

# Neuropsychological Features of Motivational and Volitional Readiness for School of Six-Year-Old Children with General Speech Underdevelopment

Iryna MARTYNENKO<sup>1</sup>,  
Hanna CHORNA<sup>2</sup>,  
Maryna OMELCHENKO<sup>3</sup>,  
Dina SHULZHENKO<sup>4</sup>,  
Zoriana LENIV<sup>5</sup>,  
Daria KHRYPUN<sup>6</sup>

<sup>1</sup> National Pedagogical Dragomanov University, Ukraine,  
[I.V.Martynenko@npu.edu.ua](mailto:I.V.Martynenko@npu.edu.ua),  
<https://orcid.org/0000-0001-5003-4653a>

<sup>2</sup> Zaporizhzhia National University, Ukraine, [chorna.a.v@ukr.net](mailto:chorna.a.v@ukr.net)

<sup>3</sup> State Higher Educational Institution "Donbas State Pedagogical University", Ukraine, [neckaa87@gmail.com](mailto:neckaa87@gmail.com),  
<https://orcid.org/0000-0001-8292-1791>

<sup>4</sup> National Pedagogical Drahomanov University, Ukraine,  
[dinashulzhenko@gmail.com](mailto:dinashulzhenko@gmail.com)

<sup>5</sup> Vasyl Stefanyk Precarpathian University, Ukraine, [lzoryana@ukr.net](mailto:lzoryana@ukr.net),  
<https://orcid.org/0000-0002-0611-9841>

<sup>6</sup> Pavlo Tychyna Uman State Pedagogical University, Ukraine, [8669838@ukr.net](mailto:8669838@ukr.net),  
<https://orcid.org/0000-0001-8982-6308>

**Abstract:** *The article raises the issue of general speech underdevelopment in six-year-old children as a disorder of complex aetiology, which includes a combination of genetically determined insufficiency of certain brain systems with the consequences of organic damage to the central nervous system. This topic is of significant interest these days, because moderate general speech underdevelopment with a positive prognosis occurs in 15-25% of children and an average of 5% have severe disorders that interfere with adaptation. Children with such underdevelopment have difficulties in social development, quality of which directly depends on the level of development of the ability to build coherent statements that prevent formation of readiness for school. The article contains a description of the features of motivational and volitional readiness for school in children with general speech underdevelopment, methods of its evaluation and a review of experimental research. A psychological readiness for school from the point of formation of motives and their features, as well as the quality of self-regulation of children with general speech underdevelopment is characterized. Conditions for development of coherent speech in children of this category and the features of purposeful and consistent correctional and pedagogical work are considered. Examples of correctional methods from the point of view of neuropsychology and substantiation of necessity of creation of pedagogical conditions for correction and development of speech in children with the general underdevelopment of speech are presented. For a long time, the issue of readiness of pre-schoolers for school has been of vital importance, which is due in part to the current large-scale socio-economic changes in society.*

**Keywords:** *Psychological readiness for school; internal position of the student; volitional regulation; verbal regulation; concentric ontogenesis; the theory of three functional blocks of the brain; neuropsychological diagnostics; neuropsychological exercises.*

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## Introduction

At present, reform processes in the field of education are actively taking place in Ukraine, in the context of which the issue of readiness for school of children with speech disorders has arisen, among which the general underdevelopment of speech should be singled out.

To begin with, let us give an interpretation of the following concepts: “readiness for school”, “motivational and volitional readiness for school”, “general underdevelopment of speech”, “neuropsychology”.

In the article by Lewit & Baker (1995), the statement that all children who go to school are ready to learn is considered according to two historically different concepts: readiness for learning and readiness for school. The former means the level of development, by reaching of which an individual of any age is able to digest certain information. This concept in terms of group or population determines the age at which the average person has such abilities. As far as readiness for school is concerned, it is a synthesis of readiness for learning and a certain level of intellectual, physical and social development, which is necessary for successful completing of the school program. However, these requirements do not have clear criteria or tools for assessing readiness of individual children for school.

In the United States, in 1992, the National Education Goals Panel developed principles of a child's readiness for school, such as cognitive, physical, motor, socio-emotional development, and speech development (Zuckerman and Halfon, 2003). A child's psychological readiness for school is characterized by two aspects: motivational and volitional. The former is determined by the desire to learn, the second –by the ability to use willpower to set goals, make decisions, solve problems and analyse one's behaviour.

From the manual by Mohylova (2019) we learn that the general underdevelopment of speech is a concept that covers syndromes different in aetiology and pathogenesis, but similar to those that occur in children with initially preserved intelligence, normal hearing and are characterized by impaired formation of all components of both sound and meaning aspects of speech. Signs of this disorder are found during study and use of the native language. The frequency of this disorder in the population is increasing, due to which in primary school from 30 to 60% of students need correction (Bartienieva, Bystranivska, 2011).

Speech, mental processes, brain function, as well as human behaviour, including arbitrary, i.e., one that makes it possible to overcome certain internal obstacles to implementation of various actions, studies the

science of neuropsychology. It considers polymodal perception as a basis for formation of such higher mental functions as speech and thinking, and Taran, Nizovskaya (2021) explain it as mental structure as a result of integration of sensory systems, which is possible due to perception of different modalities structured with formation of holistic sensory -perceptual experience of the individual.

### **Peculiarities of speech activity of six-year-old children with general speech underdevelopment**

Speech activity of senior preschool children with general speech underdevelopment has its own features that significantly affect the process of speech development, creating the idea of the world around and forming relationships (Emelyanova, Borisova, Shapovalova, Karynbaeva et al., 2018). These include: difficulties in reflecting causal and semantic relationships, inconsistency in reproduction of one's own thoughts in expression; dialogue is characterized by short duration, rapid exhaustion, inferiority, as well as presence of lexical, phonetic and grammatical errors. In addition, children's responses may be inappropriate due to their low desire to understand the language addressed to them. Difficulties in expression in this case arise due to poverty of vocabulary and information needed for the answer (Broomfield & Dodd, 2004). The disadvantages of monologic speech are phonetic and prosodic disorders, semantic narrowness and constant shifting the accents as a consequence of difficulties in the semantic organization of judgments. In addition, this group of children needs more time to analyse information and reflect on their response, as well as approval of adults.

In their study, Lobanova & Chernov (2017) used the Heidelberg test and subtests to assess the level of morphology, grammar, semantics, speech-pragmatic competence of speech and the ability to use skills of working with coherent text in senior preschool children. A significant influence of psychological and pedagogical situation and the level of parental care on speech development of a child with general speech under development in senior preschool age, lack of clear understanding of the meaning of a number of rarely used words despite sufficient vocabulary, lag in the ability to understand grammatically expressed logical relations, which is due to systematic errors in word formation and word change. Difficulties in communication and spontaneous speech are due to insufficient differentiation of certain sounds and difficult phonemic perception with creation and fixation in memory of a phonemic image, permutation, loss or

addition of new syllables and sounds in words. Despite this, children with general speech underdevelopment showed success in tests related to morphology and syntax, naming people depending on their social role, achieving pragmatic goals of communication through language.

### **Motivational and volitional readiness for school of children aged six years**

In considering this issue, we emphasize the inseparability of motivational and volitional aspects of psychological readiness for school of six-year-old children. The first phase of the volitional act is setting a goal, which is impossible without emergence of a motive, which is a unit of the motivational sphere and is characterized by objectivity, activity, awareness, stability and strength (Aseev, 1976).

The motivational aspect of psychological readiness for school in preschool children can be assessed using the method of “Motivational readiness” by Wenger, described in detail by Raygorodskiy (2008). According to the results of such study by Nasibullina, Polshina (2017), 30% of children with general speech underdevelopment had an average and below average level of formation of the internal position of the student, 20% - low and 10% - medium and high, respectively. The authors argue that senior preschool children with general speech underdevelopment have an idea of schooling, readiness to learn and fulfil responsibilities related to their new status, with a new social position - the position of a student. Nevertheless, in half of them this internal position is not yet formed, as well as the motivational component of readiness for school.

Kharchenko & Lapchenko (2018) study the influence of speech disorders on the development of volitional regulation and verbal regulation of actions. The authors note that it is expressed in the limited vocabulary, immaturity of grammatical structures, generalizing function of the word. It was found that in the implementation of actions aimed at solving a specific problem in children with this disorder, organization of motor control faces difficulties. In the process of solving certain problems, their logical part is difficult to learn and is overlooked almost completely; the vast majority of rules that need to be understood are not taken into account. In addition, there are problems in comparing the planned results with the existing ones.

In the above-mentioned study of Nasibullina & Polshina (2017) using the method of “Colouring circles”, children with general speech underdevelopment had all levels of volitional regulation - from low to high.

Undoubtedly, the results of Martynenko's work (2007) deserve attention. The scientist considers motivational-volitional readiness for schooling as a complex of such components: arbitrariness of behaviour and activity, formation of self-regulation of behaviour and activity, educational, cognitive and social motivation. During ontogenesis, formation of motivational and volitional components is interrelated and is directly dependent on the level of speech development. Accordingly, in violation of the latter, we observe certain features of the cognitive and personal spheres, and as a result of insufficient formation of the motivational and volitional component of readiness for school. The following were described: inadequate self-esteem, lack of self-regulation, verbal regulation of actions.

Implementation of volitional regulation is impossible without verbal regulation of actions, the means of which is speech. A six-year-old child has already formed self-regulation, as evidenced by the presence of all the elements of volitional action and the ability to subdue their own actions to the goal. In the study of the volitional component of psychological readiness for school, it was found that in children with general speech underdevelopment in various activities, preliminary, procedural and final self-control is insufficiently formed. As for the verbal regulation of actions, in such children the use of speech as a means of communication is difficult when learning the content and performing certain tasks.

In the motivational sphere of a six-year-old child in the hierarchy, the dominant motives should be broad and narrow social and cognitive, and less significant – play ones. In the study “Internal position of the student” children with general speech underdevelopment showed broad social motives dominant, and the levels of narrow social and cognitive learning motivation - much lower than the norm for six-year-olds. Nevertheless, the level of play motivation is much higher than that of children with normal speech development. The motivational sphere of a child with general speech underdevelopment is characterized by: superficiality and lack of differentiation, poverty on the content side, instability and insufficient effectiveness. In addition, children with this disorder may choose motives that make a better impression on the student's behaviour, but do not meet their needs (Martynenko, 2007).

### **The use of a neuropsychological approach in the assessment and correction of general speech underdevelopment**

The use of a neuropsychological approach in the study of school readiness of children with general speech underdevelopment allows a broader analysis of speech and non-speech disorders, because by greater plasticity of the child's brain and the ability to compensate due to restructuring of interfunctional relationships, certain functions can be preserved for a long time, according to Kravchenko & Piatkova (2021); Prots, Yakovliv, Medynskiy et al.(2021); Kosholap, Maksymchuk, Branitska, et al. (2021).

The study of Kozina et al. (2018) was conducted using the methodology of concentric ontogenesis, based on the theory of three functional blocks of the brain and neuropsychological rehabilitation according to Luria with observance of the principle of conformity of the current condition of the child to the basic stages of brain organization of mental processes with the subsequent reproduction of stages of ontogenesis which were not effectively passed. According to the study using a neuropsychological approach, formation of speech as a higher mental function is not yet complete, and the use of a neuropsychological approach in correctional work with children with general speech underdevelopment has positive consequences for regulatory, practical and gnostic functions and processes.

Emelyanova et al. (2018) consider coherent speech as a criterion for assessing a child's thinking capacity and social maturity. It is divided into monologic and dialogic. The former is an expression of internal motives and is characterized by logical completeness and syntactic structuredness. The latter has a light unprepared nature and focus on immediate response by listeners. In correctional work with children with general speech underdevelopment, it is necessary to form motivation to communicate, the desire to talk about themselves, their friends and life observations, and during classes to reproduce situations of immediate need to express, as well as their own desire to express their opinion – a direct speech motive. In addition, it is necessary to direct activities of a child with general speech underdevelopment to use the child's willpower for external orientation in certain situations, planning the content of speech and choosing verbal and nonverbal means for this, modification of communicative and speech behaviour, and, certainly, evaluating results.

Belova (2020) analysed aspects of the emotional and motivational sphere in children with general speech underdevelopment and among their personality traits revealed aggression, which in its insolubility has an extremely negative impact on speech disorders, mental development and, consequently, effectiveness of correctional and educational process and socialization of these children in the micro and macro environment.

According to Ahutina and Pyilaeva (1998), in paediatric neuropsychological diagnosis it is crucial to assess the state of the components of functional systems, i.e., functional diagnosis, because understanding the mechanisms allows to choose strategies for correction of disorders (Ichim, 2021).

Fotekova (2003) identifies the following variants of neuropsychological syndromes of children with general speech underdevelopment against the background of insufficient formation of higher mental functions: 1) children with special insufficiency of function of serial organization of movements and speech; 2) children with predominance of the deficit of functions of reception, processing and storage of information of polymodal perception; 3) children with pronounced and regularly unformed all higher mental functions.

According to Martynenko (2007), motivational and volitional readiness for school can be formed by correcting, with the help of purposeful development of self-regulation and educational motivation. Methodologically performed such work should be based on a gradual formation of self-regulation and educational motivation, which will allow to systematically manage their development.

It is possible to create preconditions for complete learning of educational materials during school education by influencing the sensorimotor level taking into account the general ways of development, which involves all higher mental functions and stimulates their development (Kozina et al., 2018). According to the theory of concentric ontogenesis, neuropsychological correction should have three levels, each of which has a specific influence “target” effect and is aimed at “blocks” of the brain. Therefore, the initial gaps in ontogenesis can be filled after passing all stages of sensorimotor development of the child from birth.

To achieve this goal, this article proposes four main blocks of exercises: breathing, oculomotor, motor and flexibility exercises. It is necessary to create a programme of neuropsychological support, i.e., a health treatment system aimed at creating optimal conditions for development of

emotional, volitional, cognitive, motor areas and improve the health of children. Correctional and pedagogical support should also be aimed at overcoming and preventing formation of secondary maldevelopments, as well as at obtaining certain knowledge and skills necessary in preparing the child for school. Positive changes in regulatory, practical and gnostic processes due to changes in general development programs, the use of a set of health works taking into account the psychophysical development of children with general speech underdevelopment. At the same time, the lack of special work, taking into account the neuropsychological status of the child, negatively affects six-year-old children with general speech underdevelopment.

Neuropsychological exercises developmental functions, as well as harmonize the work of the right and left hemispheres of the brain. The principles of working with these exercises are corrective, emotional-rehabilitation and stimulating to different activities. The most effective form of training is a game. Pravednikova's manual (2017) contains many exercises, including "Modified Schulte table", "Numerical search", "Odd letters", "Labyrinth", "Dictionary words", "Learning professions", "Explain to the aliens", etc. They are aimed at development of concentration and attention and its distribution, arbitrary attention and self-control, visual attention in processing the image of a word, thinking and enrichment of the word stock, speech, thinking (conceptual categories), the ability to clearly express their thoughts accordingly.

General speech underdevelopment in a child with normal mental development is manifested by symptoms of immaturity of the simultaneous-successive analysis and synthesis suggesting underdevelopment of hemispheric interaction. Insufficiency of the III functional block in such children leads to decrease in regulation of own activity and behaviour, and dysfunction of the II functional block defines difficulties with functional reception and processing of the hearing and speech information. This necessitates psycho-correctional work with children with general speech underdevelopment, aimed at development of arbitrary regulation by training concentration and distribution of attention, phonemic hearing. Thus, misunderstanding of the logical-grammatical speech constructions is eliminated, and the quality of speech semantics increases due to improvement of simultaneous-successive analysis and synthesis of verbal information (Astaeva, Voronkova, Koroleva, 2010).

The task of neuropsychological approach according to Dolmatova (2014) is to find the primary pathogenic factor in the multilayer structure of the defect, and not to determine the actual level of knowledge and skills. To work with the dysfunction of each functional unit, she offers such methods as stretching, massage and self-massage, breathing, oculomotor, reciprocal exercises, exercises for the tongue and jaw muscles, relaxation and visualization. In addition, she emphasizes the need to use games to develop coordination of movements and fine motor skills of hands, communicative and cognitive spheres.

The article by Nold, Skochilov, Berezina, Ilyina (2020) emphasizes the need to involve a teacher-psychologist to diagnose and develop further corrective measures for children with general speech underdevelopment. The interdisciplinary approach consists in their joint work with the teacher-speech therapist on the agreed programs which complement each other on the main directions. The pedagogue-psychologist should use in his / her correctional work tasks for development of general awareness, enrichment of the word stock, and to present information in a structured way. Particular attention should be paid to development of verbal-logical thinking, the ability to compare and classify objects by different distinctive features, for which purposes tasks such as finding common features of objects, identification of odd objects, distribution of objects into groups should be exercised. Especially important is the analysis and discussion of the results of corrective work in an interdisciplinary form.

## **Conclusion**

Therefore, the review of domestic and foreign articles confirmed that the issue covered in the work is now of immediate interest and requires further systematic study of the features and development of methods of psychological and pedagogical work.

The components of psychological readiness for school are clarified: motivational and volitional, which are inseparable and interdependent. The former is characterized by the desire to learn, the latter—by the ability to use willpower to set goals, make decisions, solve problems and analyse one's behaviour. General speech underdevelopment covers syndromes that occur in children with initially preserved intelligence, normal hearing and are characterized by impaired formation of all components of both sound and semantic aspects of speech. The incidence of this disorder in the population

is increasing, so in primary school from 30% to 60% of students need correction.

The motivational aspect of psychological readiness for school in children with general speech underdevelopment is characterized by an average and below average level of formation of the internal position of student, 20% - low level and 10% - medium and high, respectively. Older preschool children with general speech underdevelopment have an idea of school education, readiness to study and fulfilment of responsibilities related to their new status, with a new social position - the position of a student. Nevertheless, in half of them this internal position is not yet formed as well as the motivational component of readiness for school. Broad social motives were dominant, and the level of narrow social and cognitive learning motivation was much lower than the normative indicators for six-year-olds. However, the level of play motivation is much higher than that one of children with normal speech development. In the study of volitional regulation and verbal regulation of actions, it was found that in children with general speech underdevelopment in various activities, preliminary, procedural and final self-control is insufficiently formed. As for the verbal regulation of actions, in such children the use of speech as a means of communication involves difficulties in learning the content and performing certain tasks.

According to the results of the study using a neuropsychological approach, it was found that in six-year-old children with general speech underdevelopment formation of speech as a higher mental function is not yet complete, and the use of a neuropsychological approach in correctional work with them has positive consequences for regulatory, practical and gnostic functions and processes. In the course of such work, it is necessary to form in children motivation to communicate, desire to talk about themselves, their friends and life observations, and during classes to reproduce situations of immediate need to express, as well as their own desire to express their opinion - direct speech motive. In addition, it is necessary to direct the activities of a child with general speech underdevelopment to use the child's willpower for external orientation in certain situations, planning the content of speech and choosing verbal and nonverbal means for this, modifying communicative and speech behaviour, and, certainly, evaluating results. According to the theory of concentric ontogenesis, the neuropsychological correction should have three levels, each of which has a specific influence "target" and is aimed at the "blocks"

of brain. Therefore, the initial gaps in ontogenesis can be filled by going through all stages of the sensorimotor development of the child from birth, for which purpose four main blocks of exercises are proposed: breathing, oculomotor, motor and flexibility exercises, as well as creating a program of neuropsychological support. Insufficiency of the III functional block in six-year-old children with general speech underdevelopment leads to decrease in regulation of own activity and behaviour, and dysfunction of the II functional block defines difficulties with functional reception and processing of auditory and speech information. This necessitates psycho-correctional work with children with general speech underdevelopment, aimed at development of arbitrary regulation by training concentration and distribution of attention, phonemic hearing.

Thus, the use of specially designed programmes of neuropsychological support will increase the level of motivational and volitional readiness for school education, and this issue needs further study.

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