
Learning Disorders

Learning disorders occur in persons who have at least average intelligence, but difficulty processing certain types of information; this difficulty leads to problems in learning to read, spell, write, perform math, listen, or speak. Learning disorders should be distinguished from other types of learning problems caused by such things as mental retardation, borderline intellectual ability, underachievement, primary sensory or motor disabilities, behavioral or emotional dysfunction, and/or environmental deprivation. According to *DSM-IV-TR*, the primary criterion for learning disorders is a failure to achieve at a level commensurate with one's chronological age, measured intelligence, and age-appropriate education. The learning disorder must also interfere significantly with one's academic achievement or activities of daily living. Learning disorders are commonly referred to as "learning disabilities" in school systems, and the child's eligibility for intervention services usually is determined by the presence of a severe discrepancy between the child's intellectual and academic functioning.

Children with learning disabilities comprise the largest group of children with disabilities from birth to 21 years who receive special education services in U.S. public schools. They receive 46 percent of the special education funding compared to the next largest group (speech or language impairments) that receives 17.6 percent of the funding. This corresponds to approximately 2.8 million students who have a primary diagnosis of learning disability severe enough to be eligible for special education services (U.S. Department of Education, June

2000). The terms learning disabilities and learning disorders will be considered interchangeable in this entry.

TYPES OF LEARNING DISORDERS

Early research on learning disabilities assumed that the disorder was homogeneous and possibly caused by a single underlying factor. Current researchers consider learning disabilities to be a heterogeneous set of disorders that may have several etiologies. Subtyping of learning disabilities and their underlying processing deficits has become common practice. The primary subtypes of learning disabilities are described in Table 1.

In addition to subtyping according to the academic area affected by the learning disorder, it is important to subtype also by the information processing deficits that underlie the disorder. Much of the subtyping research to date has been done with dyslexia. For instance, a child with phonological processing deficits that underlie a reading disorder may have problems remembering or discriminating between similar phonetic sounds, or have problems blending phonetic sounds together into syllables and words. A child with visual perceptual deficits may have difficulty remembering or discriminating between similar graphemes (e.g., letters such as b–d, p–q) that leads to reading errors. This child may have a poor sight-reading vocabulary. Children with sensorimotor processing problems may manifest their problems more in writing. Their written production may be slow, poorly legible, disorganized, or replete with errors of spelling. Often individuals with this type of processing problem may demonstrate their knowledge well orally, but fail to communicate this

Table 1. Primary Subtypes of Learning Disability

Reading Disorder (Dyslexia)	A disorder in one or more of the basic skills involved in reading, including basic reading skills (e.g., letter–word recognition and identification, phonetic analysis and synthesis) and reading comprehension skills.
Mathematics Disorder (Dyscalculia)	A disorder in one or more of the basic skills involved in mathematics, including computational skills (e.g., the math operations of adding, subtracting, algebra and geometry operations, etc.) and math reasoning abilities.
Disorder of Written Expression (Dysgraphia)	<p>A disorder in one or more of the basic skills involved in written expression. This disorder may be manifest in:</p> <ul style="list-style-type: none"> • Knowledge of rules for spelling, grammar, punctuation, and capitalization • Motor production of writing, including letter formation, kinesthetic-motor sequencing of letters to make words, speed of writing production, and spatial organization of written material • Semantic and syntactic abilities that underlie clear expression of ideas in written language, using age-appropriate vocabulary and correct sentence structure • Organization of ideas and themes for writing longer passages, such as themes or essays.

information at a commensurate level in written form. Accurate subtyping of learning disorders is essential for development of appropriate educational intervention strategies that will strengthen the child's information processing weaknesses while attempting to teach through their processing strengths.

DIAGNOSIS

Learning disorders are diagnosed through an individual psychoeducational evaluation that includes measures of intellectual and academic functioning, and various types of information processing abilities. Information processing refers to the brain's ability to interpret information from various types of sensory input (e.g., visual, tactile, motor), and process that information in an integrated manner to facilitate academic performance. For example, the ability to take a spelling test in class involves a complex series of processing steps, including auditory input of the spoken word, perhaps visualizing the word mentally, associating the various phonetic sounds with specific letters in the word, remembering the correct kinesthetic-motor patterns necessary for writing the letters and sequencing them correctly, as well as accessing one's knowledge of specific spelling rules that govern the irregular spelling of many words in the English language. This complex processing ability is mediated by many different parts of the brain, specific to the particular type of academic skill being performed. Psychologists are the primary professionals to conduct this type of evaluation, although educators trained in assessment may sometimes conduct the academic portion of the examination.

In addition to the intellectual, academic, and information processing assessment, individuals with

suspected learning disorders should be examined medically to rule out even a subtle auditory or visual acuity deficit that could interfere with learning. A medical evaluation can also determine the integrity of the child's motor system as it supports writing skills. Often a speech/language pathologist will participate in an evaluation to examine whether receptive/expressive language, articulation, or auditory processing problems are present. Care should be taken to rule out primary sensory or motor deficits or mental retardation that could explain the individual's learning difficulty. Psychologists will also take a careful background history to determine if the child has had appropriate opportunities for learning (e.g., regular school attendance) and to rule out significant environmental deprivation and/or emotional problems as the primary cause of the child's learning problems.

COURSE OF THE DISORDER

Learning disorders typically are lifelong disabilities, although many individuals learn to compensate for the negative effects of the disorder through special education services they receive in school. A small number of children may experience a delay in maturation of functions needed for development of early academic skills, but they will typically catch up by 9 or 10 years of age. However, most individuals will continue to have some symptoms of learning disorders throughout their lives. The course of the disorder is also affected by the child's general intellectual ability and by the number of information processing areas affected by the learning disorder. For example, if a child has difficulty processing both auditory and visual information, their reading skills may be more seriously impaired than if only one

processing modality is affected. A child with a learning disability who has above average intelligence will likely fare better than one with below average intelligence. Family support, and the quality and timing of special education interventions, can also affect outcome.

ETIOLOGY OF LEARNING DISORDERS

The cause of learning disorders is still under investigation, but there is wide agreement that they are neurologically based disorders that affect central learning processes. Learning disorders may be inherited, and a family history will often reveal one or more close relatives with some form of learning disorder. Often several generations will display the disorder, and the familial pattern lends strong evidence for a genetic etiology in these cases. However, researchers have explored a number of other possible etiologies as well. Culbertson and colleagues (1996) suggest that causes may include brain structural differences that underlie the information processing deficits, differences in brain activity level (e.g., glucose metabolism) during academic tasks such as reading, and even perinatal or postnatal events that affect the developing fetus or young child. At present, researchers have not determined a single cause for learning disorders, and often it is not possible to determine a specific etiology for a given individual.

TREATMENT

Learning disorders are best treated through special education provided by educators who are specially trained (usually with at least a Master's degree in special education, and certification in the area of learning disabilities). These educators are found in public school systems all across the United States, but not necessarily in every school. Special education and related services are provided free of charge to all eligible children through Public Law 101-476 (Individuals with Disabilities Education Act of 1990, or IDEA). Once a child is diagnosed with a learning disability and determined to be eligible for special education services by a multidisciplinary team of educators, ancillary professionals, and parents, the team will develop an Individualized Educational Plan (IEP) that is appropriate for the needs of the child. The type, intensity, and setting for provision of the special education services will be determined at that time. Although special education services are important in helping children learn despite their learning disability, these services should not be considered a "cure" for the disability. Often the focus in early

grades is upon remedial education, but eventually the focus will shift to assisting older elementary children and adolescents to develop compensation strategies for working around their disability. In addition, modifications in the child's curriculum may be detailed in the IEP. For example, a child with a disorder of written expression may need additional time to complete written tests, or may need to request that a good "note-taker" in class share his or her lecture notes.

With the passage of the Americans with Disabilities Act of 1990 (P.L. 101-336), individuals with learning disabilities are protected from discrimination. This law has led institutions of higher learning that accept public funding to institute policies and procedures to prevent discrimination against individuals with disabilities of all types. Most colleges and universities now have programs to assist students with disabilities who are willing to identify themselves and present documentation of their disability and need for accommodations. These events have opened the door to higher education to a growing number of students with learning disabilities who have the ability and desire to undertake higher education.

See also: Adolescent Assessment; Mental Retardation; Preschool Assessment; School Age Assessment; Underachievement

Further Reading

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- Culbertson, J. L. (1998). Learning disabilities. In T. H. Ollendick & M. Hersen (Eds.), *Handbook of child psychopathology* (3rd ed., pp. 117-156). New York: Plenum.
- Individuals with Disabilities Education Act of 1990*, 20 U.S.C. Chapter 33, Section 1401.
- U.S. Department of Education, Office of Special Education and Rehabilitative Services, Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act, June 2000.

Web Sites

- Learning Disabilities Association of America (<http://www.ldanatl.org>)
- LD OnLine (<http://www.ldonline.org>)
- National Information Center for Children and Youth with Disabilities (<http://www.nichcy.org>)
- National Adult Literacy and Learning Disabilities Center: Academy for Educational Development (<http://www.aed.org>)

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