

# CHALLENGING CASE: DEVELOPMENTAL DELAYS AND REGRESSIONS

## A School-Aged Child with Delayed Reading Skills\*

### CASE

During a health supervision visit, the father of a 7.5-year-old African American second-grader asked about his son's progress in reading. He was concerned when, at a recent teacher-parent conference to review Darren's progress, the teacher remarked that Darren was not keeping up with reading skills compared with others in his class. She said that he had difficulty sounding out some words correctly. In addition, he could not recall words he had read the day before. The teacher commented that Darren was a gregarious, friendly child with better-than-average verbal communication skills. His achievement at math was age-appropriate; spelling, however, was difficult for Darren, with many deleted letters and reversals of written letters.

A focused history did not reveal any risk factors for a learning problem in the prenatal or perinatal periods. Early motor, language, and social milestones were achieved on time. Darren had not experienced any head injury, loss of consciousness, or chronic medical illness. He had several friends, and his father denied any behavioral problems at home or at school. His teacher completed a DSM-IV-specific behavioral survey for attention-deficit/hyperactivity disorder (ADHD). It did not show any evidence of ADHD. Darren's father completed 1 year of college and is currently the manager of a neighborhood convenience store. His mother had a high school education; she recalled that she found it difficult to complete assignments that required reading or writing. She is employed as a waitress. Darren does not have any siblings.

The pediatrician performed a complete physical examination, the results of which were normal, including visual acuity, audiometry, and a neurological examination. It was noted that Darren seemed to pause several times in response to questions or commands. On two occasions, during finger-nose testing and a request to assess tandem gait, directions required repetition. Overall, he was pleasant and seemed to enjoy the visit.

His pediatrician concluded that he had a learning problem but she was uncertain about the next step. She asked herself, "Is there anything else I can do in the office to evaluate Darren's problem with learning? Should I quickly refer him for educational testing or encourage a reading tutor? What questions

can I ask his teacher that would be helpful? Am I missing a medical disorder?"

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Index terms: *dyslexia, phonetic code, learning disabilities.*

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### Dr. Martin T. Stein

Pediatricians recognize the limitations inherent in conceptualizing the development of school-aged children in terms of a "latency period." When cognitive and interpersonal tasks of developmental competency are considered, we recognize that this is a period of enormous growth and change. In fact, two of the three most common chronic conditions seen among school-aged children—attention-deficit/hyperactivity disorder (ADHD), learning disabilities, and asthma—are neurodevelopmental disorders. Among these three conditions, learning disabilities are arguably the most challenging to recognize and assess in pediatric practice. Practice guidelines in this area are limited, early recognition is uncommon among children with appropriate motor and social skills, and most children with a learning disability are not diagnosed until or after the second grade. Our best practice should encourage early identification and intervention.

Darren came to his pediatrician in the second grade when his teacher informed his parents that Darren was not reading at a level consistent with his age and grade. Information about other learning skills provided by Darren's teacher, supplemented by several focused questions about other pathways of learning and a complete physical examination, provided several clues that might lead to an understanding of his learning problem.

A child with a learning disorder should not be a significant challenge to the pediatrician who regularly inquires about school performance. Maintaining an office environment in which parents are encouraged to talk about learning problems and other developmental concerns is surely the first priority. The next question, which was asked by Darren's pediatrician, "Is there anything else I can do in the office to evaluate Darren's problem with learning?" may be more challenging.

Commentaries from experts who represent two complementary disciplines provide clinical opportunities for pediatricians faced with Darren's limited progress in reading. **Dr. Sydney Zentall** is Professor of Special Education and Psychological Sciences at Purdue University. Her research has examined the social and academic outcomes of ADHD and the preferences and responses of these students to specific learning conditions and environments. **Drs.**

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**Sally Shaywitz** and **Bennett Shaywitz**, a pediatrician and a pediatric neurologist, respectively, from the Yale School of Medicine, have been active clinicians and researchers in the area of learning disabilities for many years. Their work has guided pediatricians in practical clinical approaches to children with learning disabilities.

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The specific problems reported for Darren were (1) sounding out words, (2) recalling those words from the previous day, and (3) recalling all the sounds and their letter equivalents for spelling. He has additional problems with spoken language, as suggested by a need for more time to process and additional repetitions of questions/commands. Darren's letter reversals are not atypical up to the age of 8 years. From these difficulties, it seems that the underlying problem is poor phonological awareness, which involves hearing differences between and blending sounds and syllables. These underlying skills are necessary for the tasks of translating visual symbols into sounds (reading) and sounds into visual symbols (spelling).

In contrast to these difficulties, Darren has apparent strengths with expressive verbal language, social skill, and math. His relative strengths in these areas allow the elimination of memory and reasoning as possible contributing factors. Because he has strong expressive verbal language, it is probable that his problems translating and his need for repeated exposure to spoken language are not due to an inability to recall or reason with auditory stimuli (sounds, words, sentences). Neither does it seem that his difficulties are due to problems with visual symbols, such as letters (i.e., in the absence of translating those symbols to sounds). That is, his math skills are average, and math is primarily a visually based symbol system. Except for the reading of math problems, math involves recalling visual symbols and understanding how they represent experiences, such as time, quantities, size, and space.

Given this informal analysis of his presenting problems and abilities, Darren needs formal testing. Below-average performance on assessments of word-attack (reading nonwords) or sound analysis and synthesis, demonstrated in combination with average (or above-average) listening or vocabulary comprehension would indicate the presence of a learning disability in reading.<sup>1,2</sup> To support this probable diagnosis, he does have a biogenetic marker for dyslexia (i.e., his mother's similar reading/writing problems), and the heritability of a phonological deficit in reading recognition is extremely high (approximately 80%) as indicated by twin studies.<sup>3</sup>

Getting appropriate intervention for young children such as Darren is difficult if teachers adopt a whole-class, "method-driven" approach to reading. Only during preschool and kindergarten should we find a whole-class prevention reading program

aimed at teaching phonics, letter recognition, letter reproduction, and automaticity of reading recognition skills.<sup>4</sup> After those years, a more flexible approach with attention to individual differences would be important. Darren is still young enough to learn from an emphasis on the phonetic code, even though translating symbols to sounds involves a deficit skill area for him. That is, in reading at his age, "deficit-training" does have empirical support, and early identification and intervention programs are critical. If we delay intervention until 9 years of age, approximately 75% of the children with reading difficulties will continue to have problems.<sup>4</sup> Furthermore, in the absence of intervention, the motivation to continue trying to read rapidly declines, especially when peers can continually observe Darren's slow reading progress. Cooperative learning may be an effective way to practice reading for Darren, who has good social skills.<sup>5</sup>

Finally, Darren's parents can have an important role and should be encouraged by the medical community. Parents could engage in reading activities, such as reading books out loud to and with Darren. His parents could have been encouraged to participate even earlier through experiences with nursery rhymes and early exposure to letters of the alphabet and their sounds.

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#### REFERENCES

1. Stanovich K: The right and wrong places to look for the cognitive locus of reading disability. *Ann Dyslex* 38:157-177, 1988
2. Stanovich K: The construct validity of discrepancy definitions in learning disabilities, in Lyon GR (ed): *Better Understanding Learning Disabilities: New Views from Research and Their Implications for Education and Public Policy*. Baltimore, MD, Paul H. Brookes Publishing Co., 1993, pp 273-308
3. Olson R, Forsberg H, Wise B, Rack J: Measurement of word recognition, orthographic, and phonological skills, in Lyon GR (ed): *Frames of Reference for the Assessment of Learning Disabilities*. Baltimore, MD, Paul H. Brookes Publishing Co., 1997, p 243-268
4. Lyon GR: Testimony of G. Reid Lyon, Ph.D., on children's literacy. Committee on Education and the Workforce: U.S. House of Representatives, Science Advocacy Network (SAN) Public Policy Office. Washington, DC, American Psychological Association, July 1997
5. Slavin RE, Madden NA, Stevens RJ: Cooperative learning models for the 3 R's. *Educ Leadership* 47:22-28, 1990

#### Drs. Sally E. Shaywitz and Bennett A. Shaywitz

This child exhibits all of the characteristics of developmental dyslexia, a disorder defined by an unexpected difficulty in reading in children who otherwise possess the intelligence, motivation, and schooling considered necessary for accurate and fluent reading. It is the most common and most carefully studied of the learning disabilities, and perhaps the most common neurobehavioral disorder in childhood, affecting girls as well as boys.<sup>1</sup> There is now a strong consensus that a central difficulty in dyslexia reflects a deficiency within a specific component of the language system, the phonological module, which is engaged in processing the sounds of speech.

**TABLE 1.** Early Clues to the Diagnosis of Dyslexia

History of delayed language
Problems with the sounds of words, such as trouble rhyming words
Difficulty learning to associate the sounds with the letters
History of reading and spelling difficulties in the parents and siblings

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According to the phonological deficit hypothesis, children with dyslexia have difficulty developing an awareness that words, both written and spoken, can be broken down into smaller units of sound and that, in fact, the letters constituting the printed word represent the sounds heard in the spoken word.<sup>2,3</sup>

Reading comprises two main processes: decoding and comprehension. In dyslexia, a deficit at the level of the phonological module impairs the ability to segment the written word into its underlying phonological elements. Consequently, the reader has trouble, first in decoding the word, then in identifying it. The phonological deficit is domain-specific: it is independent of other higher-order cognitive and linguistic functions involved in comprehension, such as general intelligence, reasoning, vocabulary, and problem-solving, which are generally intact.<sup>4</sup>

As in most diagnoses in medicine, the history is critical. Clues to the diagnosis of dyslexia in the school-aged child are found in Table 1. Current reading performance in school provides additional clues: difficulty decoding single words, the difficulty most apparent when decoding nonsense words or unfamiliar words; slow reading; comprehension often superior to isolated decoding skills; and problems in spelling. Documentation of current reading performance in school-aged children requires a standardized reading test, for example, the Woodcock-Johnson achievement battery and the Woodcock Reading Mastery Test. The question of whether to use a test of intelligence in the diagnosis is controversial, and we have discussed this more fully elsewhere.<sup>1</sup> We are often asked by our residents whether they as practicing pediatricians should test the children themselves. In our experience, it is far more reasonable for pediatricians to know how to interpret the reading measures than to administer them.

Once the diagnosis is established, children require a systematic and highly structured program that fo-

cuses on teaching that words can be segmented into smaller units of sound (phoneme awareness) and that these sounds are linked with specific letters and letter patterns (phonics). In addition, children with dyslexia require practice in reading stories, both to allow them to apply their newly acquired decoding skills to reading words in context and to experience reading for meaning. Ongoing studies are examining which specific intervention programs are most effective for particular groups of children with dyslexia.<sup>5</sup>

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## REFERENCES

1. Shaywitz S: Current concepts: Dyslexia. *N Engl J Med* 338:307–312, 1998
2. Liberman IY, Shankweiler D, Liberman AM: The alphabetic principle and learning to read, in Shankweiler D, Liberman IY (eds): *Phonology and Reading Disability: Solving the Reading Puzzle*. Ann Arbor, MI, University of Michigan Press, 1989, pp 1–33
3. Wagner RK, Torgesen JK: The nature of phonological processing and its causal role in the acquisition of reading skills. *Psychol Bull* 101:192–212, 1987
4. Shaywitz SE: Dyslexia. *Sci Am* 275:98–104, 1996
5. Lyon G, Moats L: Critical conceptual and methodological considerations in reading intervention research. *J Learn Disabil* 30:578–588, 1997

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A complete medical, developmental, and educational history initiates an evaluation of a child with a delay in the development of reading skills. Because time is always at a premium in office practice, the educational information in particular must be gathered by asking specific, focused questions of the child's parents and teacher. This form of data-gathering is not unlike the process for any child who presents with school underachievement. When considering the spectrum of learning disabilities, in particular, screening questions in an office pediatric practice can be directed to all school-aged children during health supervision visits (Table 2). A complete physical examination, including selected tests of neurodevelopmental maturity, may reveal a medical condition or a problem with neurodevelopment-

**TABLE 2.** Learning Disabilities—Screening Questions for School-Aged Children During Health Supervision Visits

	Above Average	Average	Below Average	Failing
Describe your child's learning in school				
Describe your child's achievements in:				
Reading				
Spelling				
Writing (punctuation/legibility)				
Writing expression				
Math				
If your child is having difficulty with any of these subjects, please describe the types of problems.				
Does your child say, "Huh?" a lot or seem to need extra time to respond?				
Does your child have difficulty understanding what he or she reads?				
Does your child have difficulty understanding or following directions?				

Information from Esther Wender, M.D. (personal communication).

tal competency. The physical examination is also an opportunity to assess a child's response to directions (receptive language), quality and quantity of expressive language, components of speech, including fluency and articulation, and mood.

Darren's initial office evaluation is an example of the useful information that can be obtained by a pediatrician. The teacher's report recorded a significant problem with the acquisition of reading skills, a possible problem with phonics ("difficulty sounding out words correctly"), and a problem with recent memory. Darren's strengths in mathematics, social skills, and verbal language expression were documented early in the evaluation process. Behaviors characteristic of ADHD were absent. His mother's educational experience suggests a genetic predisposition for problems with reading and writing. Observations during the physical examination that Darren's verbal communication was characterized by numerous pauses in response to the pediatrician's questions and directions and that he occasionally required repetition of directions suggest a receptive language problem. Additionally, by asking him to describe a recently seen movie or video, an assessment of his expressive verbal ability, memory, and sequencing ability could have been assessed. There are screening procedures for dyslexia that can be adapted to a primary care practice at school entry (Table 3).

Commentaries from two pediatricians and an educator concluded that Darren has a "learning disability in reading" (educator's term), also known as "developmental dyslexia" (pediatric neurodevelopmental term). By applying historical information and clinical observations from the physical examination, both commentaries pointed out that the underlying problem could be framed as a problem with the phonetic code. They used the educational and clinical data in different ways and came to a similar conclusion. Although the information in the case summary made the diagnosis of a phonological deficit likely, the commentators recommended standardized educational testing to delineate reading achievement (Drs. Shaywitz) and word-attack, sound analysis, listening and vocabulary comprehension (Dr. Zentall). Once Darren's reading problem is defined in this context, the therapeutic inter-

vention, as described by Drs. Shaywitz, is "teaching that words can be segmented into smaller units of sound (phoneme awareness) and that these sounds are linked with specific letters and letter patterns (phonics)." Dr. Zentall emphasized the importance of this kind of "deficit training" before 9 years of age when improvement in reading skills is more likely.

#### Web Site Discussion

This Challenging Case was posted on the developmental behavioral pediatric web site (<http://www.dbpeds.org>) and the *Journal's* web site (<http://www.lww.com/DBP>). There were many commentaries and a brisk dialogue about the diagnosis and therapeutic strategies. The discussion began with a focus on the diagnosis, specifically a concern with the possibility of absence seizures as a cause of the observed pauses in response to questions and commands during the office visit.

**Henry L. Shapiro, M.D.**, pointed out that "The 'pauses' before responding seem unlikely to represent seizures, because the child did respond. Perhaps the question or remark had to be repeated. Although this is often seen in a 'central auditory processing' problem, it certainly could be either a higher order language problem (receptively), a formulation/semantic problem, or an executive problem. The child might take several seconds to formulate a response. If these 'pauses' are always in relationship to answering a question, then it is highly unlikely to represent seizures (compared with pauses in performance, or lapses)."

**Dr. Damon Korb** asked, "Why the reading problem?" His response reflects sound clinical thinking: "(1) Active working memory seems to be an issue with this child. Complex directions of the finger-to-nose task confused him. He is deleting letters and rotating letters when he spells. Perhaps he is losing his thought in the middle of spelling the word, and when he remembers to spell correctly, he cannot remember, at the same time, to properly rotate his letters. (2) I would like to look more at his sequencing abilities. Spelling requires accessing information in a sequential order, as does listening to instructions. Can he follow multistep instructions? Active working memory and sequencing should have an impact on his math, but his math is good. He most likely has language issues as well as memory problems. It is also possible that the math being done by a 7-year-old is not very taxing on memory and his math will fall too as he gets older. (3) Basic phonology seems poor. He has difficulty sounding out words. Is it problems sounding out words (active working memory and sequencing), or is it problems sounding out letters?"

**Dr. Paul C. Leiby** commented, "... this child (should) receive a full evaluation by a neuropsychologist, particularly one that specializes in children. The symptoms seem to suggest a phonological/central auditory processing problem with dyslexia, and maybe a higher-order language-based problem. ... In my experience, most 'educational evaluations' don't do a very good job with children like this. They are good for diagnosing learning disabilities, but not

**TABLE 3.** Types of Tests Useful in Identifying Children at Risk for Dyslexia at the Time of School Entry

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Letter identification (naming letters of the alphabet)
Letter-sound association (e.g., identifying words that begin with the same letter from a list: doll, dog, boat)
Phonologic awareness (e.g., identifying the word that would remain if a particular sound was removed: if the /k/ sound was taken away from "cat")
Verbal memory (e.g., recalling a sentence or story that was just told)
Rapid naming (rapidly naming a continuous series of familiar objects, digits, letters, or colors)
Expressive vocabulary, or word retrieval (e.g., naming single pictured objects)

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From Shaywitz SE: Current concepts: Dyslexia. *N Engl J Med* 1998; 338:307. Copyright © 1998 Massachusetts Medical Society. All rights reserved.

much else. This child seems to need a more thorough examination by a specialist (neuropsychologist)."

**Dr. Shapiro** commented on the value of a standardized test of phonological awareness, which would include assessment of reading functions such as "blending, segmenting, rapid naming, discrimination, and auditory span, which are highly correlated with both reading disability and response to intervention. We use this in combination with standardized language measures, cognitive screening (either using a valid instrument such as the Kaufman Brief Intelligence Test or a full assessment instrument like the Wechsler Intelligence Scale for Children—Third Edition or the Stanford Binet-IV), and different reading tests. I like the Gray Oral Reading Test 3 because it is easy to give and has a timed measure; we also like the Woodcock Reading Mastery Test. We feel that this, combined with the educational history, gives us adequate information to diagnose a reading disability.

**Barbara Cohen, M.D.**, wrote: "If I saw this child in my office, I would have him read from the Gray's Standard Reading Paragraph to get some kind of objective measure of his reading disability/delay and then speak with his teacher or the reading specialist at his school. This child would end up receiving one-on-one help with reading for the school year.

**Dr. Martin T. Stein**

**Dr. Cohen Polinsky** then asked, "Would the diagnosis of phonological/central auditory processing problem with dyslexia result in this child's receiving more or a different kind of services from the school? I really don't know. Is there more specific therapy for a more specific diagnosis?"

There were numerous comments that addressed both the variety of available diagnostic strategies and interventions for children with reading disabilities. Regional differences in diagnostic techniques among clinicians and in school-based services were highlighted. Variabilities in diagnostic techniques for children with learning disabilities among developmental-behavioral pediatricians, pediatric psychologists, and neuropsychologists were discussed.

These discussions emphasize the complexity of early recognition, clarification, and treatment of learning disabilities. They are common problems of neurocognitive development that need the attention not only of pediatric and psychology specialists but also of primary care clinicians at the front line. It seems to me that an important role for developmental-behavioral pediatricians, psychologists, and educators is to work cooperatively to educate and mentor pediatricians in effective early recognition, referral, and advocacy for services for children with learning disabilities.

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