

Neuropsycholinguistic Characteristics of Dyslexia and Diagnostic Criteria

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Abstract: This article examines dyslexia from a neuropsycholinguistic perspective, with particular attention to the role of grapheme–phoneme correspondences and decoding processes in reading development. The study analyzes the phonological, linguistic, and cognitive mechanisms underlying reading difficulties and emphasizes the importance of distinguishing dyslexia from general reading problems, limited language proficiency, sensory impairments, intellectual difficulties, and motivational factors. Particular attention is given to phonemic perception, phonological awareness, phonological memory, decoding, pseudoword reading, and reading automatization as key diagnostic components. Considering the phonetic nature and agglutinative structure of the Uzbek language, the article argues for the development of a national diagnostic framework that incorporates language-specific linguistic and neuropsycholinguistic criteria for the reliable assessment of dyslexia.

Keywords: Dyslexia, neuropsycholinguistics, grapheme–phoneme correspondence, decoding, phonological processing, phonemic perception, phonological awareness, phonological memory, pseudoword reading, reading automatization, Uzbek language, diagnostic model.

Introduction: In contemporary neuropsycholinguistics, dyslexia is interpreted as a specific reading disorder that manifests in difficulties with accurate and fluent word reading, decoding, and the acquisition of spelling skills, despite preserved general intellectual abilities. In the International Classification of Diseases of the World Health Organization, dyslexia is described as a specific and persistent disorder of the development of reading skills, and it is emphasized that it cannot be explained solely by intellectual disability, visual impairment, or inadequate educational conditions.

According to the definition provided by the International Dyslexia Association, dyslexia is a specific learning disability of neurobiological origin, characterized by difficulties in accurate and fluent word reading, decoding, and the acquisition of adequate spelling skills. These difficulties are generally associated

with deficits in the phonological component of language.

In international research, one of the principal mechanisms underlying dyslexia is associated with deficits in the phonological component of language. This condition may lead to difficulties in distinguishing speech sounds, identifying phonemes within words, mastering phoneme–grapheme correspondences, and retaining phonological information in memory. In their studies, M. J. Snowling and C. Hulme interpret dyslexia as a cognitive disorder that manifests itself during the acquisition of written language and is associated with difficulties in processing the sound structure of language. Therefore, the present study examines dyslexia from the perspectives of neuropsycholinguistic, neuropsychological, applied linguistic, and computational linguistic approaches.

For a scientifically accurate assessment of dyslexia, it is essential to differentiate it from general reading difficulties, educational deprivation, insufficient language experience, visual or auditory impairments, intellectual disabilities, and motivational factors. This distinction is important because difficulties in reading do not necessarily indicate dyslexia. In some cases, poor reading performance may be associated with unfavorable educational conditions, insufficient reading practice, limited language exposure, the effects of bilingualism, or the child's emotional state. In dyslexia, however, the primary difficulty does not lie in the absence of the capacity to learn to read, but rather in the insufficient automatization of the phonological, cognitive, and neuropsychological mechanisms underlying the reading process.

General reading difficulties are often associated with external factors. For example, a child may demonstrate low reading speed and accuracy when they have received insufficient education, engaged in limited reading practice, been provided with instructional materials that are not age-appropriate, or received inadequate family support for reading. In such cases, reading performance may improve relatively quickly through regular instruction, practice, and pedagogical support. In dyslexia, however, the difficulties tend to be more persistent: even when a child has received adequate instruction, continuing difficulties may be observed in word decoding, the acquisition of grapheme–phoneme correspondences, pseudoword reading, and the processing of phonological information.

Dyslexia should also be distinguished from limited language proficiency. Particularly among children growing up in bilingual or multilingual environments, certain reading difficulties may be attributable to limited vocabulary in the second language, incomplete acquisition of grammatical structures, or insufficient language experience. In such cases, a child may be able to decode a word correctly but may nevertheless fail to understand its meaning. In dyslexia, however, the primary difficulty is not merely a lack of knowledge of word meanings but is manifested in the processing of the phonological structure of words, the mapping of letters onto sounds, and the automatization of reading.

Dyslexia should also be differentiated from visual or auditory impairments. If a child has reduced visual

acuity, they may have difficulty seeing letters clearly, lose their place while reading, or experience reading difficulties due to visual fatigue. In cases of impaired auditory sensitivity, a child may fail to perceive speech sounds adequately and, consequently, may experience difficulties with phonemic discrimination. In dyslexia, however, difficulties in phonemic perception, phonological memory, decoding, and the acquisition of grapheme–phoneme correspondences persist even when the visual and auditory systems are functioning within normal limits. Therefore, when assessing dyslexia, it is advisable to conduct an initial screening of visual and auditory functioning, followed by a separate assessment of the mechanisms involved in phonological processing.

Dyslexia should not be equated with general intellectual developmental delay. Children with dyslexia may have intact overall intellectual abilities while experiencing specific difficulties in acquiring reading, decoding, and orthographic skills. Such a child may express their thoughts effectively in oral communication, perform oral tasks successfully, and demonstrate general knowledge and reasoning abilities comparable to those of their peers. However, when reading written text, the child may confuse or substitute letters, read words slowly and laboriously by syllables, incorrectly decode pseudowords, or become fatigued quickly during the reading process. Thus, dyslexia is not a form of general intellectual impairment but rather a specific difficulty associated with the acquisition of written language. It is also scientifically inaccurate to attribute dyslexia to low motivation or laziness. In many cases, children at risk of dyslexia may attempt to avoid reading; however, this behavior may be a consequence rather than a cause of their difficulties. This is because reading requires excessive cognitive effort for them. In other words, the processes of decoding each word, connecting sounds, synthesizing syllables, and maintaining meaning are not sufficiently automatized. As a result, the child may become fatigued quickly, make more errors, and develop reduced confidence in their reading abilities. Therefore, although the child's motivational state should be taken into account when assessing dyslexia, reading avoidance should not be interpreted as a primary cause of dyslexia but rather as one of its possible psychological consequences. One of the most

important differential criteria for identifying dyslexia is the persistence of difficulties and their association with phonological processing. If a child continues to experience difficulties in distinguishing phonemes, acquiring letter–sound correspondences, reading pseudowords, retaining sequences of sounds in memory, and decoding words fluently even after receiving practice and pedagogical support, this may indicate a risk of dyslexia. Therefore, dyslexia assessment should not be limited to measuring reading speed alone; rather, it should be based on a comprehensive evaluation of such components as phonemic perception, phonological awareness, phonological memory, decoding, pseudoword reading, and reading comprehension. Thus, dyslexia differs from other reading difficulties in its neuropsycholinguistic nature. It cannot be fully explained by external educational factors, language experience, visual or auditory problems, or low motivation. In dyslexia, the primary difficulty is manifested in processing the relationships between the phonological structure of oral language and the system of written symbols, automatizing grapheme–phoneme correspondences, and retaining phonological information in memory. Therefore, the differentiation and assessment of dyslexia require a specialized diagnostic approach based on applied linguistic and neuropsycholinguistic criteria, alongside clinical, pedagogical, and speech-language observations. In understanding dyslexia from a neuropsycholinguistic perspective, the grapheme–phoneme relationship is of particular importance. During the reading process, a child visually perceives a graphic symbol, associates it with a specific speech sound, and processes the sequence of sounds as a meaningful word. Thus, reading is a complex linguocognitive process based on establishing a relationship between the phonological structure of oral language and the system of written symbols. While a phoneme is the smallest sound unit of a language that distinguishes meaning, a grapheme is a written symbol that represents this sound unit in the writing system. During the process of learning to read, a child must understand which phoneme corresponds to each grapheme, retain these correspondences in memory, and apply them rapidly and automatically during reading. If grapheme–phoneme correspondences are not established consistently, the child is forced to

analyze each word repeatedly. This condition negatively affects reading speed, fluency, and reading comprehension. Decoding is the practical manifestation of grapheme–phoneme correspondence. During the decoding process, the child converts a sequence of letters into a sequence of sounds, synthesizes them at the syllable and word levels, and ultimately recognizes a meaningful linguistic unit. If grapheme–phoneme correspondences are not stable and sufficiently automatized, reading becomes slow, effortful, and error-prone. In children at risk of dyslexia, the decoding mechanism is often insufficiently developed. Such children may be able to read familiar words approximately by relying on memory, but they experience considerable difficulty when reading unfamiliar words or pseudowords. This is because, when reading pseudowords, the child cannot rely on an established lexical representation in memory. Instead, they must apply letter–sound correspondences accurately and reconstruct the word phonologically. Therefore, pseudoword reading is considered an important tool for assessing decoding ability in the diagnosis of dyslexia. Instability in grapheme–phoneme correspondences may manifest itself through various errors in reading and writing. A child may substitute letters representing acoustically or articulatorily similar phonemes, omit certain letters, disrupt the sequence of syllables, or rely on contextual guessing when reading words. For example, an inability to consistently distinguish phonemic oppositions such as /q/–/k/, /gʻ/–/g/, /h/–/x/, /b/–/p/, and /d/–/t/ may result in grapheme confusions, inaccurate word reading, and spelling errors. In the Uzbek language, grapheme–phoneme correspondences are based primarily on the phonetic principle. In global psycholinguistic research and international scientific practice, languages characterized by this feature are studied under the term “transparent orthographies.” However, this characteristic of the language does not completely rule out the risk of dyslexia, since reading is not limited solely to mapping sounds onto letters. In particular, the agglutinative structure of Uzbek words, the lengthening of word forms through the addition of affixes, certain phonemic oppositions, and dialectal variation should be taken into account when assessing the decoding process.

From this perspective, the assessment of grapheme–

phoneme correspondences occupies a particularly important place in the diagnosis of dyslexia. For this purpose, children may be given tasks such as identifying letter–sound correspondences, identifying the initial or final sound in a word, identifying words containing a given sound, distinguishing minimal pairs, and reading real words and pseudowords. Such tasks help assess the child’s phonemic perception, phonological awareness, decoding ability, and level of reading automatization. Thus, grapheme–phoneme correspondences and the decoding mechanism occupy a central position in understanding and assessing dyslexia. If a child is unable to establish stable associations between phonological units in oral language and written symbols, the reading process fails to become automatized, word recognition becomes slower, and reading comprehension becomes more difficult. Therefore, in a national diagnostic model designed to assess dyslexia in the Uzbek language, grapheme–phoneme correspondences, decoding, pseudoword reading, and phonological memory should be established as distinct diagnostic criteria.

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