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**THE RELATIONSHIP OF SPEECH AND THINKING IN
SCHOOLCHILDREN WITH DISABILITIES**

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Abstract

Within the framework of the problem of heterochrony of development, age-related changes in speech activity from younger to older in schoolchildren with normal ontogenesis and disabilities. For this purpose, a comparative analysis of the level of speech development and visual-figurative thinking and their age characteristics in persons with disabilities of all school age on the basis of oral and written speech has been made. Neuropsychological approach to the analysis of the state of speech involves the consideration of two speech functions: operational and regulatory. The regulatory function of speech is manifested in the possibility of organizing the focus of thinking, including non-verbal as well. In the process of development, the unevenness of the two levels of speech activity reveals itself at different school ages, especially among students with disabilities. Mental activity, mediated by speech, is realized in the preparation of stories on a series of subject pictures in oral and written form, when in the latter its organizing and regulating function is more clearly displayed. By the senior school age people with disabilities show positive dynamics in the formation of speech in terms of production, however, its increase does not ensure the focus and regulation of mental activity, which remain quite deficient in senior school age.

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1. Introduction

Within the framework of the modern system of diagnostic and correctional development work with children with learning difficulties or mental developmental disorders, problems of mental development patterns of children of all school ages and age-related changes in terms of heterochronic and individual typological features as developmental unevenness from primary school age for the senior pupils with disabilities are widely developed.

2. Problem Statement

Currently, the requirements for the school student in the educational aspect became more complicated, particularly, in expanding the volume and degree of complexity of the material being studied, which can lead to learning difficulties for schoolchildren both with normotypic development, and with disabilities studying under the general education program (Khaustov, Manelis, Pancyr, Mamontova, & Volgina, 2015).

According to various researchers (Akhutina, 2014; Luriya, 2018; Mikadze, 2014; Polonskaya, 2007), the most frequent variant is the lack of functions programming formation, regulation and control, both in normal ontogenesis, and for children with a disability. This is manifesting in the behavioral and cognitive characteristics of children, and, especially, the lack of formation is manifested in the implementation of speech, most notably in its regulatory function. The school-age children neuropsychological diagnostics includes the diagnosis of the state of the so-called “visual-figurative thinking”, which involves the study of an understanding of the meanings of subject pictures and their series (Polonskaya, 2007). There are several approaches to the analysis of this experimental material. Akhutina (2014) uses the “neuro-linguistic” approach and analyzes a series of subject pictures in the aspect of their coherence or violation of this parameter. In modern psychology, the “mental model” problem, which is the ability to ascribe independent mental states to oneself and others to explain and predict behavior, is developing actively, and it is assumed that the understanding of the mental world is already formed by four years. Primarily, this inaccessibility of understanding the causality of the actions of other people is detected in children with autism spectrum disorders (ASD) (Medvedovskaya & Lebedeva, 2011).

Within the ambit of the psychological-pedagogical approach, understanding the analysis of the semantic aspect of a literary work highlights two hierarchical levels in the structure of verbal-semantic processes, when one lower level is represented by the implementation of the most simple, basic cognitive operations associated with the semantic processing of words as one of the elements of the language, while the overlying level provides for the identification of verbal generalized logical relationships in the semantic processing of complex verbal textual material with understanding of its subtext. Dissociation of these levels is observable in younger students. It can be considered as a variant of the unevenness of mental development (Lokalova, 2000). Basic cognitive operations related to the underlying level in the structure of verbal-semantic processes, associated with the semantic differentiation of words, makes possible the providing of the operational side of verbal-logical thinking, that largely determines the implementation of the processes of analysis and synthesis.

Such an approach can be extended not only to a literary work analysis, but also to the understanding of a subject picture meaning. However, a holistic, systematic way of analyzing the meaning understanding of the subject pictures should include verbal activity to identify verbal generalized logical relationships, active visual perception, providing a full selection of the main elements of the plot, as well as the formation of an adequate hypothesis regarding the content of the plot. From the point of view of the analysis of mental activity verbal generalized logical relations in the future we will call “the establishment of cause-effect relationships and relations”. Indeed, quite often the description of the main characters of the plot, their location, the action performed, the state, etc. is taken as a complete understanding, but after asking clarifying questions, we can get answers, where, along with a full understanding of the plot, there are answers with semantic incompleteness or distortion of the plot (Gurova, 2012).

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3. Research Questions

3.1 What is the dynamics of the development of speech in terms of vocabulary among schoolchildren with disabilities in oral and written statements?

3.2 What is the impact of the regulatory function of speech on the focus of mental activity?

4. Purpose of the Study

The aim of the research was to study the state of speech and its regulatory function in the processes of visual-figurative and verbal-logical thinking at students with disabilities.

In the furtherance of this goal it was necessary to solve the following tasks:

- To carry out a comparative analysis of the level of the visual-figurative thinking development and its age features in persons with disabilities of all school age on the basis of oral and written speech.
- To study the influence of the speech regulatory function on the focus of mental activity.

5. Research Methods

The study of visual-figurative thinking was carried out on the basis of perception, understanding and subsequent formation of the story on a series of subject pictures: orally - “Hiding Frogs” and in written form - “Sly fish” both from the book “Stories in Pictures” (Radlov, 2010).

The traditional method of research of verbal-logical thinking as a diagnosis of the level of formation of the operational side of mental activity, when the semantic differentiation of verbal material is available, is the pathopsychological technique of “Analogy” (Rubinstein, 2018). In this work, we used the modified method “Analogies” (40 tasks), where it was necessary to independently update the searched word on the basis of identifying a logical connection between the first two words (for example, match-

boxes, money-...). The obtained results analyze the availability of the allocation of an adequate comparison principle as an indicator of the formation of the verbal-logical thinking.

As the criteria for the formation/deficiency of visual-figurative thinking were highlighted: the availability of the full establishment of all the necessary causal relationships. At the same time, the was made an analysis of the state of speech in terms of the volume of verbal output, the possibility of drawing up a detailed connected grammatically correctly formed story, and the level of formation of verbal-logical thinking.

5.1. The object of the research

The study involved 173 schoolchildren aged from 9 to 18 years old. The group with disabilities among them consisted of schoolchildren with residual organic lesions of the central nervous system (organic lesions) and autism spectrum disorders (ASD). Involved schoolchildren are presented in the Table 01.

Table 01. Involved schoolchildren

Class	Normal ontogenesis	organic lesions of the central nervous system	autism spectrum disorders	Total
3-5 class	14	24	21	59
6-8 class	17	20	30	67
9-11 class	25	10	12	47
Total	56	54	63	173

6. Findings

In the case of normotypical development, the speech activity of younger schoolchildren in oral and written form is characterized by a copious vocabulary, with a limited amount of vocabulary in the written activity (60.0 and 47.4 words), Figure 1. Verbal-logical thinking is formed at an average level (70.2% of the performed analogies). These indicators can be regarded as a lack of focus of speech activity.

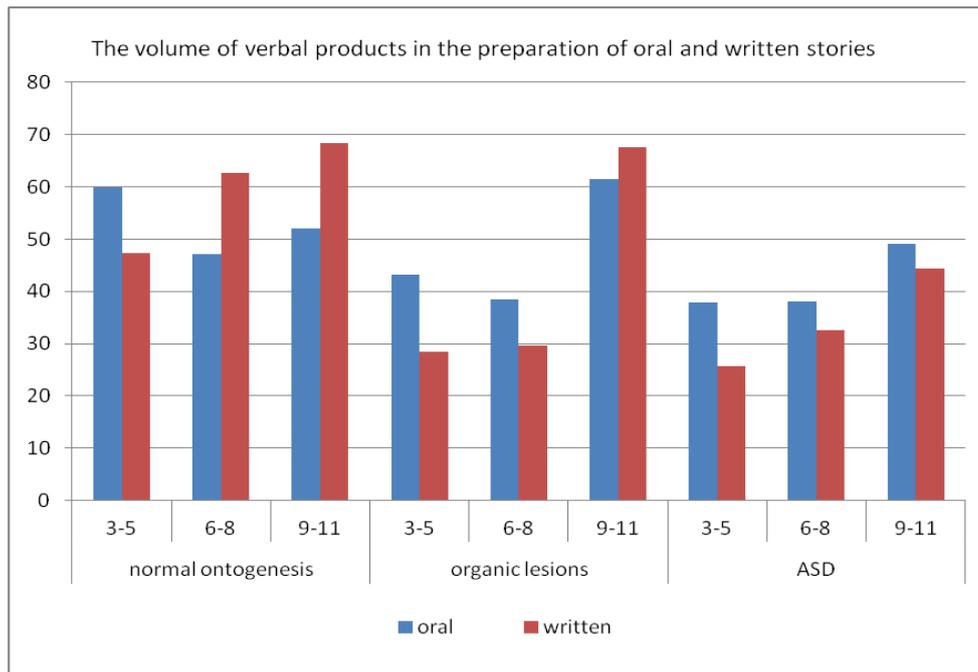


Figure 01. The volume of verbal products in the preparation of oral and written stories

In middle and high school age there is a clear positive trend in the increase in the volume of speech products in the preparation of stories in oral and written form (average age - 47.1 and 62.6 words, high school students 52.1 and 68.4, respectively). By older age, speech becomes more structured and connected. These two groups of schoolchildren have a high level of formation of verbal-logical thinking, since the indicators of completed tasks are 85.4% and 89.5% of 100% of tasks.

The visual-figurative thinking also reveals a high level of understanding and the formation of a significant amount of adequate causal relationships (84.6 and 93.2%) at primary school age (Figure 2).

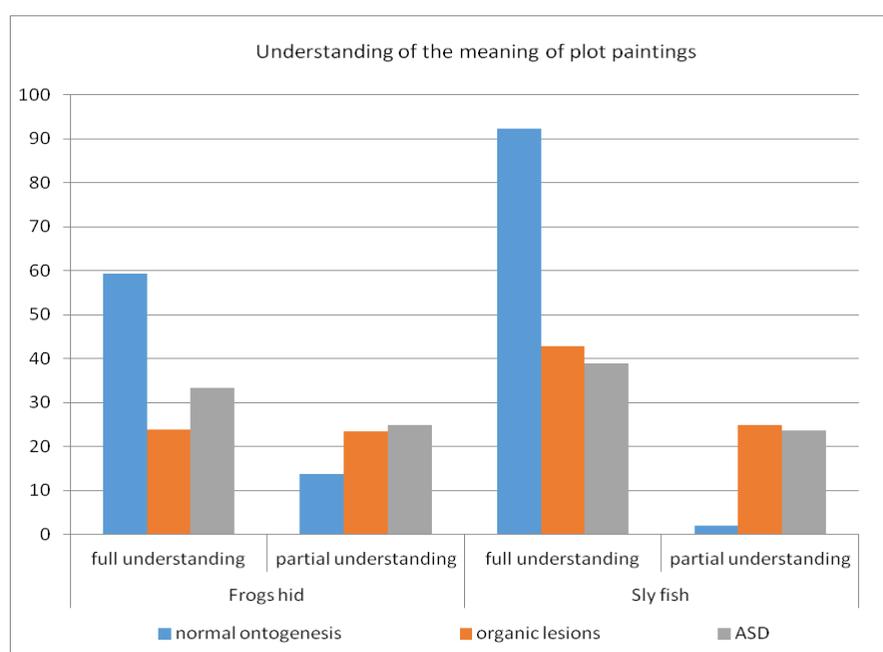


Figure 02. Understanding of the meaning of plot paintings

For middle and high school age is common the positive dynamics in speech activity from oral to written narrative, however, in middle school age, the indicators are slightly lower compared to junior schoolchildren, which is confirmed statistically ($0.27 p < 0.05$). The obtained data are consistent with the ideas in the age psychology of adolescence, as a period where there are pronounced changes in the personality and mental activity under the influence of biological factors. However, such changes are temporary functional in nature (Bezrukikh & Farber, 2010). In senior school age, the dynamics of establishing adequate causal relationships from oral to writing are somewhat reduced when writing stories orally compared to writing (76.0 and 96.0), so most older schoolchildren demonstrate a high level of speech coherence and the development of visual-figurative thinking in normotypical development.

In the organic lesions group the following trends are standing out: at younger and middle schoolchildren the volume of speech production from speech to writing decreases but increases to the older school age. Thus, there is a delay in speech development in primary and secondary school age. The volume of vocabulary in oral and written language and in primary and secondary school age is about 30% lower compared with schoolchildren with normotypic development. In relation to verbal-logical thinking, there is a similar trend, when the dynamics of the task of establishing analogies increases from 44% to 49.3% and 68.8%. Regarding the possibility of establishing the full scope of analogies the following indicators are noted: in this group of schoolchildren a lower volume of established analogies is revealed at the younger school age, the volume is lower by 37.4%, but the gap to the senior school age is reduced to 23.1%. Statistically significant differences were obtained between indicators of the availability of making analogies among schoolchildren of different ages ($0.27 p < 0.05$). In visual-figurative thinking, the formation of cause-and-effect relationships is rather lower when composing a story in writing as compared to an oral one (16.7% and 23.1%). Next, there is a significant improvement in the understanding of the meaning of the plots in combination with the establishment of cause-effect relationships to the middle and senior school age (60% and 60%). Comparing the indicators of understanding the meaning of the plots by schoolchildren with the organic lesions with the typically developing schoolchildren, becomes apparent a pronounced deficiency of mental activity, with significant positive age-related changes to older age. Understanding the meaning of plot patterns, reflected in causal relationships, lags far behind the operational side of verbal-logical thinking based on analogy materials, especially at primary school age. This is confirmed by the data of correlation analysis ($0.27 p < 0.05$).

In the group of schoolchildren with ASD, the level of speech activity is significantly lower than normal. In comparison with schoolchildren with normotypical development, in written activity in all three school ages the average word volume, used in the description of the plot, is always lower than in oral speech. From junior to senior school age the increase in the volume of speech products in oral and written form. The increase in the content of speech products in the two types of speech activity is 30.2% and 72.8%. The level of formation of verbal-logical thinking is approximately at the same level, regardless of age, indicators of adequate establishment of analogies are 54.7, 60 and 62%, respectively. In visual-figurative thinking, the establishment of cause-effect relationships with understanding reveals a distinct dissociation, when an extremely low level of establishing cause-effect relationships is present in the oral narrative compared to the written one. Undergraduates are especially differing: when only 4.8% fully establish causal relationships, 61.9% do not establish a single causal relationship, formally listing plot

characters, and 28.6% is available in writing. There is a low level of dynamic changes in age from 4.8% to 25% in the preparation of oral stories. It is noteworthy that a more distinct positive dynamics is present when writing stories in written from 28.6% to 41.9% and up to 58.3% among schoolchildren with ASD, which is confirmed not only by descriptive statistics, but also at the level of correlation analysis ($0.27 p < 0, 05$).

Considering the normal ontogenesis from the position of the morpho-functional approach, the following should be noted: if in the process of development speech develops as an operational system (expansion of the dictionary, following the rules of phrase design), then there is a parallel development of speech and thinking in their close relationship, where thought is associated with the word and represents speech thinking. Analyzing speech, Vygotsky (2018), shares the external plan of speech and the internal plan. Inner speech, in the meaning of a thought, associated with a word, turns out to be a dynamic unstable fluid moment. This flow and movement of thought do not coincide directly and proximately with the unfolding of speech.

A thought is a whole, much larger in scope, but the word must capture the movement of thought, that which is contained simultaneously, then it is unfolded successively in speech (Vygotsky, 2018). When thoughts and words coincide, verbal thinking is performed in the process of mediating the verbal meaning of a person's thoughts. In the process of development of speech thinking, syntagmatic coding moves to a higher level, which in turn contributes to the formation of such characteristics as focus, deployment, and coherence of the utterance, which reflects all the interrelationships of perceived and analyzed events in the form of causal relationships. Written speech is an indicator of a higher level of formation of its regulatory function, manifested in mental activity compared to oral.

With a significant lag of speech development in schoolchildren with organic lesions at the primary and secondary school age, speech activity improves by the senior school age. Comparison of oral and written stories allows us to identify the following trends: with a low initial level of understanding of the meaning of plot pictures (younger students) there is a more pronounced positive age dynamics of mental activity in written stories from middle to high school age.

With ASD, distinctly dissociative way of forming oral and written speech is detected, regardless of age. In writing, with a decrease in verbal output, the understanding of the meaning of the plot is significantly improved, which makes it possible to conclude that the focus of thinking has increased, despite the limited amount of verbal output. Consequently, at the level of inner speech occurs the regulation of mental activity, which is reflected in the compilation of written stories, where students with ASD to a greater degree understand the meaning of plot pictures, but this happens by reducing the volume of words used to compile the story.

7. Conclusion

The restriction of verbal products allows for the implementation of verbal-logical thinking for all students with disabilities but corresponds to the limited possibilities of a full understanding of the meaning of the subjects in non-verbal thinking. In this case, data on children with ASD are particularly distinct, which, in conditions of purposeful mental activity in understanding the meaning of the plots, resort to narrowing vocabulary to ensure the preparation of a coherent text.

When performing various types of mental activity, there exist marked differences, consisting in a dissociative version of the functioning of speech activity. The limitedness of speech in terms of volume does not prevent the implementation of thinking at the level of categorization and generalization (verbal-logical thinking), but manifests itself in the limited possibilities of thinking of a different kind, namely non-verbal thinking, when the weakness of its regulating function does not provide a complete understanding of the meaning of the subjects.

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