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RELATIONSHIP OF THE ACTIVITY OF THE AUDITORY ANALYZER AND THE RHYTHM SENSE INDICATORS IN MIDDLE-GRADE SCHOOLCHILDREN WITH VISUAL IMPAIRMENTS

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Abstract. *For children with visual impairments, sound information provides an opportunity to receive information about the environment, and is an identifying reference point that has important subject and signal value. It is proved that the level of development of rhythmic ability depends on the functional state of the auditory sensory system. A violation of the sense of rhythm in visually impaired children has been established.. Purpose: determine the relationship between the functional state of the auditory analyzer and the sense of rhythm in middle-grade schoolchildren with visual impairments. Organization. The study was conducted on the basis of a special comprehensive boarding school for children with visual impairment in Kharkov. It was attended by 117 visually impaired middle-grade schoolchildren. Results: The parameters of the duration of hearing the sound of the right and left ears, sense of rhythm in middle-grade schoolchildren with visual impairments were determined. The level of interrelation between the indicators of the functional state of the auditory analyzer and the rhythm sense is established. Conclusions: Low, compared with the norm, indicators of air conduction among middle school students with visual impairments were revealed. The most significant indicators of air conduction were observed in schoolchildren s with visual impairment of grade 6; sense of rhythm - in boys 9 and girls of 8 classes. Correlation analysis between the indicators of the functional state of the auditory analyzer and the level of development of the sense of rhythm in children of secondary school age with visual impairments revealed a high and medium degree of interconnection.*

Keywords: *air conduction, auditory analyzer, duration of audibility of sound, middle school students, sense of rhythm, visual impairment.*

Introduction

The auditory sensory system is a distant analyzer that allows you to perceive objects and out of interaction at a distance.

In children with visual impairments, the auditory sensory system is leading in addition to the information that comes from the outside world through the visual analyzer. It plays an important role in mental and physical development, the processes of cognition of the surrounding world, the struggle with the problem of comfort of existence, orientation in space, successful social adaptation, integration into society; serves as the basis for the formation of phonemic hearing, communication, makes it possible to successfully acquire knowledge and put it into practice in all kinds of activities [3, 8].

The function of the auditory sensory system makes it possible to estimate the duration of the performance and the frequency of movements [7, p. 62].

Studies have shown [1, 10] that children with visual impairments have impaired development in the ability to feel rhythm, difficulties arise in the implementation of coordinated movements of the arms and legs.

I. A. Kuzmenko [6] investigated the interrelation of indicators of air conduction and sense of rhythm in healthy children of secondary school age. The positive effect of the functional state of the auditory analyzer on

the level of development of the ability to sense rhythm was revealed. In the literature available to us on the issue of the relationship of the above indicators among middle-grade schoolchildren with visual impairments was not found.

All of the above determines the relevance of our research..

Methodology and organization of research.

Objective: to determine the relationship of the functional state of the auditory analyzer and rhythm sense indicators in middle-grade schoolchildren with visual impairments.

Research methods: theoretical analysis and synthesis of scientific and methodological literature, acoumetry, pedagogical testing, methods of mathematical statistics.

The level of activity of the auditory analyzer was investigated in terms of the duration of the hearing of sound at air conduction using a tuning fork with a frequency of 2048 Hz. This gives an idea of the state of the sound-conducting and sound-perceiving apparatus.

The study participant was asked to sit down on a chair and pick up a stopwatch. The experimenter hit the hammer on the tuning fork, holding his leg with two fingers, and brought the test subject to his ear. The stopwatch measured the time during which the sound is heard with the air conduction separately with the right and left ear. The the report began from the moment the tuning fork oscillated and ended after the test person stopped hearing a sound. The results were recorded with an accuracy of 0.1 s. The duration of the audibility of sound when air conduction corresponds to 40 s [2, 5].

Rhythmic ability was assessed by the results of rhythmic movements of the arms and legs. The testing participant stood in the corner of the gym facing the wall so that each of the two walls could be pulled out with his arms and legs extended. At the command “Go!”, as quickly as possible for 20 seconds, he performed a rhythmic cycle of movements, which consists of four phases:

1. Left foot two light blows to the left side of the corner.
2. Right palm one hit to the right side of the corner.
3. Two blows with the left palm to the left side of the corner.
4. Right foot, one light blow to the right side of the corner.

Number of correctly executed complete cycles of rhythmic movements for 20 s was recorded.

The study was conducted on the basis of the municipal institution “Kharkiv Special General Education Boarding School I-III Stages № 12” of the Kharkiv Regional Council and on the basis of the municipal educational institution “Educational and Rehabilitation Center №. 12” of the Dnipro Regional Council for Visually Impaired Children. It was attended by 117 visually impaired middle school students..

Research results and discussion

Considering the indicators of the duration of audibility of sound with air conduction of the right and left ears in middle-grade schoolchildren with visual impairment, presented in Table 1, it was found that they are highest in boys and girls of grade 6.

Analysis of the results of the duration of the audibility of the sound of the right and left ears in middle-grade schoolchildren with visual impairments in the sexual aspect suggests that the indicators of air conduction in the right ear are mostly higher in boys, and in the left ear in girls. The differences are significant ($p<0,01$) only in the results of the duration of hearing the sound with the left ear in schoolchildren of grade 10, where they are better in girls.

Comparison of the obtained results with the figures presented by V.P. Degtyarev et al. [2, p. 238] revealed that the results of air conduction of the right and left ears in middle-grade schoolchildren with visual impairments are lower than the normative ones.

Table 1. Indicators of the duration of audibility of sound in air conduction of the right and left ears of boys and girls of secondary school age with visual impairment

Grade	n	Duration of audible sound with air conduction, s					$t_{1,3}$	p	$t_{2,4}$	p
		Boys		n	Girls					
		Right ear	Left ear		Right ear	Left ear				
		$\overline{X}$ ±m			$\overline{X}$ ±m					
5	15	27,94±0,32	27,29±0,40	6	27,13±0,40	27,03±0,55	1,69	>0,05	0,41	>0,05
6	15	28,39±0,50	28,44±0,53	10	28,15±0,54	28,72±0,93	0,34	>0,05	0,27	>0,05
7	6	26,75±0,24	26,63±0,48	16	27,34±0,31	26,60±0,16	1,58	>0,05	0,07	>0,05
8	15	27,39±0,30	27,29±0,31	6	27,43±0,41	26,82±0,12	0,10	>0,05	1,49	>0,05
9	8	28,08±0,75	27,01±0,34	6	26,83±0,26	27,38±0,12	1,69	>0,05	1,10	>0,05
10	6	28,30±0,41	26,52±0,29	8	27,65±0,65	27,66±0,22	0,91	>0,05	3,38	<0,01

The analysis of the indicators of the sense of rhythm of middle-school students with visual impairments made it possible to establish that they are the best in boys 9 and girls in 8 classes (Table 2).

Table 2. Indicators of the sense of rhythm of boys and girls of secondary school age with visual impairment

Grade	Rhythmic hand and foot movements, number of times				$t_{1,2}$	p
	Boys		Girls			
	n	$\overline{X}$ ±m	n	$\overline{X}$ ±m		
5	15	3,13±0,14	6	3,67±0,23	2,14	>0,05
6	15	3,87±0,14	10	4,40±0,23	2,07	>0,05
7	6	3,67±0,23	16	3,94±0,15	1,06	>0,05
8	15	4,13±0,14	6	6,33±0,23	8,82	<0,001
9	8	5,00±0,20	6	6,00±0,28	3,13	<0,01
10	6	4,00±0,28	8	5,00±0,20	3,13	<0,01

Comparative analysis of the results of the sense of rhythm in children of middle school age, depending on gender, makes it possible to say that girls are better than boys. The significance of differences (p<0,01–0,001) is observed in the results of schoolchildren of 8, 9 and 10 grades.

In our opinion, higher rhythmic ability indicators in girls are due to the natural ability to perceive and recreate rhythm and more delicate hearing.

An analysis of the relationship between the air conduction indices of sound with the right ear and the level of development of the ability to sense rhythm among middle-grade schoolchildren with visual impairments showed that a strong link is observed in boys and girls of grade 6 (0,73, p<0,001 and r=0,76, p<0,01, respectively); in boys of the 8th, 9th, 10th classes (r=0,73, p<0,001; r=0,79, p<0,01; r=0.83, p<0,05) and girls of the 7th class (r=0,76, p<0,001). The average degree of interference is observed in boys and girls in grade 5 (r=0,51, p<0,05 and r=0,59, p>0,05, respectively); in boys of the 7th grade (r=0,57, p>0,05); in girls of 8, 9, 10 class (r=0,65, p>0,05; r=0,66, p>0.05; r=0,59, p>0.05, respectively): Figure 1.

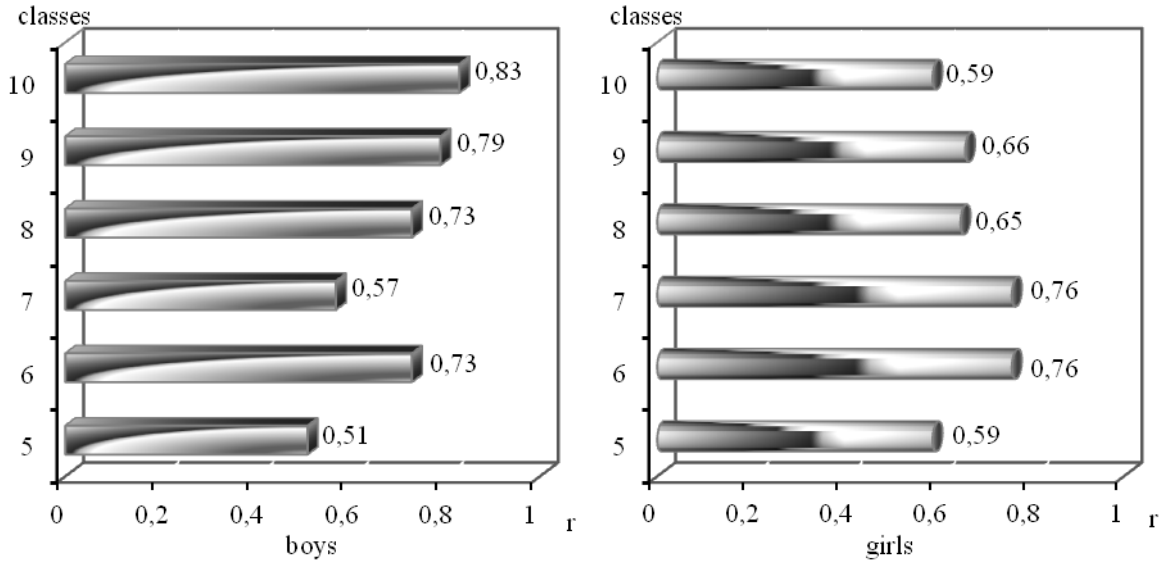

Fig. 1. The relationship of the indicators of the duration of hearing sound with air conduction in the right ear and the level of development of the ability to sense rhythm in middle-grade schoolchildren's with visual impairment

Considering the correlation between the indicators of the duration of audibility of sound with air conduction in the left ear and the ability to sense rhythm detected the presence of a close connection in boys and girls of grade 9 (r=0,71, p<0,05 and r=0,72, p>0,05, respectively); in boys of grade 10 (r=0,86, p<0,05) and in girls of classes 6, 7 (r=0,94, p<0,001; r=0,75, p<0,001, respectively). The average interrelation is observed in boys and girls in grade 5 (r=0,38, p>0.05 and r=0,59, p>0.05, respectively); in boys 6, 7, 8 classes (r=0,60, p <0.01; r=0,32, p>0.05; r=0.67, p <0.01, respectively) and in girls 8, 10 classes (r=0,68, p>0,05; r=0,55, p>0,05) (Figure 2).

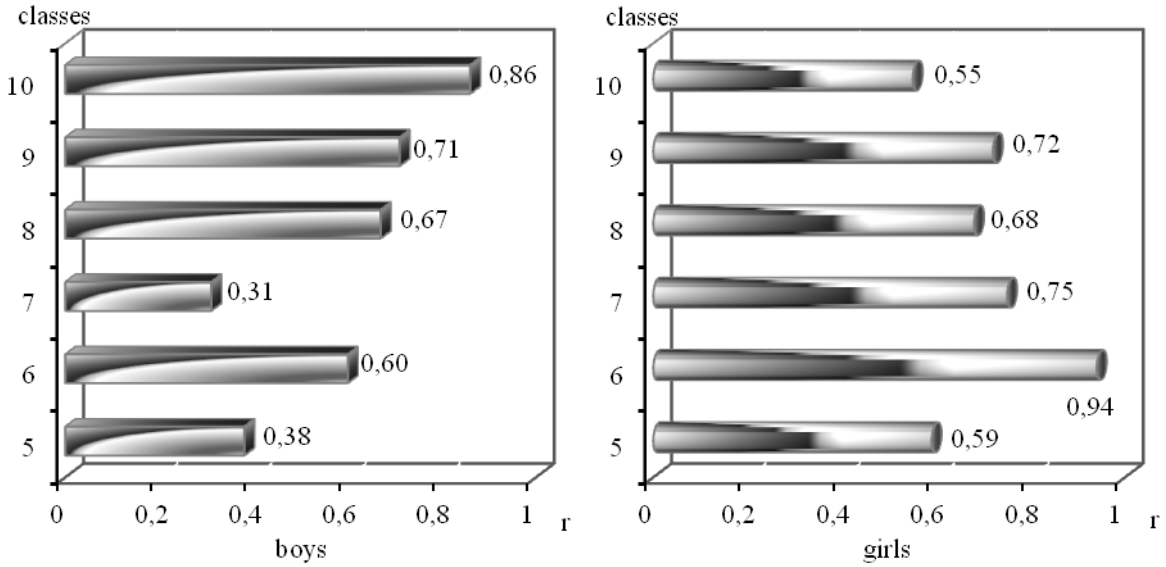

Fig. 2. Interrelation of indicators of the duration of hearing of sound with air conduction in the left ear and the level of development of the ability to sense rhythm in middle-grade schoolchildren's with visual impairment

Thus, the results of our research confirm the data of T. O. Markova, N. V. Repsh [4], which prove that the auditory analyzer plays an important role in the development of the ability to sense rhythm. A similar opinion is shared by K. Rohrschneider, R. Kiel, V. Pavlovska [10], T. Yu. Krucevich [9] and others who believe that the perception of a given rhythm depends largely on the functional state of the auditory analyzer.

Conclusion

1. The results of the study indicate low, compared with the normative, indicators of air conduction among middle-grade schoolchildren's with visual impairments.

2. The most significant indicators of air conduction were observed in middle-grade schoolchildren's with visual impairment of grade 6; sense of rhythm - in boys 9 and girls of 8 classes.

3. Correlation analysis between the indicators of the functional state of the auditory analyzer and the level of development of the sense of rhythm in children of secondary school age with visual impairments revealed a high and medium degree of interconnection.

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