Causes of Severe Reading Difficulty and the Impact on Reading
by Rebecca Felton, Ph.D

The Puzzle

For many years educators were puzzled by children of average to above average intelligence who come to school with good oral language and rich experiences with books and, yet, experience difficulty learning to read. Since the early 60’s such students have been considered to have a specific learning disability and special educational services have been provided although little was understood about the nature of such disabilities and no consensus existed concerning treatment.

In 1985, the National Institute of Child Health and Human Development (NICHD) was mandated to conduct long-term, prospective, longitudinal, and multidisciplinary work designed to better understand the causes of reading disabilities as well as effective treatments. By the year 2000, more than 100 researchers in fourteen research centers have been funded to study these issues. Because of more stringent scientific requirements, the studies have produced a growing body of highly replicable and consistent findings.

The Answers

Research focusing on the causes of “unexpected” reading disabilities indicates that, for many individuals, their difficulties are related to inherited brain differences. Several NICHD studies have found that deficits in working with the sounds (phonemes) of language is related to atypical functioning in specific brain regions. The strongest finding to date is that phonological processing is the primary area in which children with reading difficulties differ from other children. NICHD studies indicate that about 40% of the general population of students have reading problems sufficient to hinder their enjoyment of reading but an arbitrary cutoff point of 20% has been utilized in many research studies to designate children as reading disabled. For most of these students, however, the primary problem is poor phonological processing and the difference between learning disabled and other poor readers is one of degree (severity) and not a difference in the nature of the problem. IQ-achievement discrepancies have been determined to be unimportant in the understanding of reading disabilities. In summary, problems processing the sounds of language, not visual problems, are responsible for the majority of reading problems.

Phonological processing includes three basic components which have been found to be important for success in reading:

- phonological awareness
  - rapid naming/word retrieval
  - holding sounds in working memory

Of these components, phonological awareness is the most prevalent area of deficit in disabled readers. Phonological awareness skills involve the ability to segment words into sounds and to manipulate the sounds of words in different ways. For example, to be a good reader a student must first be able to: recognize that two words have the same beginning, ending or middle sound; segment words into syllables and phonemes; blend syllables and sounds into words; and count, add, and delete sounds within words. Students must also know that letters represent sounds and must be able to map speech onto print.
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The Impact on Reading

Impact of Poor Phonological Awareness Problems: Students with weaknesses in phonological awareness will have difficulty developing these skills which will impact their ability to develop beginning reading skills. Such students do not understand the alphabetic principle of English and fail to develop adequate decoding (letter to sound) skills for reading or encoding (sound to letter) skills for spelling. They may be unable to produce good invented spellings because they do not have the requisite skills necessary to segment words into sounds and map those sounds onto the appropriate letters. Such students tend to rely on their knowledge of words memorized as “sight words” and attempt to read new words based on context or by guessing based on partial letter cues (such as the first and last letters of the word). They may not recognize the common spelling patterns in words so do not benefit from the regularities that exist in the English language. Deficits in decoding (and encoding) are the most critical factors in poor reading for the majority of students. Studies clearly indicate that a major portion of the difficulty students have in reading comprehension is related to inaccurate identification of the individual words encountered which is, in turn, strongly related to decoding skills. It is, of course, possible to read words accurately and still have problems with comprehension and this is an area which is now being studied more carefully.

Impact of Naming Problems: Students with difficulties in rapid naming/word retrieval are characterized by slow and effortful naming of items such as letters, numbers, and colors. Such students often have difficulty initially learning letter names/sounds in kindergarten and irregular, high frequency words in first grade; teachers and parents remark that these students seem to learn the information only to have forgotten it later. For such students, learning the names of items requires multiple repetitions over a long period of time and they may be slow to recall the names of the items even when they have been learned. Because they may not be able to accurately or quickly recall letter-sound associations, such children often make “reversal errors” such as hearing the sound of /b/ and writing the letter ‘d’ - such errors are not related to “seeing” the letter backwards. The result of naming problems is that learning to read is very difficult - decoding and encoding will be affected by the difficulty such students have learning letter-sound associations and memorization of sight words is equally difficult. Even when such students learn to decode accurately, they often have to decode the same words over and over rather than recognizing those words quickly and automatically. Thus, reading is very slow and laborious and these students typically hate reading and avoid practicing.

Impact of Working Memory Problems: Holding information in working memory involves the ability to hold a string of sounds (such as a name of a letter or a number) in short term memory while the information is being processed. This is often measured by the ability to recall a string of numbers or to repeat unfamiliar words accurately. Although of lesser importance for reading than phonological awareness and naming, weaknesses in this area can impact students’ ability to segment and blend sounds into words.

Students with a combination of phonological awareness, naming and working memory deficits are considered to have a double or triple deficit and are typically the most severely impaired of readers.
Implications for Identification

The extensive body of NICHD research on the causes of reading disabilities has direct implications for the identification of such students. An IQ-achievement discrepancy, as used in most states for identifying students with specific learning disabilities, is not important in the determination of reading disabilities. There is very little relationship between learning to fluently decode and the individual’s measured intelligence level. Reading disabilities should be identified based upon the processing problems described above rather than arbitrary IQ-achievement scores.

A related issue which has been clarified by the NICHD research concerns the use of the term dyslexia. Although this term has traditionally not been used by educators, it is important that the educational community be aware of the proper use of this term and the educational implications. The most current and widely accepted definition of dyslexia was agreed upon by researchers and educators in 2002 and reads as follows: “Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge”. Unlike the definitions of learning disability used by schools for the purpose of determining eligibility for special education services, dyslexia is a term used to describe a language-based disorder for clinical, educational and research purposes. The NICHD research on educational interventions which will be presented in this program is based upon this definition. The term dyslexia is typically used to indicate those students with the most severe reading problems (perhaps 5 percent of the students who have difficulty with reading). However, it is clear from numerous studies that the majority of students who have difficulty with basic reading skills do so because of some degree of difficulty with phonological processing. The difference between students properly diagnosed as dyslexic and others is primarily a matter of the degree of the difficulty.

This is a very important educational issue because of the implications for instruction. In order to plan effective instruction, teachers must know the nature and degree of the language processing weaknesses and basic reading problems of their students. In this program you will be taught basic principles of assessment of such students as well as how to plan effective instruction.