proponents of the program have reported strong gains in reading by RR children (e.g., Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994), with 80% or more of treated samples attaining grade-appropriate reading skills. However, RR also has met with criticism from researchers. Some concerns have revolved around methodological issues, for example, that RR does not serve the most impaired readers or that methods of constituting comparison groups tend to bias results in favor of RR (Hiebert, 1994; Shanahan & Barr, 1995). Other concerns have been raised about the cost-effectiveness of the program.

Recent criticisms have focused especially on the instructional activities and theoretical underpinnings of RR. Both Pressley (1998) and Chapman, Tunmer, and Prochnow (2001) point out that RR relies on a multiple-cueing-systems model of reading development. This model is not consistent with research evidence indicating that the development of skilled reading is associated with increasingly accurate and automatic word recognition, not the use of multiple cueing systems for reading words. Although word decoding and phonological skills are addressed to some extent in RR through the plastic letters and writing activities, these skills are not emphasized or taught systematically. In a longitudinal study in New Zealand, Chapman et al. (2001) found that most RR children had deficiencies in phonological skills that were not improved by the program. Reading
Recovery did not significantly increase the reading achievement of these children, who also evidenced the usual negative effects of reading failure, such as a decline in self-concept. Conversely, adaptations of RR that include a strong, systematic phonological component (Hatcher, Hulme, & Ellis, 1994; Iverson & Tunmer, 1993) report substantial increases in the effectiveness of the program.

READ 180. READ 180 is a computer-supported program for struggling readers in grades 4 to 12. It was originally developed by Hasselbring and his colleagues (Hasselbring, Goin, Taylor, Bottge, & Daley, 1997) at Vanderbilt University in Nashville, Tennessee, and has been used in numerous school districts around the United States (see, e.g., Taylor, 2002). It is available in Spanish as well as English. The main components of the program, organized within a 90-minute block period, include the following: whole-group teacher-directed instruction in areas such as vocabulary, word decoding, and reading comprehension; small-group direct instruction; development of background knowledge through video clips on CD-ROM, followed by instructional reading of leveled, content area passages; independent use of software to give students individualized skills practice in areas such as structural analysis of unfamiliar words; modeled reading using audiobooks; and independent reading of leveled novels.

READ 180 is a relatively new program that lacks a research base in peer-reviewed journals. However, the program directly addresses a range of skills known to be important in reading, with substantial use of technology, in a way that appears to be appropriate and motivating for middle school and secondary-level poor readers. It is rated as a promising program for struggling secondary readers by Peterson et al. (2000).

LANGUAGE! LANGUAGE! (Greene, Eberhardt, Whitney, & Moats, 2000) is a comprehensive literacy curriculum designed for struggling readers, including English-language learners, “curriculum casualties” (those for whom previous literacy instruction was problematic), and students with RD. The curriculum includes separate sets of materials for grades 1–5 and 6–12 and is implemented by teachers after considerable training in the method. LANGUAGE! addresses numerous areas important to literacy achievement, including oral language comprehension, phonemic awareness, word decoding, reading fluency, vocabulary, reading comprehension, basic grammar, and both mechanical and content aspects of written expression. Students are grouped homogeneously for instruction, which is very highly structured and sequential. Materials that accompany LANGUAGE! include assessments, teacher guides, phonemic awareness materials, decodable books, and a CD-ROM for selecting supplemental reading materials.

Like READ 180, LANGUAGE! is a relatively new program that does not have an independent research base in peer-reviewed journals. However, Greene (1996) demonstrated that a 6-month intervention using the program was very
effective in improving the oral reading fluency, word decoding, spelling, and reading comprehension of a group of adolescents with low literacy who had also been in trouble with the law. The program is especially comprehensive in scope and addresses many important literacy abilities in a highly systematic fashion.

Conclusions and Future Directions

This article has suggested that cognitive profiles provide a more educationally useful way to conceptualize and address reading disability (RD)—and other reading problems—than do educational guidelines involving discrepancy criteria and IQ tests. Identifying reading-related cognitive patterns and profiles does not involve a scattershot administration of processing tests to establish a “processing disorder.” Rather, it involves assessment of specific abilities known to be important in learning to read, as well as interpreting patterns of performance in relation to research evidence on typical reading development and difficulties. Researchers have associated RD as it is viewed traditionally—that is, a specific difficulty in learning to read not caused by more generalized learning problems—with a specific word-recognition deficit profile, which typically involves phonological weaknesses. This profile in turn may include four possible patterns of difficulty that were discussed at length in the article. Two other common profiles of poor reading, garden-variety poor reading (GVPR) and a specific comprehension deficit (SCD), including two patterns of SCD, also were discussed. Although GVPR and SCD differ from the profile associated with traditional RD, with some different implications for identification and intervention, all three profiles constitute serious reading difficulties that require prompt intervention and remediation.

The profiling approach, by itself, does not distinguish genuine cases of RD from more experientially or instructionally based reading problems (nor does the use of processing measures or discrepancy criteria). A variety of ultimate causes could underlie any given profile or pattern. Nevertheless, this approach is very useful in early identification because certain kinds of cognitive patterns tend to presage later reading problems, and it provides clear implications for instruction. Furthermore, the use of cognitive profiles is relevant to poor readers in general, not only those with RD. This final section of the article will consider some issues involved in using cognitive profiles in education and some possible future directions for research.

One important issue in the use of profiles has to do with their stability (or lack of it) over time. As discussed previously, language deficit profiles may shift during the preschool years, with children who later become poor readers showing different patterns of deficits at different points in development (Scarborough, 2002). During early elementary school, word-decoding and language comprehension skills become relatively separable (Whitehurst & Lonigan, 2002), with some children showing quite different levels of performance in the two areas. Formal
schooling also introduces an important set of variables that may influence whether and how a particular deficit is manifested. For instance, some children may have relatively stable underlying weaknesses in naming speed or oral language comprehension that become more problematic, and hence more noticeable, as the curriculum makes greater demands on reading volume and comprehension. Ultimately, poor reading itself may negatively affect some cognitive and linguistic abilities because these abilities appear to be acquired, in part, through reading (Stanovich & Cunningham, 1993). More optimistically, effective instruction also may alter a child’s deficit profile. All these factors may underlie the observation that, even in school-age children, deficit profiles frequently are unstable over time (e.g., Badian, 1999). Although stability over time is not essential for making use of profiles in instruction, further knowledge about the stability and relationship of different profiles could have important educational implications. For example, unraveling the relationship between preschool language deficit profiles and later reading difficulties could increase the success of early intervention, and identification of subtle oral language deficiencies, coupled with effective remediation, might prevent the later emergence of some SCDs in reading.

Current arguments about educational identification of RD often pit discrepancy criteria against treatment-resister models. Discrepancy criteria tend to identify as reading-disabled poor readers with a specific word-recognition deficit, especially if the metric used involves a discrepancy between listening comprehension and reading comprehension. (If an IQ-achievement discrepancy is employed, children with more generalized language problems occasionally may be identified, providing their nonverbal IQs are high.) However, without an analysis of the cognitive patterns involved in children’s reading difficulties, the discrepancy approach is not useful educationally, in addition to its numerous other limitations (e.g., Siegel, 1988, 1989; Stanovich, 1991). Moreover, without the incorporation of a treatment-resister component, or at least the use of well-defined prereferral strategies in reading, this approach risks inappropriately classifying as learning disabled many poor readers who have instructionally or experientially based reading problems. A few state guidelines on LD do incorporate extensive prereferral strategies that target specific areas of reading (see, e.g., Connecticut State Department of Education, 1999). Nevertheless, although IDEA stipulates that children should not be identified as having a disability if the reason for their difficulties is lack of instruction in reading, many states do not mandate any kind of prereferral intervention (Buck et al., 2003).

Many researchers appear to favor adoption of a treatment-resister model for identifying RD (Speece & Shekitka, 2002). If discrepancy criteria were abandoned entirely, children with a wide range of cognitive profiles, including those with GVPR and SCD, could be identified as having RD. However, some practical problems exist with using treatment-resister definitions in eligibility guidelines, as a variety of LD organizations pointed out in May 2003, when the
U.S. House of Representatives approved a reauthorization of IDEA allowing—not requiring—states to employ a treatment-resister definition of LD in lieu of discrepancy criteria (e.g., Learning Disabilities Association of America, 2003). Legitimate concerns have been raised about exactly how treatment-resister definitions would be implemented in education (although some specific implementation plans have been proposed, e.g., Horowitz, Lichtenstein, & Roller, 2002) and about the lack of longitudinal research on the efficacy and cost of treatment-resister models. Conceptual and technical problems involved in using treatment-resister models include measurement issues, large-scale implementation, and decisions about whether treatments should be rooted primarily in general education or in more individualized, intensive interventions such as tutoring (Denton, Vaughn, & Fletcher, 2003; Vaughn & Fuchs, 2003). Furthermore, although state education agencies generally appear receptive to treatment-resister views of LD, most current state guidelines are based heavily on discrepancy criteria, and implementing treatment-resister models will require extensive change in classification practices (Reschly, Hosp, & Schmied, 2003).

A considerable research base exists on treatment-resister models (e.g., Al Otaiba, 2001; Fuchs, 2003; Speece, Case, & Molloy, 2003; Torgesen, Alexander, et al., 2001; Vellutino & Scanlon, 2002; Vellutino, Scanlon, & Lyon, 2000), but most treatment-resister studies have focused on young children. Applications of the models to older children and to children with SCD have received much less attention. Research focused on these populations is vital to implementing a treatment-resister approach in education on a large scale. In addition, more research is needed on the different components of comprehension (e.g., vocabulary, listening comprehension, and strategic knowledge) and on how different types of comprehension weaknesses might respond to different approaches to comprehension instruction. Further study of the efficacy of interventions aimed specifically at older poor readers is essential because there is substantial agreement that even the most effective early intervention programs will not prevent reading difficulties in all children and because some serious reading problems do not emerge until the middle grades or later. A profiling approach could be especially helpful with older poor readers, who must cope with high reading demands in the general education curriculum and whose difficulties may involve an especially wide range of patterns. For example, three struggling secondary readers might obtain the same reading comprehension score on a standardized test, but if one has strong oral language comprehension coupled with poor word-decoding accuracy and fluency, the second has the opposite pattern, and the third has fluency problems only, then the interventions for the three students will need to differ in some significant ways.

Longitudinal research addressing the conceptual and technical issues involved in large-scale implementations of treatment-resister models is very important. However, there already is a substantial research consensus on the
conceptual, as well as technical and practical, flaws in the discrepancy approach. If the history of the LD field were different and an IQ-achievement discrepancy were proposed as a “new” alternative to determine eligibility, few researchers would embrace that alternative with enthusiasm. Moreover, although the tendency of schools to ignore eligibility criteria is well documented (MacMillan & Speece, 1999; Scruggs & Mastropieri, 2002), schools might be more inclined to adhere to eligibility guidelines and diagnostic approaches that actually are useful educationally. Of course, to implement treatment-resister models appropriately, schools and teachers also require adequate human and material resources. Whether they are general educators, special educators, or reading specialists, even the most caring, competent teachers cannot be effective if they are overwhelmed with large groups of struggling readers spanning many reading levels (Moody et al., 2000; Vaughn et al., 1998).

Finally, implementing both treatment-resister models and the use of cognitive profiles requires that teachers have strong preservice preparation and many opportunities for ongoing professional development. Employing cognitive profiles in diagnosis and instruction entails a broad knowledge base not only about literacy development, the nature of written English, and individual differences that may affect learning to read, but also about how to select and use measures of important reading-related abilities, interpret diagnostic data to plan a comprehensive program of reading instruction, and teach a wide range of reading-related abilities to diverse learners. This kind of approach to teacher education is consistent with the current recommendations of many professional organizations (e.g., Brady & Moats, 1997; International Reading Association, 2000), but it also places high demands on teacher preparation. Furthermore, relatively brief preparation on some topics may not be sufficient for developing the level of knowledge needed for teaching reading effectively, especially to children experiencing difficulties (e.g., Spear-Swerling & Brucker, 2003). Thus, establishing priorities at different levels of professional development—for instance, for preservice teachers, first-year teachers, and more experienced educators—appears crucial.

Encouragingly, a number of studies (McCutchen et al., 2002; McCutchen & Berninger, 1999; O’Connor, 1999; Palincsar, Collins, et al., 2000; Palincsar, Magnusson, et al., 2001) have suggested that developing teachers’ knowledge base about language and reading can improve children’s achievement. Continued research in this area may offer important insights about which approaches to teacher education are most successful in yielding benefits for children and in attracting and retaining effective teachers. Research designs focused on differences among teachers (e.g., those with more versus less prior preparation or experience), as well as differences among children (e.g., older versus younger struggling readers), can be especially helpful. Studies exploring contextual factors, such as those affecting teachers’ willingness to continue to implement research-
based programs and their tendency to make adaptations to programs (e.g., Datnow & Castellano, 2000), also are valuable.

Although treatment-resister approaches can help to rule out instructional causes of reading difficulties, at present there is no definitive way for educators to diagnose genuine RD in individual children. Not only do current educational guidelines fail to provide this kind of definitive diagnosis, but those relying on discrepancy criteria also make early identification difficult, may misidentify as “disabled” poor readers whose problems are largely experiential or instructional in nature, and offer little educational insight into reading problems. In contrast, an analysis of the cognitive patterns seen in RD, based on the kinds of abilities that are known to play a role in learning to read, and interpreted in reference to typical reading development is highly relevant to early identification and instructional planning. Moreover, such an approach is useful not only for students with RD but for other poor readers as well.

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*indicates that article is included on TMPR5 supplementary CD.


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