

Early Language Development and Language Learning Disabilities

Kenneth L. Grizzle, PhD,*
Mark D. Simms, MD,
MPH[†]

Author Disclosure
Drs Grizzle and
Simms did not
disclose any financial
relationships relevant
to this article.

Objectives After completing this article, readers should be able to:

1. Review stages in development of early language and language-based learning abilities.
2. Recognize factors placing a child at risk to experience reading difficulties.
3. Discuss when to refer a child for speech/language and psychoeducational testing.

Case Studies

Child 1: The parents of 23-month-old Dale are concerned because their son uses only eight distinct words. Although he can make his wants known to caregivers through gesturing and use of his limited vocabulary, he is becoming frustrated by his parents' insistence on his use of language and their inability to understand his requests. At mealtimes and throughout the day, Dale is engaged in "conversation" with family members and enjoys making the sounds of a motor as he pushes his trucks along the ground. He enjoys "calling" his older siblings to dinner when asked by his father and generally is well behaved.

Child 2: Sarah, a 5½-year-old child who received speech and language services as a preschooler through an Early Childhood Program because of poor language formulation, is struggling to recognize some upper case and most lower case letters of the alphabet. She can identify the sounds of about five letters. After evaluating Sarah at the end of preschool, the speech pathologist did not think language services were necessary. Although she is happy to have her parents and teacher read to her, Sarah is easily distracted and seems uninterested in guided reading books provided by her kindergarten teacher. Her teacher is considering recommending that Sarah not be promoted to first grade.

Child 3: Jacob just turned 8 years old and is in third grade. Unlike Dale and Sarah, Jacob has no history of language delays, and there is no family history of language or academic problems. Since kindergarten, Jacob's teachers have expressed concerns about his progress in reading development, but everyone thought he would "catch up." He worked with a reading specialist at school during first and second grade, but continues to struggle with language-based learning in general (eg, reading, spelling, and written expression). His teacher reports that Jacob struggles to sound words out and feels that if he was more effective at decoding words, comprehension of what he reads may be adequate.

Each child in these scenarios shares a common theme—developmental features that place them at risk of developing a reading disability (RD). Considerable evidence suggests that reading is influenced strongly by early language factors. Language and learning problems are among the most common neurodevelopmental disorders seen by primary care physicians. Familiarity with these conditions assists in early recognition and evaluation of children at risk for learning disorders. This article reviews the early developmental progression of language and reading, including prereading language skills, and introduces concepts prevalent in the fields of psychology and education.

Early Language Development

Communication results from a complicated interplay of many sensory and cognitive processes. The verbal component of communication is the most obvious, but it is only one part of a much larger system that includes visual, social, and behavioral skills. The ability to interpret facial and postural cues (visual domain) correctly as well as matching such cues

*Lead psychologist, School Performance Program, Children's Hospital of Wisconsin; Assistant Professor, Department of Pediatrics, Medical College of Wisconsin, Milwaukee, Wisc.

[†]Medical Director, Child Development Center, Children's Hospital of Wisconsin; Professor, Department of Pediatrics, and Chief, Section of Developmental Pediatrics, Medical College of Wisconsin, Milwaukee, Wisc.

Table 1. Select Language Milestones

Age Range	Receptive Language	Expressive Language
12 to 15 months	Points to familiar objects Shakes head no Follows one-step commands	Has vocabulary of 5 to 10 words Says "mama" and "dada" Imitates sounds Points to two to four body parts Uses jargon mixed with real words
15 to 18 months	Shakes or nods head to questions Recognizes pictures when named Comprehends up to 50 words	Knows 3 to 20 words Repeats words heard Imitates environmental sounds
18 to 24 months	Points to body parts Understands personal pronouns Carries out two directions with objects	Imitates speech Uses "mine" or "me" Uses jargon and words to relate experiences Has 100- to 200-word vocabulary
24 to 36 months	Follows two-step directives Responds to yes/no questions Understands concept of "one"	Has up to 900-word vocabulary Uses three- or four-word phrases 50% to 75% of speech is understood
36 to 48 months	Points to objects by category Identifies four colors Understands negatives	Has four or more word sentences Relates experiences 75% of speech is understood
4 to 5 years	Follows complex directions Understands time concepts	Retells stories Uses irregular past tense Uses complex sentences

Adapted from *A Quick Reference Guide to Your Child's Speech and Language Development*. Masters Family Speech and Hearing Center, Children's Hospital of Wisconsin.

with one's own oral language is required for competent communication. Behavioral and social components also require mastery, including such skills as engaging, responding, and maintaining reciprocal interactions with others. The type and quality of these interaction skills vary and change over time for effective communicators (eg, the infant's skill at maintaining eye contact with caretakers is sufficient [crucial], but it alone will not suffice at 5 years of age).

Between the ages of 1 and 3 years, there is a wide variation in the range of normal speech and language development. Although the sequence of milestones is predictable, the exact timing of their achievement may vary from individual to individual. Receptive language skills typically develop prior to a child's ability to produce understandable words, phrases, and sentences (Table 1).

Disorders of Language

For some children, the development of language skills proceeds in a normal sequence but at a slower pace than normal. This condition is referred to as a "delay" in development. In contrast, other children appear to follow an atypical sequence of skill acquisition, which is referred to as a "disorder" of development. Disorders of language development may affect expressive abilities

alone or both expressive and receptive abilities. For children who have normally developed nonverbal cognitive abilities, language problems that are severe and pronounced in the absence of obvious neurologic insult or hearing impairment are referred to as specific language impairments (SLIs). The prevalence of SLI varies with the specific definition used, but a rate of approximately 7% of school-age children is cited commonly. SLI is more prevalent among males than females, with ratios ranging from 2.8:1 to 4.8:1, depending on the population studied. The more conservative estimate most likely applies to the general population.

At what point should a pediatrician become concerned about a child's language development and consider the need to refer for further evaluation? This is not a trivial question when considering the prevalence of the problem and the developmental sequelae of language disorders. Approximately one third to one half of children showing severe language delays at 2 years of age continue to show delays at 3 years. Furthermore, 50% to 80% of preschoolers who have language delay and normal nonverbal intelligence continue to show language difficulties up to 20 years beyond the initial diagnosis. Although average or above-average nonverbal cognitive ability is a good prognostic indicator among children

who have SLIs, that finding alone does not ensure eventual development of normal language functioning. In addition to continued language difficulties, children who have SLIs are affected in academic, social, and psychological domains. The type of language problem appears to be related to outcome. Children who have speech and phonology problems generally have a better prognosis than those who have broader impairments of both production and comprehension of language.

Although opinion on the method of handling language and speech delays among young children varies considerably (Stein et al), there are general guidelines. Children between the ages of 18 and 24 months of age in whom language comprehension and expression is delayed should be referred for a hearing test and language evaluation. A subset of children is delayed in developing speaking skills but eventually has normal language abilities. These young children have excellent comprehension of language and are well developed in their social skills. This condition, colloquially referred to as “familial late talker” syndrome, occurs primarily in males and has none of the developmental sequelae seen among children who have language disorders. Review of family history for these children identifies males, often on the paternal side, who were delayed in the development of expressive language, although otherwise were bright children who excelled cognitively and academically. However, in view of the rather pessimistic developmental sequelae associated with untreated language delays and the difficulty associated with evaluating receptive language accurately without the assistance of a speech and language professional, referring the toddler for a speech and language evaluation is recommended if there is any concern.

Delays in both the production and comprehension of language place a child at much greater risk to continue to fall behind same-age peers both linguistically and cognitively. If a child is not able to follow single-step commands without gesture by 12 to 14 months of age and two-step commands without gesture by 24 to 28 months of age, further evaluation of receptive language is warranted. It is important to evaluate other developmental milestones to rule out global or pervasive developmental delays (Simms and Schum). Children who have developed cognitive prerequisites for language, such as imitation, goal-directed activities, and symbolic representation (pretend play), and who show normal receptive language development have a better linguistic and cognitive prognosis.

Early Literacy Development

When children are encouraged and afforded the opportunity, their early “reading” and literacy skills develop in

a predictable pattern. Appreciation of literacy can begin early in childhood. As soon as infants are able to grasp objects intentionally, age-appropriate books should be placed within their reach. Young children who are read to by caregivers in the first postnatal year learn to “play” with books by turning pages as they mature. They gradually begin to associate the stories they hear with the pictures on the pages. During their second and third years, children verbally respond to and interact with books, asking questions, describing pictures, and attributing characteristics to various characters. Parents may find 3- and 4-year-old children sitting on the floor with a frequently read book open, reciting the words on each page. In addition to memorizing story lines and pretending to read, children at this age begin to recognize that it is the print in books that is being read. Preschool-age children also may recognize highly salient words in their environment (Table 2).

Language and Reading

The acquisition and use of language is crucial to a child’s development in a number of domains, the most apparent among toddlers and preschool-age children being cognitive and social development. However, early speech and language skills also are related to the eventual development of reading skills. Phonemic awareness (PA) is a critical language skill in the development of reading. It is the ability to recognize and manipulate individual sounds of language (phonemes) to form words. This skill progresses from primitive manifestations (rhyming) to more sophisticated forms, including the ability to blend component sounds into a word (/f/ /ah/ /t/ is blended into *fat*), to segment sounds of a word (*fat* is segmented into /f/ /ah/ /t/), and to delete a sound from an intact word (deleting /f/ from *fat* leaves /at/). Although 70% to 80% of children acquire this skill rather easily, for some it can be difficult to develop.

Within the language system, the phonologic component is the most basic because syntax and semantics build on the discrete sounds processed. Humans do not perceive individual sounds of words auditorily; rather, overlapping component bursts of sound are spoken and subsequently perceived by the listener (referred to as coarticulation). It is not until stimuli have reached the brain that these sounds are identified as phonemes and, ultimately, language. This sophisticated process occurs naturally as language develops for most children. Because the processing of language is automatic, children (and adults) do not attend to or necessarily realize that words are composed of component sounds, and there is no

Table 2. Developmental Milestones of Early Literacy

Motor	Cognitive	What Parents Can Do
6 to 12 Months –Reaches for books –Puts book to mouth –Sits in lap, head steady –Turns pages with adult help	–Looks at pictures –Vocalizes, pats pictures –Prefers pictures of faces	–Hold child comfortably; face-to-face gaze –Follow baby's cues for "more" and "stop"
12 to 18 months –Sits without support –May carry book –Holds book with help –Turns board pages, several at a time	–No longer mouths right away –Points at pictures with one finger –May make same sound for particular pictures (labels) –Points when asked "Where's" –Turns book right side up –Gives book to adult to read	–Respond to child, prompting to read –Let the child control book –Be comfortable with child's short attention span –Ask "Where's the . . .?" and let child respond
18 to 24 Months –Turns board book pages easily, one at a time –Carries book around the house –May use book as transitional object	–Names familiar pictures –Fills in words in familiar stories –"Reads" to dolls or stuffed animals –Recites part of well-known stories –Attention span highly variable	–Relate books to child's experiences –Use books in routines, at bedtimes –Ask "What's that?" and give child time to answer –Pause and let child complete sentence
24 to 36 Months –Learns to handle paper pages –Goes back and forth in books to find favorite pictures	–Recites whole phrases, sometimes whole stories –Coordinates text with picture –Protests when adult gets a word wrong in familiar story –Reads familiar books to self	–Keep using books in routine –Read at bedtime –Be willing to read the same story over –Ask "What's that?" –Relate books to child's experiences –Provide crayons and paper
36 to 48 months –Handles book competently –Turns paper pages one at a time	–Listens to longer stories –Can retell familiar story –Understands what text is –Moves finger along text –"Writes" name –Moves toward letter recognition	–Ask "What's happening?" –Encourage writing and drawing –Let child tell the story

Reprinted by permission from *Reach Out and Read*.

need to understand this process consciously to comprehend and use language effectively.

Reading, on the other hand, is very different from language development. Recognizing symbols on a page, unlike the brain's ability to process component sounds of language, has no inherent meaning; a child must learn to make linguistic sense of abstract writing on a page if he or she is to be able to read. Children who have strong skills at the phonologic level of language are in a better position to recognize that the words they hear can be broken into individual sounds and, in turn, will be cognitively ready to perform the most basic of reading skills—decoding words (ie, phonetically sound out words). Decoding forms the basis for reading development.

The Relationship Between Early Language Skills and Reading Disorders

There is strong evidence that early language development is related to later reading skills. In fact, among children of parents who have reading difficulties, differences in language development are apparent as early as 2 years of age. Over time, different language variables better predict reading outcomes. For example, children who have RD and a positive family history of reading problems have been found to differ from peers on measures of syntax (grammar) and speech production skills at 2 to 3 years of age. Prior to being identified as having reading problems, such children tend to produce fewer words per utterance, express less complicated sentences,

and show more pronunciation difficulties compared with peers who do not have RDs. Over time, the phenotype of children at risk for RD shifts from a deficit in syntax to lexical (vocabulary) and phonologic deficits. Thus, at the time of kindergarten entry, sentence complexity has little predictive power. Expressive vocabulary and phonologic awareness, on the other hand, are much more highly correlated with later reading achievement. For both preschoolers and older children, little relationship exists between nonverbal skills such as nonverbal intelligence, visual memory, and motor skills and either language or reading achievement.

Unlike oral language, which for most children progresses in a developmentally predictable manner without formal education or instruction, access to and use of written language proceeds most effectively in the presence of systematic and explicit instruction. Children who receive adequate instruction, do not have deficits in cognitive functioning, have no history of neurologic insult or a sensory deficit, yet continue to struggle in their ability to read, are considered to have RD, suggesting that this problem is congenital.

As in SLI, children who have RD often have a family history, suggesting a genetic basis for their problem. Reading has been linked to sites on chromosomes 1, 2, 6, and 15, although there is no evidence that genes are specifically responsible for reading ability or disability. A meta-analysis of early childhood influences on reading completed by Scarborough suggests that the rate of RD among parents of affected children ranges from 25% to 60%. Prospective studies have shown that children whose parents have a history of reading difficulty are 3 to 30 times more likely to receive RD as an eventual diagnosis than are those who have no such family history. Beyond family incidence studies, there is strong evidence for a genetic component to RD and related phonemic awareness. Twin studies suggest a 58% group deficit heritability factor for reading (Wadsworth, et al), and similar heritability factors have been found for component reading skills such as phonemic awareness and word decoding.

The occurrence of RD is estimated at 10% to 20% of the population. For many children, reading difficulty is related to poor or limited early literacy experiences. Recent research suggests that when adequate instruction is provided, the number of children who have true RD may be less than 5%. Further complicating the RD prevalence picture is research by Shaywitz and colleagues (1992) from the Connecticut Longitudinal Study, indicating that children identified as having learning disability do not reflect a distinct and separate group among

readers. Rather, they fall at the lower end of a reading ability continuum. Said another way, reading ability is a continuous variable in which no clear-cut point indicates pathology or the absence of pathology, much like other common physiologic functions such as blood pressure or stature.

This finding is consistent with evidence that many different genes may be responsible for reading ability. As noted by Plomin and Rutter, the genetic factors responsible for complex functions are conceptualized best as quantitative trait loci (QTLs). For continuous phenomena, such as reading or height, each QTL may act to increase or decrease the expression of the condition, but it is unlikely that any particular QTL is necessary or sufficient to produce the extreme variety of the condition. The presence of multiple QTLs and the influence of family and environmental risk factors appear to result in a continuous spectrum of function for the condition in question.

Prevalence rates for RD, although long believed to be much greater for males than females, appear to be fairly even. Data from the Connecticut Longitudinal Study suggests a 4:1 ratio in favor of boys in a school-identified sample, but the ratio drops to 1.3:1 in a research-identified sample. When accounting for the bias due to behavior-related factors in school and looking exclusively at reading skills as inclusion criteria for receiving the diagnosis, there appears to be little difference in the prevalence rate between the sexes.

The majority (80%) of individuals who have an RD have difficulty with single-word decoding, a condition referred to as dyslexia. Decoding refers to the ability to sound out words and requires that a child understand the "alphabetic principle"; that is, each letter has a corresponding sound, and these sounds can be combined to make words. Not only do poor decoding skills impair efficient, quick, and automatic reading, they also can have a pronounced effect on comprehension of text. The more cognitive effort that is devoted to reading word-by-word, the less is available to understanding what is being read. Although slow, dysfluent reading is typical in young developing readers, continuing this somewhat arduous process without the expected increase in reading vocabulary and the automatic recognition of words can have dramatic effects on what a child is able to comprehend and the amount of material that he or she is able to read.

As previously noted, the primary language skill involved in the development of word reading is phonologic awareness. Failing to make progress in the acquisition of PA places a child at much greater risk to experience

Table 3. Early Risk Factors for Reading Difficulties

- Biologic parents having a history of reading problems
- Early childhood language delays
- Difficulties with sounds of words (eg, rhyming)
- Poor phonemic awareness in kindergarten
- Limited understanding of letter-sound relationships
- Poor upper and lower case letter identification
- Lack of familiarity with book reading (eg, concepts of print)

reading difficulties. Deficits at the phonologic level of language affects a child's ability to recognize that words she or he hears can be broken into individual sounds and, in turn, results in the child finding it difficult to perform the most basic of reading skills, decoding words.

Strong reading has a “boot strapping” effect over time; that is, good readers tend to read more frequently and, in turn, improve their reading, language, vocabulary, and academic skills in general. Poor readers, on the other hand, fall further behind their peers in reading skills and in other academic areas, vocabulary, and general cognitive skills. Children experiencing reading difficulties who do not receive the benefit of effective early instruction are not likely to catch up to same-age/grade peers. Evidence suggests that nearly 90% of children identified as poor readers at the end of first grade remain poor readers at the end of fourth grade. In fact, as many as 75% of children determined to have RDs early in their school careers continue to struggle with reading throughout their lives. Conversely, only 5% to 10% of children who develop satisfactory reading skills early in their school experience struggle with reading later in life.

Office Evaluation of the Child Who Has Reading Difficulty

The ongoing relationship between pediatricians and their patients provides an opportunity to identify early risk factors for reading difficulties and to place patients in touch with appropriate intervention resources. A parent's complaint or office observation of language delay likely is the pediatrician's first indicator that a child is at risk for later reading difficulties (Table 3). Mild-to-moderate delays in language development, such as not saying single words at 15 to 16 months of age and not speaking in phrases after 24 months of age, among children who have a positive family history for RDs should give a pediatrician cause for concern. As children age, subtle language problems, such as difficulties with

Table 4. Domains Included in Evaluation for Reading Problems

Early Childhood (4- to 5-year-old Children)

- Recognizes alphabet and letter sounds
- Has receptive and expressive vocabulary
- Knows conventions of print
- Has auditory comprehension
- Has phonologic awareness
- Has phonologic memory
- Exhibits rapid automatized naming (colors and objects)
- Has global cognitive functioning

School-age Children (6 Years and Older)

- Reads single words
- Reads pseudowords
- Comprehends reading
- Reads fluently
- Has phonologic awareness
- Has phonologic memory
- Exhibits rapid automatized naming (numbers and letters)
- Has global cognitive functioning

word finding or use of nonspecific or vague words (eg, “thingies” or “stuff”), may reflect language problems that warrant attention.

During an office visit, ask parents of 3- and 4-year-old children about their child's interest in and ability to recite nursery rhymes or play rhyming games. Not reciting nursery rhymes at 4 years of age and the inability to recognize words that rhyme by 5 years of age may reflect early problems with PA. Do 4-year-old preschool-age children recognize letters in their name? By the end of kindergarten, does the child recognize all upper and lower case letters of the alphabet and know the sounds of many of the letters? Alphabet recognition at this age is critical; it is entry into the reading process. In fact, the single best predictor of developing reading problems entering into first grade is letter recognition.

For children already in school, difficulty decoding single words or unfamiliar words, slow reading, and problems with spelling are highly suggestive of a reading disability. At the beginning of first grade, children should begin attempting to sound out words and regularly identify the first sound in a word. As the year progresses, they should recognize the ending sound and medial sounds. Although fluency is not expected at this point, children should be reading by the end of first grade.

Regularly sounding out words is expected during second grade. It is usual for children to “read” a word inappropriately on impulse, but if the child does so regularly and is unable to return to the word and attempt to decode its component sounds, there may be cause for concern. A lack of desire and resistance to completing any reading task combined with real difficulties with reading teacher-determined grade level books is a red flag, especially in the presence of other risk factors such as family history or language delays.

Just as a clinician would have a difficult time evaluating a child who has congenital heart disease without a stethoscope, physicians need tools to “examine” a child’s reading skills. The best method of examining reading is to observe a child reading words or sentences. The Wide Range Achievement Test (WRAT3) (Wilkinson, 1993) is an easily administered, nationally normed instrument that can be used by a pediatrician (or staff) in an office to assess single-word reading, spelling, and arithmetic in children from ages 5 years through adulthood. This screening instrument takes approximately 10 to 15 minutes to complete and provides standard scores, percentiles, and grade levels in these three academic areas. It is not necessary to administer all three subtests; in fact, in light of the demands of a busy primary practice, it is reasonable to have the child simply complete the word reading and spelling component. Performing well on the WRAT3 does not rule out an RD. In fact, the WRAT3 does not include a pseudoword reading component, which is crucial in the diagnosis of dyslexia. Inadequate performance on this screening measure in the context of elevated risk factors outlined previously suggests the need to refer the child for a comprehensive evaluation by a psychologist or neuropsychologist.

As shown in the Figure, analysis of a child’s spelling errors on the WRAT3 may reveal significant difficulty with PA ability. This 8-year, 9-month-old boy was experiencing great difficulty keeping up with his peers in a regular third grade class. Despite having received Title I reading support since kindergarten, he was able to read fluently only at a first-grade level. Psychological evaluation revealed a full scale intelligence quotient (IQ) of 97 on the Wechsler Intelligence Scale for Children, 3rd edition (WISC-III) (Wechsler, 1991), with a verbal IQ of 95 and performance IQ of 99. The mother recalled that he did not begin to use single words until age 18 months of age or sentences until 30 months. Several other immediate family members also had histories of poor reading and spelling ability.

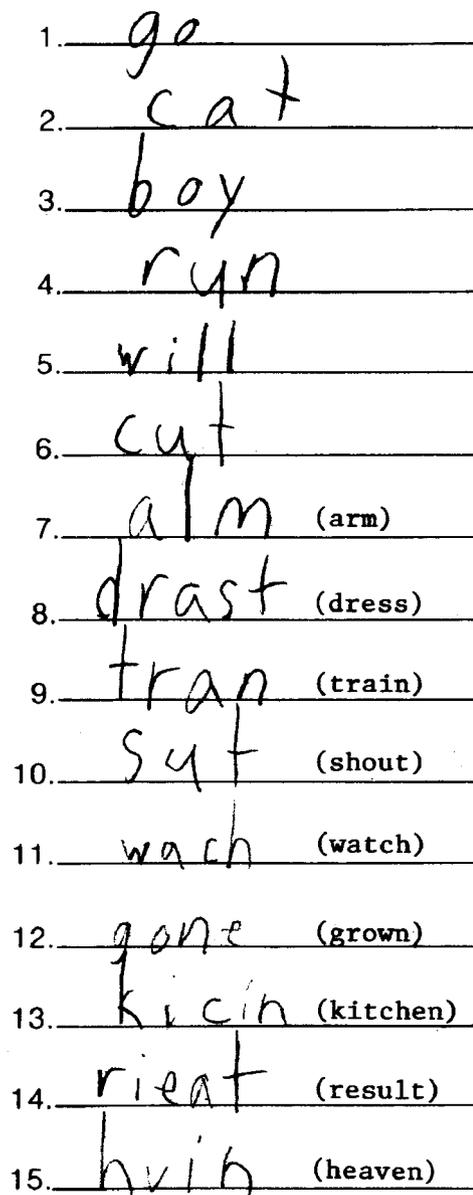


Figure. Sample result of The Wide Range Achievement Test (WRAT3).

Prevention and Identification of Reading Problems

There is no evidence that individual speech or language therapy affects reading skills directly. Nevertheless, as outlined earlier, the developmental sequelae of untreated language disorders can be bleak. At the same time, a plethora of evidence suggests that therapy can effectively treat or ameliorate the symptoms of SLI. Consequently, referring children who have language delay for a speech and language evaluation privately, through Birth to

Three or through Early Childhood programming, is critical.

Encouraging a literacy-rich environment is invaluable for all children. This includes making parents aware of the benefits of having interesting children's books available and encouraging parents to read with their toddlers. Rather than simply reading to the child, caregivers of 2- and 3-year-olds can discuss with their child what they see in the pictures as they read the printed text of the book. Encouraging the child to make a connection between his or her previous experience and the story being read helps the book "come alive." Reading animatedly also communicates the pleasure of literacy experiences to the child. Parents can encourage their 4- and 5-year-olds to predict what might happen on the next page and talk about the story and the characters while reading. For young preschool-age children, developing an awareness of the sounds of language by regularly reading books with predictable rhyming (words ending in the same sound) and alliteration (multiple words with the same initial sound) patterns can set the stage for the development of PA.

"Reach Out and Read" is one example of a national program developed for pediatricians to encourage early literacy among their patients. Parts of this program include providing parents with age-appropriate books for their children during health supervision visits, allowing for volunteers to model reading strategies in the waiting room, and encouraging physicians to screen for literacy risk factors among children. Finding a strong preschool program for a child also is important. Such a program should encourage literacy through vocabulary development and age-appropriate curriculum, including enjoyable activities that emphasize development of phonemic awareness.

As many as 95% of children can be taught to read at a level commensurate with their reasoning and language comprehension abilities, but attaining this percentage requires effective early intervention. The most common educational practice is to wait to identify a child who has a reading disability well into his or her elementary school education. Although this approach ignores recent advances in the early identification and treatment of language-based learning problems, the trend continues. Management of reading problems begins early by encouraging literacy activity within the home as outlined previously (see Resources), being aware of factors placing a child at risk for later reading problems, and knowing resources in the community available to assist those children identified as having an RD.

Referring a child suspected of having a reading prob-

lem for a psychoeducational evaluation through his or her school system may be sufficient. Because most public school systems use a discrepancy formula (between intelligence and academic achievement) to determine if a child qualifies for learning disability services, often without considering cognitive processing skills that may be contributing to the learning problem, a child who has a legitimate RD may not qualify for assistance. Being aware of what cognitive and learning domains should be included in an evaluation allows pediatricians to provide better guidance to parents of their patients.

A good core battery when assessing a young child (4- or 5-year-old) considered at risk for reading problems includes measures of letter recognition (including letter names and sounds), receptive and expressive vocabulary, conventions of print, auditory comprehension (eg, listening to and retelling a short story), and phonologic processing. Included in the phonologic processing component is phonemic awareness, memory span, and a rapid-naming task.

If global cognitive delays are a concern, a measure of intelligence should be included in the evaluation. If, on the other hand, the child appears to be developing typically in every other way, a measure of intelligence may not be warranted. The domains outlined previously are better indicators and predictors of reading skill development than is intelligence. (See Shaywitz, 2003 for an expanded discussion of the increasing evidence suggesting the relative limited value of intelligence testing for children who have RDs.)

For children beyond kindergarten, the same set of skills should be evaluated, in addition to actual reading skills. Several component skills should be measured: word reading, pseudoword reading, comprehension, and fluency. Including a pseudoword component is crucial. This list includes nonsense words that a child cannot have in his or her reading or verbal vocabulary, a task that is extremely difficult for children who have dyslexia because of their phonologic processing deficits.

Conclusion

Returning to the three children described at the outset, it appears that Dale, the 23-month-old child who has expressive language delays, has isolated delayed language acquisition with no other developmental concerns. His receptive language is adequate, and his social skills good. On further questioning of his parents, it was determined that Dale's father, a paternal uncle, and a grandfather have histories of delayed language acquisition. None of the affected family members experienced protracted language problems, nor is there a family history of learning

problems. Dale's language difficulties and the associated family history are consistent with "familial late talker" syndrome. A substantial evidence base suggests that the prognosis for preschoolers who have isolated expressive language delay is excellent, and those children who "catch up" perform within the normal range in reading and school achievement (Bishop and Adams 1990).

Sarah, the kindergarten child who had an early history of language delays, appears to be at high risk for reading problems. The difficulty she has recognizing the alphabet combined with her early language delays warrants a more comprehensive evaluation that includes an updated speech/language evaluation, possible cognitive testing, and an assessment of prereading skills.

Jacob showed no real problems prior to entering school and kindergarten, and the first grade teachers thought that he would "catch up." Jacob may be a child who had no early risk factors for reading problems, but is struggling as the reading process becomes automatic for most of his peers. Thorough language and family histories should be obtained to be sure there are no family members who have undiagnosed language or reading difficulties. Developing an understanding of how Jacob was taught to read is important. Was there systematic and explicit instruction in the alphabetic principle? Not all children who struggle to learn to read have a neurobiologically based reading disorder; many have not received adequate and appropriate instruction. However, delaying a comprehensive evaluation further is contraindicated for a child in third grade who has a 2-year history of reading assistance outside the regular curriculum. Because most educational systems base the determination of learning disability services on an ability-achievement discrepancy, cognitive testing is necessary. In addition, at a minimum, a comprehensive measure of academic achievement that includes word reading, nonword reading, and reading comprehension as well as phonologic processing should be administered. Oral comprehension also should be evaluated, and if there are concerns about language processing, a speech pathologist should be consulted.

There is reason to be encouraged that children who have language-based learning deficits can make considerable progress. The developmental consequences of language delays and RD can be attenuated for many children who have early identification and intervention. Converging behavioral and neurobiological data suggest that intense, systematic, and empirically sound educational interventions can produce lasting treatment effects for children who have RDs. Not only have children sustained gains in word reading and reading fluency

following intervention (Blachman et al, 1999; Torgeson et al, 2001; Torgeson et al, 1999), but they have shown neurobiological changes, as evidenced through functional magnetic resonance imaging findings that are consistent with those of children who do not have RDs (Shaywitz et al, 2004). Recognizing early risk factors, providing a good screening, and, when necessary, obtaining a multidisciplinary evaluation and subsequently adequately addressing the areas of deficit can produce considerable gains for affected children.

Suggested Reading

- Bishop D, Adams C. A prospective study of the relationship between specific language impairment, phonological disorders, and reading retardation. *J Child Psychol Psychiatry*. 1990;31:1027-1050
- Blachman BA, Tangel DM, Ball WE, Black R, McGraw CK. Developing phonological awareness and word recognition skills: a two-year intervention with low-income, inner-city children. *Reading and Writing: An Interdisciplinary Journal*. 1999;11:239-273
- Plomin R, Rutter M. Child development, molecular genetics, and what to do with genes once they are found. *Child Dev*. 1998; 69:1223-1242
- Scarborough HS. Early identification of children at risk for reading disabilities: phonological awareness and some other promising predictors. In: Shapiro BK, Accardo PJ, Capute AJ, eds. *Specific Reading Disability: A View of the Spectrum*. Timonium, Md: York Press; 1998
- Shaywitz SE. *Overcoming Dyslexia: A New and Complete Science-based Program for Reading Problems at Any Level*. New York, NY: Alfred A. Knopf; 2003
- Shaywitz SE, Escobar MD, Shaywitz BA, Fletcher JM, Makuch R. Evidence that dyslexia may represent the lower tail of a normal distribution of reading disability. *N Engl J Med*. 1992;326: 145-150
- Shaywitz BA, Shaywitz SE, Blachman BA, et al. Development of left occipitotemporal systems for skilled reading in children after phonologically based intervention. *J Biol Psychiatry*. 2004;55:926-933
- Simms M, Schum RL. Preschool children who have atypical patterns of development. *Pediatr Rev*. 2000;21:147-158
- Stein MT, Parker S, Coplan J, Feldman H. Expressive language delay in a toddler. *J Dev Behav Pediatr*. 2001;22(2 suppl):S99-S103
- Torgeson J, Alexander A, Wagner R, et al. Intensive remedial instruction for children with severe reading disabilities: immediate and long-term outcomes from two instructional approaches. *J Learn Disabil*. 2001;34:33-58
- Torgeson J, Wagner R, Rashotte C, et al. Preventing reading failure in young children with phonological processing disabilities: group and individual responses to instruction. *J Educ Psychol*. 1999;91:579-593
- Wadsworth SJ, Olson RK, Pennington BF, DeFries JC. Differential genetic etiology of reading disability as a function of IQ. *J Learn Disabil*. 2000;33:192-199
- Wechsler D. *Wechsler Intelligence Scale for Children*. 3rd ed. San Antonio, Tex: The Psychological Corporation; 1991
- Wilkinson GS. *Wide Range Achievement Test*. 3rd ed. Wilmington, Del: Wide Range, Inc; 1993

Resources

Committee on the Prevention of Reading Difficulties in Young Children, National Center for Learning Disabilities. *Preventing Reading Difficulties in Young Children*. Washington, DC; National Academy Press: 1998

Coplan J. Normal speech and language development: an overview. *Pediatr Rev*. 1995;16:91–100

National Center for Learning Disabilities (www.ld.org) Reach Out and Read Program. Available at: www.reachoutandread.org

Shaywitz SE. *Overcoming Dyslexia: A New and Complete Science-based Program for Reading Problems at Any Level*. New York, NY: Alfred A. Knopf; 2003

Shaywitz SE. Dyslexia. *N Engl J Med*. 1998;338:307–312

Whitehurst GJ, Fischel JE. Practitioner review: early developmental language delay. What, if anything, should the clinician do about it? *J Child Psychol Psychiat*. 1994;35:613–648

Wilkinson GS. *Wide Range Achievement Test*. 3rd ed. Wilmington, DE; Wide Range, Inc; 1993

PIR Quiz

Quiz also available online at www.pedsinreview.org.

- The mother of a 13-month-old boy expresses concern to her pediatrician about her child's language development. The pediatrician reassures her that by this age, her son should be able to:
 - Imitate sounds.
 - Recognize pictures when named.
 - Repeat words heard.
 - Respond to yes/no questions.
 - Use the word "me."
- The father of a 30-month-old girl who was a term infant and had normal Apgar scores, growth, and development expresses his concern about her ability to understand him. By what age should the girl be able to comprehend a two-step command without gestures from her father?
 - 12 to 14 months.
 - 14 to 16 months.
 - 16 to 18 months.
 - 20 to 24 months.
 - 24 to 28 months.
- You are the local pediatric representative for the "Reach out and Read Program." When speaking to a group of pediatric residents about the program, you urge them to recognize the importance of children becoming good readers early in their school years. You further stress that children who have reading disabilities can have life-long reading problems. You add that the percentage of children who have reading problems early in their school careers who will continue to have problems into adulthood is *closest* to:
 - 15%.
 - 25%.
 - 50%.
 - 75%.
 - 90%.
- A mother reports that her 5-year-old son has struggled through his recently completed kindergarten grade. His behavior during this year has included disruption of his class, especially during the reading periods. The mother has made efforts to read and work with him at home, but she is fearful that he will have reading problems in first grade. You tell her that one of the *best* predictors of a child having reading problems in the first grade is a(n):
 - Disinterest in playing rhyming games.
 - Failure to recognize letters.
 - Inability to relate pictures to a story text.
 - Inability to retell stories.
 - Unwillingness to listen to a long story.