

## Psychological study of higher mental functions of students with general underdevelopment of speech (GUS)

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**Abstract:** This article is devoted to a problem of children's thinking formation that suffer from lag in speech development. Relying on P. K. Anokhin, A.R. Luriya, A. Leontyev, V. N. Myasishchev's researches, L.S. Vygotsky, the author states a hypothesis that thinking, memory, attention and speech development are closely connected. For confirmation of it he conducts a special research with the help of testing, interviewing and supervision to examine a cogitative activity of pupils of the high school who suffers from the lag in development of the speech. 200 pupils of correctional and general education schools took part in experiment at the age of 11 years having speech lag. Features of cognitive activity of this group of children, and also their personal features are depicted in article. The results received during research were subjected to statistical processing. Positive correlation between verbal, logical and visual creative thinking, and also negative correlation between long-term memory and attention was revealed. Thus, the hypothesis stated by the author was confirmed partially.

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### Introduction

The thesis of modern psychology is based on the recognition of the socio-historical origin of psycho. Complex mental processes - the higher mental functions - are the product of historical development and are formed vivo by assimilation of human experience. The development of mental functions passes through a series of stages before they become complex mental processes. All complex forms of mental activity (voluntary attention, logical memory, abstract thinking etc.) are mediated by the structure where the main role belongs to speech. Owing to the speech activity the higher mental functions become conscious and arbitrary, as speech transfers the implementation of higher mental functions to more higher level. The functional systems concept of P.K. Anokhin, the theory of dynamic localization of higher mental functions in the cerebral cortex formulated by A.R. Luria, the activity theory of A. Leontyev, V.N. Myasishchev's theory of relations, L.S. Vygotsky's viewpoints of vivo child's psycho formation by assigning cultural and historical experiences in the process of communication and education serve as the theoretical basis of the given work [1, 2].

The theoretical substantiation for repeated disruption of mental development of children with speech disorder serves as a reason to suppose about the existence of the relationship between the development of higher mental functions and speech disorder of schoolchildren with general speech underdevelopment. In this connection, a psychological study of such cognitive processes as perception, visualization, memory, thinking, attention, speech, and also the study of temperament as an individual psycho-physiological characteristics of the secondary schoolchildren with general speech underdevelopment have been conducted by us. The aim of our research was to determine the status of higher mental functions of secondary schoolchildren with GUS (general underdevelopment of speech). In accordance with the aim of our research we have formulated the following objectives[3, 4]:

1. To determine the level of mental sphere of schoolchildren with GUS.
2. To select the set of psychological techniques aimed at identifying the level of mental development of secondary school children with GUS.
3. To verify the effectiveness of these instructional techniques by means of mathematic-statistical methods.

We have used the following instructional techniques to verify the hypothesis [5, 6, 7]:

1. Analysis of psychological and educational literature on the subject of our research.
2. Psycho-diagnostic research by means of experiment, testing, interview and observation.
3. Mathematical analysis of the results.

The object of our research is the level of formation of higher mental functions, perceptual and speech development of secondary school children age with general speech underdevelopment. The subject of this study is the formation of mental sphere of schoolchildren with GUS. The practical significance of this work lies in the fact that the materials of our research can be used by psychologist, speech therapist practitioner of secondary educational institution.

- the given research is necessary for the activity of psychologist of the secondary school in the process of psychological and pedagogical examination of schoolchildren;
- the results of the research are important for speech therapist in the process of cognitive speech examination of schoolchildren of V type special remedial school;
- the practical material of work is valuable for the work of methodical service of the educational institution;

200 schoolchildren with GUS of the third level special remedial school and secondary school participated in this pilot research. The average age is 11.

The results of the examination of higher mental functions state that the given selection of the participants of the secondary schoolchildren with GUS is characterized by the following peculiarities of cognitive activity:

- rigidity of cognitive control in the visual perception of information;
- low level of the development observation;
- predominance of the visual type of memory;
- general immediate memory span;
- low level of short-term memory;
- average level of switch attention;
- low level of sustained attention;
- predominance of low-level verbal and logical thinking;
- low level of visual-creative thinking;
- low level speed of speech;
- average ability to read aloud.

The investigation of personal characteristics (temperament) in the given sample showed the

presence of the following features temperament of the secondary schoolchildren with GUS:

- low subjective positive susceptibility;
- average social positive susceptibility;
- low flexibility;
- average social flexibility;
- average rate of reaction;
- low social rate;
- average sensibility;
- average social sensibility.

Further, the results of the research were analyzed statistically by means of correlation analysis (correlation coefficient r-Spearman) /10/. The formula of correlation coefficient r-Spearman was used:

$$r_s = 1 - \frac{6 \sum d_i^2}{N(N^2 - 1)}$$

$d_i$  - the difference between the ranks for the  $i$  participant

$N$  – number of participants

In the course of the research to determine the hypothesis of the existence of the relationship between the studied parameters obtained during the pilot study the data were systemized, and statistically analyzed in accordance with the scheme of correlation investigation[8, 9]. The correlation investigation was conducted on the entire sample of participants. We have revealed the correlation between the results obtained by means of above mentioned techniques and methods of the Spearman rank correlation.

The hypothesis was confirmed on the following scales:

1. "Sustained attention / switch attention" (the meaning of correlation coefficient  $r_s$  EMP=-0.459\*).

2. "Verbal-logical thinking / visual-creative thinking" (the meaning of correlation coefficient  $r_s$  EMP=0.993\*).

3. "The amount of short-term memory / flexibility of temperament" the meaning of correlation coefficient  $r_s$  EMP=0.447\*).

The significant positive correlation between verbal, logical and visual-creative thinking has been revealed. Thus, the higher the parameters of visual-creative thinking, the more developed the verbal and

logical thinking is. As the manifestation of analytic-synthetic activity of the cerebral cortex, the given thinking processes are developed in their relationship, and the more developed one aspect of thinking is, and consequently, the other one will rapidly [10, 11]. The participants of this group are characterized by a predominance of low-level of visual-creative and verbal-logical thinking, that confirms the correlation data (the lower the level of visual-creative, the less-developed verbal-logical thinking is).

A significant positive correlation between the short-term memory span and the flexibility of temperament is marked [12]. The greater the of short-term memory span, the higher flexibility parameters of the temperament are. Thus, the more complicated short-term memory structure, the easier the process of switching from one subject to another one is, and the participant quickly switches from one type of mnestic activity to another one. In the given pilot group low parameters of short-term memory and flexibility are expressed which characterizes the participants as prone to monotonous activity, avoidance of various forms of activity and the predominance of conservative forms of activity. Apparently, the difficulties of switching from one activity to another reduces the possibility of the dynamics of the memory process.

The negative significant correlation between the sustained memory and switch attention. That means that the lower sustained attention, the higher switch attention is (vice versa). The participants of the sample were characterized by low parameters of sustained attention within average results of switch attention. Such an irregularity of parameters, apparently, is due to the decrease of participant concentration on the particular subject at particular time. The higher dynamics of attention at the given moment (the active restructuring of mental activity, switch attention), the lower the duration of concentration of the subject is.

### Conclusions

Thus, the hypothesis of the existence of the relationship between parameters of higher mental functions of secondary school children with GSU was confirmed in part [13].

The correlation investigation has been carried out in order to obtain the more reliable data to test hypothesis. This hypothesis of the investigation was confirmed by the parameters of "sustained attention / switch attention", "verbal-logical thinking / visual-creative thinking", "short-term memory span / flexibility of temperament". The main point of the hypothesis has been formulated in the following way.

The investigation data confirmed the hypothesis of the existence of the relationship

between the sustained and switch attention, parameters of visual-creative and verbal-logical thinking, and also between short-term memory span and temperament flexibility, about the correlation between higher mental functions of perception, attention, memory, thinking, imagination, speech activities, and also about the features of temperament as the personal characteristics. In the process of the pilot research we have investigated the cognitive sphere of secondary schoolchildren with GUS.

In the cause of psychological investigation such following peculiarities of cognitive activity of schoolchildren with GUS have been revealed. They include the rigidity of cognitive control within the perception of visual information, a low level of the development of observation, the predominance of the visual type of memory, low level of short-term memory, average level of switch attention, low sustained attention, predominance of low-level of verbal and logical thinking, low level of visual-creative thinking, the low temple of oral speech and the average ability of reading aloud, low subjective positive susceptibility, low flexibility, and also average rate of reaction.

Despite the presence of the given parameters, the investigated sample has sufficient possibilities for the intellectual and personal growth within the creation of more effective correctional and developing conditions when the simultaneous speech and mental development of children with general speech underdevelopment will possibly develop. In the presence of speech pathology activation of the development of mental processes by means of complex techniques, including speech therapy and different psychological and pedagogical methods of forming the mental sphere of the child is required.

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