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Research Article

Mental States of Children with Hearing Disorders in a Forecasting Situation

LIRA V.ARTISHCHEVA[1*]
[1]Department of Psychology and Pedagogy of Special Education, Kazan (Volga region) Federal University, Kazan, Russia
*Corresponding Author
Email ID: ladylira2013@yandex.ru
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ABSTRACT
This article describes the correlation and interdependence of mental states and forecasting capabilities of children of primary school age with hearing disorders and normotypic development. It reveals the specificity of the forecasting structure depending on the severity of mental states. Determining the modality of mental state involved the "Locomotive" method, the level of anxiety was measured using the "Anxiety Test" technique, and forecasting skills were assessed according to the method called "The ability to predict in situations of potential or real violation of social norms". It was found that forecasting of children with hearing disorders prediction in their communication with adults is determined by the state of anxiety. Forecasting of children without any hearing disorders is not directly associated the severity of a mental state. The modality of mental state and the level of anxiety determine the structure of forecasting.

Keywords: mental states, forecasting, hearing disorder, structure.

INTRODUCTION

Mental states in different age groups

Mental state is a general characteristic of the activity of human's psyche for a specific period of time. It reflects the features of the psyche processes depending on individual personality traits [1].

Methods for studying the characteristics of mental states cover not all age categories. Therefore, mental states have been sufficiently studied only in some age spans [1].

It has been revealed that mental states of preschoolers easily arise, quickly change and are more exposed to external influences. At the age of 3 – 7, the frequency of the occurrence of intellectual states increases; 3 – 4 years of age is when moodiness and excitement manifest themselves; by the age of 5 – 6, children begin to learn how to describe their states, feelings and experiences [2].

Younger schoolchildren begin to distinguish their emotional states without understanding it. The most typical mental states for younger students are motivational, emotional, volitional and intellectual ones. Their states have certain specificity: fast alternation, high intensity and low stability. Mental states are determined by the leading activities – gaming and education. A larger number of conditions may be observed in children of 1-3 grades since at this period their social situation of development changes [3].

Schoolchildren of adolescent age are often characterized by negative mental states, especially in the afternoon (fatigue, discomfort, aimlessness, etc.). Being in a negative mental state, children obey the situation, they can commit unpleasant acts even without willing to do so. Teenagers often experience the state of discontent, sometimes even hostility. Unconsciously or due to external influences, they can also experience positive mental states – both emotional and intellectual [4].

Mental states of children with hearing disorders

Mental states of students act as a background for the formation of educational activities and they can be either adequate (which increase the effectiveness of educational activities) or inadequate (which reduces their effectiveness).

The new social role in which children suddenly find themselves requires organization, responsibility, strict discipline, and development of compliance [5, 6]. All these factors cause a stress situation, since the environment in which children find themselves becomes much tougher than it was before. It increases mental tension and leads to such deviations as hyper excitability, hyperdynamia, and lethargy.

Considering that cognitive processes and the emotional-volitional sphere are closely correlated, we can state that emotions can determine cognitive processes [7]. The current problem lies in the fact that more and more children face problems associated with the development of the emotional sphere. Very often, children cannot respond and focus on the feelings and states of

other people and are unable to show adequate reaction to various things.

If we examine the period from the early childhood to adolescence, it should be said that the main stages of mental development coincide with the development of the emotional sphere. Neuropsychic reactions at different ages and under various influences of the surrounding reality correspond to certain levels (types). Each level is characterized by certain emotional, personality traits and certain behavior. These features can be considered as a manifestation of a normal development. Deviation from them is believed to be the sign of mental and emotional deviation from the norm.

Currently, we see a tendency to include children with developmental disorders in general educational process which is called inclusive education [8, 9]. Therefore, there is a need for providing theoretical basis for inclusive education of children with developmental disorders who study in common classes, including children with hearing impairments [10]. The main objective of teaching children with hearing disorders should be aimed at the provision for compensation for lost functions, as well as for maximum socialization in society.

The primary defect of children with hearing disorders is associated with the damage of the auditory analyzer, and this causes secondary and tertiary defects. The situation in which children with hearing impairments find themselves is very important in shaping their developmental characteristics of the emotional sphere [11].

Child's proficiency in using emotionally-evaluative vocabulary is directly correlated with emotional development. The emotional sphere of children with hearing disorders develops differently in compare to children with normal hearing. Since such children have hearing pathologies, the influence of external factors is limited. Normal mental development of a child requires the influence of external factors different in quantity, variety and complexity. If these factors are limited or absent, then mental development of a child with hearing disorder at the initial stages will slightly differ from normal peers, but over time, these differences will increase and become apparent [12].

Emotional development of children with hearing disorders are characterized by various degrees of severity, variability. Children get limited information about emotions, they face difficulties in using emotional language means and verbalizing their states. Children of primary school age with hearing disorders experience difficulties in interacting with other people, in understanding their own emotional state because of features in their mental and speech development [13].

Children with hearing impairments are able to reproduce emotions according to verbal or graphic description with the help of facial expressions; they determine emotions by action or specific signs. Due to underdeveloped oral skills, they turn out to be somewhat isolated from verbal communication with other people which interferes with gaining social experience and cause difficulties in understanding their own emotions or emotions of other people [14].

The research conducted by V. Petshak [15] came to the conclusion that the lack of emotions in children with severe hearing disorders is determined by the fact that normal adults cannot call children to emotional communication. Deaf 10-11 year old children are significantly inferior to normally hearing children of 7-8 years old in accuracy of identification of emotions causing certain emotional states according to their verbal description. It may be explained by the fact that deaf children have insufficiently developed speech and logical thinking skills. However, over time, by about 13-14 years of age, deaf children learn the skill of recognizing emotions and feelings of other people and in some cases can determine the causes of certain emotional states [16].

Thus, we can conclude that the development of the emotional sphere of a child with hearing pathology is subordinated to common patterns. However, it is specific due to existing violations which limit the development of the emotional sphere of a child.

Features of forecasting of younger schoolchildren with developmental disorders

Anticipation of upcoming events can either stimulate or slow down the development of a personality, it can give emotional coloring to life, give meaning to any experiences, states and feelings. Considering the present, the anticipation and expectation of upcoming events can play a motivational role. Prediction of activity and its possible consequences acts as the basis for regulation and self-regulation (a person realizes that he is able to build one's behavior in accordance with the objectives of the activity) [17].

Forecasting is considered as a cognitive activity with the purpose to get a forecast [18]. In psychology, the concept of forecasting combines the time continuum of the past, present and the future. When a person intends to perform some action, he imagines some future result in advance. The image of this result is formed based on the past experience. Speaking about the forecasting capability of children and adolescents, we should note that forecasting is associated with

the process of socialization of a child in society. Considering primary school age, the ability to make forecasts acts as one of the personality traits that seem very important for successful socialization. Prognostic competence is studied at different age stages: in preschool and primary school age, in adolescence, in senior schoolchildren and students. Studies show that disturbances in the processes of forecasting activity can lead to various deviations. Prognostic competence of children of primary school age is determined by their ability to make forecasts in the areas of relations that seem significant for them. Children with developmental disorders consider the following areas as important situations of life activity: education, relationships with teacher, peers, family, adults, online communication and attitude towards their health. Each area covers significant part of socialization; each of them has their own requirements in terms of forecasting. Success in making forecast in significant life situations may indicate that a child with developmental disorders successfully socializes, but if there are any drawbacks, it may be a sign of the emerging risk of deviation [19]. There is a problem associated with the development of prognostic competence in children with hearing disorders as they cannot always predict the outcome of some situation. They often choose their behavioral strategies irrationally, which leads to difficulties in social adaptation. Since children with hearing disorders are characterized by insufficiently developed arbitrariness of cognitive processes, their forecasting skills differ from the skills of children with normal development.

The issue of assessing prognostic competence and its development in conjunction with mental states of children of primary school age with hearing disorders is still open for discussion. When a person receives some verbal information, he can anticipate its outcome, and then, based on one's own experience, model the future situation and act accordingly. But since the perception of oral speech in children with hearing disorders is impaired, they face difficulties in building a forecast based on perceived information and this leads to a decrease in understanding of this information [19]. The process of forecasting activity in children with hearing disorders requires more time than in children with no auditory pathologies. It is explained by the fact that schoolchildren with hearing disorders have difficulties in mental activities, socialization restrictions, and concomitant diseases. It was also found that younger schoolchildren with intact intellect and a good level of speaking skills formulate forecasts in almost the same way as children with no pathologies [17].

Thus, it is clear that prognostic competence of younger schoolchildren with hearing disorders has its own characteristics [20]. The forecasting process itself requires much more time and greatly depends on the development of educational activity. Deaf children tend to guess the upcoming events, rather than analyze the information. Another reason why forecasting is so difficult may be associated with violation of the emotional-volitional sphere. In other words, we can assume that there is a correlation between the specifics of the course of the development of mental states in children with hearing disorders and their ability to make forecasts.

RESEARCH METHODOLOGY

The research involved children with hearing disorders, pupils of a boarding school for children with disabilities (15 individuals), as well as 15 school-age children with normal development. The research was conducted on an individual basis. Children were offered stimulus material and they listened to the instructions. The duration of each meeting was approximately 15-20 minutes; researchers followed the changes in the state of children during the whole process. The following methods and techniques were used:

1. "Anxiety Test" proposed by M. Dorkey, E. Amen, R. Tamml and adapted by I.B. Dermanova [21];
2. "Locomotive" proposed by S.V. Velieva [22];
3. "The ability to predict in situations of potential or real violation of social norms" (team of the Department of Defectology and Clinical Psychology of KFU)

The "Anxiety Test" proposed by M. Dorkey, E. Amen, R. Tamml and adapted by I.B. Dermanova [21] helps to study the severity of children's anxiety. The severity of child's anxiety shows how well he is adapted to various social situations from emotional point of view and indicates the child's attitude to a particular situation.

The "Locomotive" technique [22] helps to determine the prevalence of positive or negative mental state in children.

The "The ability to predict in situations of potential or real violation of social norms" methodology (developed by the team of the Department of Defectology and Clinical Psychology of KFU) helps to assess children's forecasting skills, the course of socialization and early signs of deviant behavior.

The data from two samples were processed and analyzed. We used correlation and structural analysis.

Analysis of The Results Of The Study Of Mental States In A Situation Of Forecasting

Schoolchildren anxiety

Analysis of the average values of the anxiety indicators allowed us to determine the severity of the state of anxiety in children with hearing disorders and children with normotypic development (FIGURE 1).

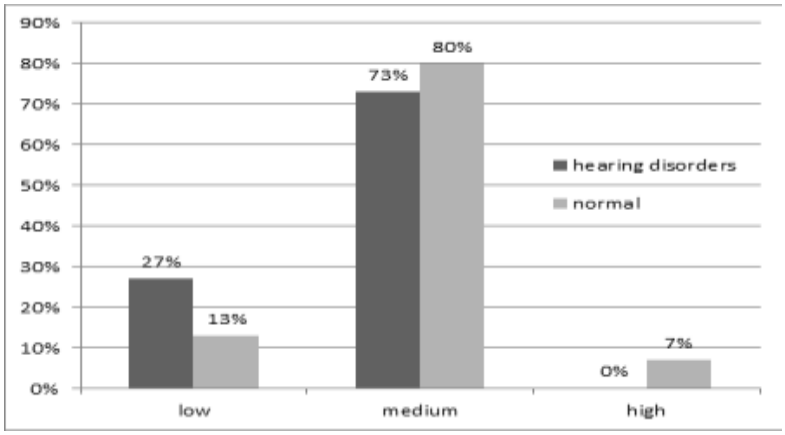

Fig.1: The severity of anxiety in children

Note: % - number of children

High level of anxiety is characteristic only of children with normotypic development. Children with hearing disorders have a low and medium level of anxiety. Children with normotypic development, for the most part, demonstrate moderate severity of anxiety.

TABLE I shows the anxiety index for each of the groups of subjects.

Table 1: Average values according to the "Anxiety Test" technique

Group of children	Average value according to technique
hearing disorders	24,2 %
normal	32,9 %

Note: % - the severity of anxiety (anxiety index), defined as a percentage

General level of anxiety in children with hearing disorders is lower in compare to children with normotypic development.

Each group of subjects is characterized by the average level of anxiety which may indicate that hearing pathology does not have a strong negative effect on children's state of anxiety. Children with hearing disorders most often find themselves in familiar situations surrounded by people they know, which allows them to feel fairly calm.

Mental states of schoolchildren

Let us further consider the severity of positive or negative mental states of the subjects in both groups (FIGURE 2).

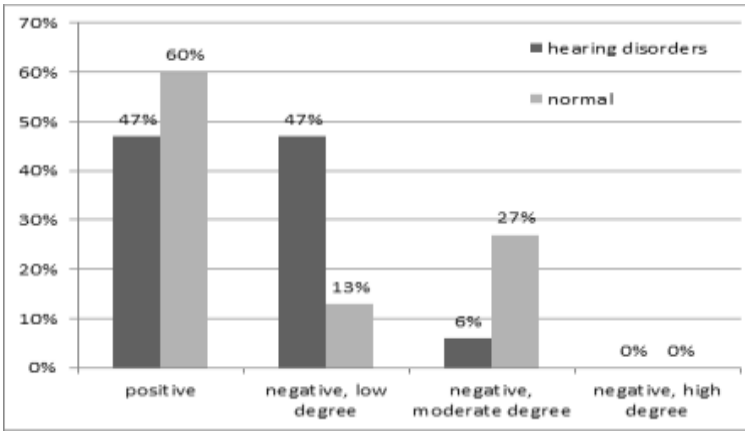

Fig.2: The severity of positive and negative mental states

Note: % - number of children

Children with hearing disorders are most often characterized by both positive and negative mental states. Children with normotypic development more often find themselves in a positive mental state. Talking about negative states, most of children experience states of a moderate degree of mental activity.

Table 2: Average values according to the "Locomotive" technique

Group of children	Average value according to technique
hearing disorders	3,06
normal	3,5

Based on the data in the table, we can say that each group of subjects in general is characterized by positive mental states. During the analysis, it was found that positive mental states are more often experienced by children whose parents also have hearing disorders. We believe that this effect might be explained by the fact that there are certain trusting relationships between children and parents and there is a mutual understanding in communication due to common disorder and common means of communication. Hearing impaired children experience positive mental states almost the same as their peers with no pathologies, which is possibly explained by sound hearing and speaking skills that are close to normal.

Younger schoolchildren with hearing disorders experience both positive and negative mental states equally depending on the situation, while children with normal hearing are characterized by the predominance of positive mental states.

Forecasting capabilities of schoolchildren

Next, we move on to the analysis of data reflecting forecasting capabilities (TABLE III).

Table 3: The severity of characteristics of forecasting skills

	Forecasting											
	Areas of life								Functions			
	Attitude towards learning	Communication with peers	Communication with adults	Virtual communication	Attitude towards the disease	Family relationship	Education	Extracurricular activity	Regulatory	Cognitive	Speech-communicative	Overall PC score
Children with hearing disorders	5,4	6,9	9,5	8,4	8,3	5,8	22	22,4	23,2	8,8	12,4	44,4
Children without hearing disorders	10,6	11,06	11,4	11,2	12,3	11,7	34,2	34,06	36,5	13,4	18,5	68,3

Analysis of the results showed that younger schoolchildren with hearing disorders and children with normal development experience certain difficulties in making forecasts. However, the level of prognostic competence in children with hearing disorders is slightly lower than in children with no pathology. It is especially difficult for them to make forecasts concerning attitudes towards learning and relationships in the family. Children with hearing disorders are characterized by immaturity of regulatory, cognitive and speech-communicative forecasting functions.

Table 4: The severity of prognostic competence functions

PC functions		Regulatory		Cognitive		Speech-communicative	
Overall value		23,2		8,8		12,4	
Spheres	Type of situation	Median value		Median value		Median value	
		Normal	Disorder	Normal	Disorder	Normal	Disorder
1	educational	2,4	1,5	1,1	0,5	1,7	0,5
	extracurricular	2,6	1,7	1,1	0,5	1,6	0,9
2	educational	2,9	2	1,1	0,7	1,4	0,9
	extracurricular	2,8	1,8	1,3	0,7	1,5	0,8
3	educational	3,2	2,8	1,3	0,9	1,5	1,4
	extracurricular	3,3	2,3	1	1	1	1
4	educational	2,8	1,8	1	1	1	1
	extracurricular	3,6	2,4	1	1,1	1,7	1,3
5	educational	3,8	2	1	1	2	2
	extracurricular	2,9	2,2	1,4	0,7	1,5	1
6	educational	3	1	1,5	0,4	1,6	1
	extracurricular	3	1,4	1	1	1,7	0,9

Note: 1. “Attitude towards learning”; 2. “Attitude towards peers”; 3. “Relationships with adults”; 4. "Virtual communication"; 5. “Attitude towards the disease”; 6. "Relationships in the family"

Regulatory function of prognostic competence in construction of a forecast reflects the emotional-motivational side; it also determines the direction and pattern of behavior [23]. This function is less formed in children with hearing impairments than in children with normal hearing, but it is best formed compared to the other two functions. The regulatory function is also more formed in children with normal hearing in compare to the other two.

The analysis of the subjects’ responses showed that children with hearing disorders generally understand the situation and describe it, but cannot always form a forecast. When forecasting situations, they often choose a passive position, but at the same time they do not contradict the norms of society and take an optimistic attitude in their forecasts – they expect a favorable outcome for situations they consider. Children with hearing disorders and children with normal hearing have high rates (compared to other areas) in similar areas (“Attitude towards health”, “Communication with adults”, “Virtual communication”). This means that regardless of whether there is a hearing disorder or not, these areas of relations within the regulatory function in primary school age are the most significant ones.

Cognitive function of prognostic competence reflects the characteristics of thought processes which help to form the link between cognitive process and socialization of a subject. Cognitive function turned out to be the least developed compared to the other two in children of both groups. The forecasts of primary schoolchildren of both groups are invariant and undetailed. Children offer the only outcome of the event. When building a forecast, children with hearing disorders focus on the participants of the events and do not focus on the surrounding people.

The speech-communicative function of prognostic competence implies planning and anticipating different situations, interacting with other people, obeying social norms, recognizing the emotions and mental states of other people. This function is the second most developed after regulatory one, but its level is still lower in compare to children with normal hearing. Children with hearing disorders are characterized by minimal verbalization of forecasts, they do not use a wide variety of words in description of forecasts, do not add the statements of the participants of the situations, form their forecasts using the present or past tense. Children with no disorders show almost the same results, but they also tend for maximum verbalization of their forecasts.

Thus, we see that younger schoolchildren with and without hearing disorders have some similar features in forecasting. Regulatory function of prognostic competence turned out to be the most developed one in children of both groups, while cognitive and speech-communicative seem to be less developed. At the same time, the lowest rates were noted in a cognitive function. The revealed similarity in forecasting may be attributed to age-specific features, since primary school children do not have much experience in dealing with problem situations, they lack speech means of expressing feelings and describing situations.

Relationship of mental states and schoolchildren’s forecasting capability

Correlation analysis showed that forecasting activity of children with hearing disorders in their

communication with adults is determined by the state of anxiety. Forecasting of children with no hearing disorders is not associated with the severity of a mental state and anxiety.

Next, we shall consider the forecasting structure of students with negative and positive mental states (FIGURE 3, 4).

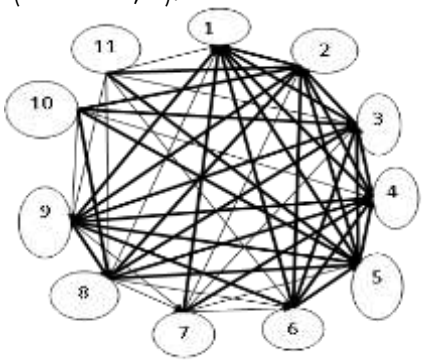

Fig.3: Forecasting structure of schoolchildren with hearing disorders with a negative mental state

Note: 1. Speech-communicative function; 2. Cognitive function; 3. Regulatory function; 4. Extracurricular activity; 5 Educational sphere; 6. Relation-ships in the family; 7. Attitude towards the disease; 8. Virtual communication; 9. Communication with adults; 10. Communication with peers; 11. Attitude towards learning.

Children with hearing disorders who are more likely to experience negative mental states have a complicated forecasting structure – it contains many significant relationships between forecasting characteristics. Forecast is determined by cognitive and regulatory functions, educational sphere, the spheres of communication with adults and virtual communication.

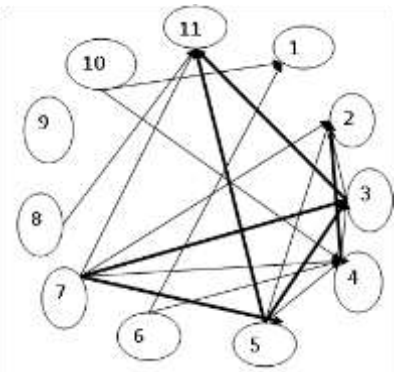

Fig.4: Forecasting structure of schoolchildren with hearing disorders with a positive mental state

Note: 1. Cognitive function; 2. Regulatory function; 3. Extracurricular activity; 4. Educational sphere; 5. Relation-ships in the family; 6. Attitude towards the disease; 7. Virtual communication; 8. Communication with adults; 9. Communication with peers; 10. Attitude towards learning; 11. Speech-communicative function

The forecasting structure of children with hearing disorders who are more often in a positive state is less organized. The forecasting processes are determined by the educational and extracurricular activities, as well as by the sphere of family relations and virtual communication.

Having compared the forecasting structure of children with hearing disorders depending on the modality of mental state, we revealed that the modality of mental state determines the structure of forecasting. Forecasting processes are built more easily without the inclusion in the process of numerous relationships of characteristics in positive mental states. It was also revealed that the leading characteristics of forecasting in positive and negative mental states are the areas of education and virtual communication.

Let us consider the forecasting structure in a subgroup of children with medium-level anxiety (FIGURE 5).

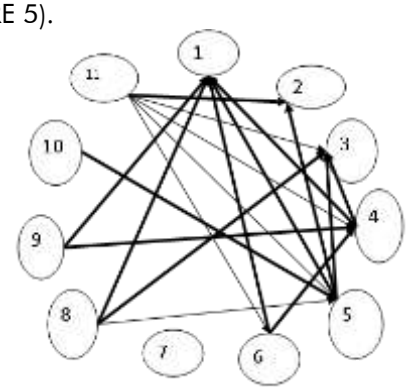

Fig.5: Forecasting structure of schoolchildren with hearing disorders with a medium-level anxiety

Note: 1. Speech-communicative function; 2. Cognitive function; 3. Regulatory function; 4. Extracurricular activity; 5. Educational sphere; 6. Relation-ships in the family; 7. Attitude towards the disease; 8. Virtual communication; 9. Communication with adults; 10. Communication with peers; 11. Attitude towards learning

The forecasting structure of children with hearing disorder with a medium-level anxiety is complicated and has interrelations of high level of significance. Forecasting processes are determined by attitude towards learning, educational and extracurricular areas, as well as by the speech-communicative function. It means that these areas and functions determine the specifics of forecasting if a subgroup of children with a medium-level state of anxiety.

Next, we shall consider the forecasting structure in a subgroup of children with a low level anxiety (FIGURE 6).

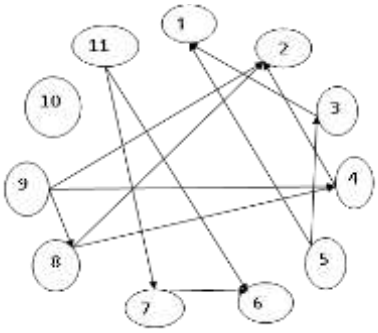

Fig.6: Forecasting structure of schoolchildren with hearing disorders with a low level of anxiety

Note: 1. Speech-communicative function; 2. Cognitive function; 3. Regulatory function; 4. Extracurricular activity; 5. Educational sphere; 6. Relation-ships in the family; 7. Attitude towards the disease; 8. Virtual communication; 9. Communication with adults; 10. Communication with peers; 11. Attitude towards learning

Forecasting structure of children with low level of anxiety is less complex – it includes a small number of correlations of medium significance. Forecasting is determined by such areas as communication with adults, virtual communication, extracurricular activities and cognitive function. These areas and functions determine the specifics of forecasting of a subgroup of children with a low level of anxiety.

The severity of anxiety determines the specificity of forecasting. With moderate anxiety, the forecasting process includes close interrelations of the characteristics of forecasting skills. With low level of anxiety, forecasting processes seem to be less complicated. We also discovered that both subgroups have a common indicator that acts as a structure-forming basis in forecasting – extracurricular activity. It is the area of extra-curricular situations in which forecasting can also determine the forecasting in other areas of life of children with hearing impairments.

Children with low level of anxiety have no problems in the educational sphere and they are more concerned about the sphere of communication with adults and peers. For children with a moderate level of anxiety, attitude towards learning, educational and extracurricular spheres are of decisive importance.

The research shows that educational sphere is critical for almost all subgroups of children (except for children with a low level of anxiety). It may be explained by the fact that educational activities at this age are the leading ones in the lives of children. The subgroup of children with a low level of anxiety includes children of the 1st grade and for them gaming may still be a predominant activity since the process of adaptation to school is incomplete.

The area of virtual communication is a structure-forming one in the forecasting structure of all subgroups, except for the children with an average level of anxiety. Perhaps it may be explained by the fact that modern life makes virtual communication more and more important (social networks, websites, chats and virtual groups etc.). Children can transfer the experience of interaction and their skills for predicting the development of relations in social networks to other areas which is confirmed by their importance (communication with adults, peers, relationships in the family). As for more anxious children and children with a predominance of negative states, the determining function for them is a speech-communicative function which determines interaction with other people, submission to social norms, recognition of emotions and states of other people.

CONCLUSION

1. General level of anxiety in children with hearing disorders is lower than in children with normal development. Children with hearing disorders are characterized by the predominance of positive and negative states of a low degree, while children with normal hearing are characterized by the predominance of positive mental state of a higher level than in children with hearing pathologies;
2. Children of primary school age with hearing disorders have the following features of forecast constructing: difficulties in establishing causal relationships; difficulties with using one's own experience; short sentences and phrases; speaking is accompanied by gestures; using gesture language in describing complex words; attempts to guess future situations;
3. Prognostic competence of younger schoolchildren with auditory pathology has its own characteristics associated both with the specifics of disorders and the severity of mental states;
4. Forecasting activity of children with hearing disorders in their communication with adults is determined by the state of anxiety. Forecasting activity of children with no impairments is not directly related to the severity of the mental state;
5. The modality of mental state determines the structure of forecasting. Forecasting processes are built more easily in positive mental states without the inclusion in this process of numerous

relationships of characteristics. In positive and negative mental states, the leading characteristics of forecasting are the areas of educational and virtual communication;

6. The severity of anxiety determines the specificity of forecasting. With a moderate anxiety, the forecasting structure includes close interrelations between the characteristics of forecasting skills. With a low-level anxiety, the forecasting structure is less complicated. It was discovered that both subgroups have a common indicator that acts as a structure-forming basis in a forecasting activity – the extracurricular activities.

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