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ABSTRACT

This paper presents a cognitive model of reading disability that looks at how the disability develops across the age and grade span and how it relates to the process of reading acquisition in normal-achieving readers. The model uses the metaphor of a "road map," which identifies the normal road to proficient reading through six phases: visual-cue word recognition, phonetic-cue word recognition, controlled word recognition, automatic word recognition, strategic reading, and proficient reading. Reading disability is conceptualized as involving departures from the normal path in one or more of the first four phases, leading to four possible patterns of reading disability (nonalphabetic, compensatory, nonautomatic, and delayed), which may or may not involve the same underlying causal deficit. The model also emphasizes that reading disability always involves interaction between the child's intrinsic cognitive characteristics and environmental influences. Features which distinguish this model from others include its relatively broad scope, its developmental nature, and its interactive view. Educational implications include recognition that the many cognitive deficits seen in reading disability change developmentally; that the measures most useful in identifying the disability vary with its pattern; that all children benefit from a combination of code-oriented and meaning-oriented approaches to reading instruction; that early identification of reading disability is important because of the cognitive and motivational consequences of longstanding reading failure; and that there is little scientific support for the practice of identifying poor readers based upon IQ-achievement discrepancies. (Contains 16 references.) (DB)

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Educational Implications of an Interactive Model of Reading
Disability *

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Although there is a vast body of literature on reading disability (also called dyslexia), this literature tends to be confusing and difficult to interpret. Researchers interested in reading disability often have focused on one particular age group (e.g., beginning readers) or on one particular cognitive skill (e.g., phonological awareness), rather than on the "big picture" of how RD develops across the age and grade span. In addition, research sometimes has failed to show how reading disability relates to the process of reading acquisition in normally-achieving readers. Without this linkage, interpreting the meaning of the many cognitive deficits seen in RD is impossible.

We have developed (Spear-Swerling & Sternberg, 1994; Spear-Swerling & Sternberg, in press) a cognitive model of reading disability that addresses the preceding problems and that also, we believe, has particular utility for educational practitioners. Our population of interest involves the kinds of children who are identified as having reading disability in schools. Educationally, these children are subsumed under the learning disabilities (LD) category, and in practice are identified primarily on the basis of a discrepancy between IQ score and reading achievement. However, we

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share the viewpoint of a number of other investigators (e.g., Fletcher et al., 1994; Stanovich & Siegel, 1994) that RD is best conceptualized not as a distinctive syndrome, but rather as being on a continuum with other cases of poor reading. We also share the viewpoint of these and many other investigators that RD should be conceptualized as a disorder in which word-recognition processes rather than comprehension processes play a causally central role.

Our model uses the metaphor of a "road map." There is a road to proficient reading that is commonly taken by normally-achieving readers and that consists of a series of six phases: visual-cue word recognition, phonetic-cue word recognition, controlled word recognition, automatic word recognition, strategic reading, and proficient reading. (The first two phases in this model are labeled using the terminology of Ehri, 1991). Reading disability is conceptualized as involving departures from this road to proficient reading in one of the first four phases of reading acquisition involving word recognition. These departures lead to four possible patterns of reading disability, which we term nonalphabetic, compensatory, nonautomatic, and delayed reading.

We hold an interactive view of RD, that is, the view that RD always involves an interaction between children's intrinsic cognitive characteristics and environmental influences. Traditional views of RD emphasize biological causation (e.g., Galaburda, Sherman, Rosen, Aboitiz, & Geschwind, 1985). However, we argue that RD may involve some biological *differences*, but that these differences do not necessarily constitute abnormalities.

Furthermore, although some children may be born with a biological

vulnerability to RD, this biological vulnerability only develops in interaction with the environment and does not preclude learning to read, sometimes at a high level of achievement. For example, many children with RD may be on the low end of a normal continuum of phonological processing that is influenced considerably by genetic inheritance (e.g., Olson, Rack, Conners, DeFries, & Fulker, 1991). However, phonological processes also are influenced by the environment and by experience (e.g., Maclean, Bryant, & Bradley, 1987). Children with severe phonological weaknesses can learn to read with appropriate instruction (Blachman, 1994; Felton, 1993).

An interactive view of reading disability suggests that a single underlying deficit, such as poor phonological awareness, might lead to a variety of performance outcomes, depending upon how this deficit interacts with environmental and other (e.g., temperament and motivation) variables. Thus, we do not view the four patterns of RD in our model as involving discrete etiological subtypes, as have been suggested by some other investigators (e.g., Boder, 1973) interested in RD. Rather, the four patterns describe patterns of *cognitive performance* in reading that may or may not involve the same underlying causal deficit.

The model integrates a wide range of research findings, both on RD and on reading acquisition in nondisabled readers. These findings include those on the importance of phonological processes in early reading acquisition and in RD (e.g., Blachman, 1994; Stanovich & Siegel, 1994); those on the role of orthographic processes in reading acquisition (e.g., Barker, Torgesen, & Wagner, 1992); those on the importance of the automatization of word

recognition to reading comprehension (e.g., LaBerge & Samuels, 1974); and those on the role of strategic processes in reading acquisition and in RD (e.g., Dole, Duffy, Roehler, & Pearson, 1991; Wong & Wong, 1986).

Our model is similar to the models of a number of other investigators interested in RD in its emphasis on the role of word-recognition processes and of verbal, especially phonological, processes in RD. However, a number of features distinguish our model from those of most other researchers. These features include the relatively broad scope of our model, its developmental nature, and its interactive view.

The broad educational implications of our model that we wish to emphasize are as follows:

1. The many cognitive deficits that are seen in RD change developmentally. Some of these are causally more central to RD (e.g., phonological processes) than are others (e.g., strategic processes). Practitioners should understand that the kinds of deficits that typically are seen among adolescents and adults with RD (such as deficits in reading comprehension and in strategic knowledge) are not causally central to RD, but rather are a direct result of longstanding difficulties in other cognitive areas, such as phonological processing and word recognition.

2. Because of the developmental changes in the deficits associated with RD, the measures that are most useful in identifying RD vary with the pattern of reading disability. For example, measures of phonological awareness are especially useful in identifying nonalphabetic readers, who go astray very early in

reading acquisition and who tend to have extremely limited or nonexistent reading skills. Measures of accuracy of decoding may be especially useful in identifying compensatory readers, whereas measures of speed of decoding are more useful in identifying nonautomatic readers, who go astray somewhat later in reading acquisition than do nonalphabetic or compensatory readers. For identifying delayed readers, measures of strategic knowledge and use of strategies may be most helpful.

3. We agree with authorities such as Adams (1990), that all youngsters---whether or not they are poor readers---benefit from a combination of code-oriented and meaning-oriented approaches to reading instruction. However, children with RD also need some specific instructional emphases, that again depend upon the pattern of reading disability. For example, nonalphabetic readers benefit from an emphasis on phonological-awareness training combined with explicit decoding instruction; compensatory readers from an emphasis on acquiring fully accurate decoding; nonautomatic readers from an emphasis on activities designed to develop automatic (not just accurate) word recognition; and delayed readers from an emphasis on comprehension and strategic abilities.

4. Early identification of RD is important because of the cognitive and motivational consequences of longstanding reading failure. Or, to put it in terms of our metaphor, the further children stray from the path to proficient reading, the more difficult it is to bring them back to it.

5. Our view of reading disability also has some implications for special educational policy. We concur with a number of other

investigators (e.g., Fletcher et al., 1994; Stanovich & Siegel, 1994) who find little scientific support for the prevailing educational practice of identifying poor readers based upon IQ-achievement discrepancies. "LD" poor readers do not appear to differ in qualitative or unique ways from other poor readers, either in their remedial needs or in cognitive areas related to word recognition. "LD" poor readers also do not appear to possess a unique biological deficit that distinguishes them from other poor readers. We would urge professionals in the learning-disabilities field to forge links with and to pool resources with other professionals, such as those in the fields of reading, regular education, and school psychology. In order for these kinds of collaborative efforts to be feasible, there must also be changes in the ways that funds are allocated to provide special services in schools.

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