METHODIC APPROACH TO DETERMINATION OF COGNITIVE FUNCTIONS' NON-UNIFORMITY IN PRE-SCHOOL AGE CHILDREN, REQUIRING SPEECH DISORDERS CORRECTIONS

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Abstract. *Introduction*: It is known that children with speech disorders can have problems in cognitive functioning, restrictions in communication, isolation, aloofness. Naturally, such children need speech therapy and developing of thinking processes, perfection of cognitive functions. *Purpose:* To determine changes in non-uniformity of children's cognitive and psycho-physical functions after application of dance-cognitive training forms. *Material:* In experiment 5-6 years' age children with speech disorders participated. The tested group consisted of 14 children. All parents gave written consent for participation of their children in experiment. We used cluster analysis and assessment of main psycho-physical and cognitive functions with the help of tests of increasing complexity. The tests were assessed in points from 1 to 10. In assessment we considered musicality, coordination of dance movements, plasticity. *Results:* at the beginning and at the end of academic year we formed sub-groups with uniform physical and psycho-physical qualities, cognitive functions and dance abilities. Cluster analysis permitted to determine the fact of uniformity increase in children with improved indicators of psycho-physical qualities and cognitive functions. *Conclusions:* we offered programs of dance-cognitive trainings for pre-school age children with speech disorders.
Key words: speech disorders, physical qualities, psycho-physical condition, cognitive functions, dance abilities.

Introduction

As on to day, education of children with speech disorders is an important pedagogic problem, which touches child's psych-physical condition. Many researchers found that children with speech disorders can have cognitive problems, neurological deviations, limited communication with peers, isolation and aloofness [2, 3, 6, 12, 16, 19, and 22]. Such children need long-term speech therapeutic corrections. They can demonstrate different emotional reactions, critical assessment of own speech deficiency. In this connection, in many tasks they try to consciously avoid oral answers. In pre-school educational establishments children with speech disorders are united in one group, though hey perceive information and think differently. As a result one and the same academic program for one part of children is difficult and for other – too easy.

Since long ago, in pedagogic it has been known how great potentials for education of soul and body are embedded in synthesis of music and plasticity **[1, 4]**. Organization of movements with the help of musical rhythm trains children's memory, attention, inner concentration; facilitates formation of targeted activity. It is pointed in works of many researchers [3, 6, 8, and 12].

It is known that in process of dance-cognitive trainings, with multiple repetitions of movements under musical accompaniment many sections of cortex activate: the back of the head, temple, forehead, cerebellum, Brock's parietal area. It results in formation of conventional-reflex connections that can facilitate development of thinking processes and improvement of cognitive functions [13, 14].

In our opinion knowledge and understanding of musical theory (size, temp, duration, musical strike, accent, rhythm, musical phrase) in combination with dance figures are speech functions' natural correction means' components.

We think that correction works with pre-school age children, having speech disorders, will be effective, if to determine, first, non-uniformity of group by degree of cognitive functions, ability to perceive temp and musical rhythm in process of dance figures' fulfillment. For this purpose cluster analysis can be used, which permits to find similarities by many variables [10].

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Purpose, tasks of the work, material and methods

The purpose of the work is with the help of cluster analysis to determine non-uniformity of cognitive and psycho-physical functions in 5-6 years' age children of group with speech disorders; to assess correctness of the chosen methodic approach.

The methods and organization of the research:

For assessment of main psycho-physical and cognitive functions before and after application of dance-cognitive forms, as methodic approach we used complex of tests with increasing complexity. This complex permits to assess psycho-physical functions, verbal thinking, rhythm-motor (or dance) abilities).

We determined static and dynamic motor coordination, quickness of movements' fulfillment, ability to reproduce several movements at the same time. Points were given in the following way: high level – 9-10 points; above average – 7-8; average – 5-6 points; below average – 3-4 points and low level – 1-2 points [9].

Assessment of verbal thinking was fulfilled by methodic of Ya. Yerasyk [9], based on formulated by a child answers to questions put to him (her). Points were accounted in the same way.

Assessment of rhythm-motor (or dance) abilities, musicality, coordination of dance movements, plasticity was realized on the base of analysis of possibility to make several simultaneous movements as dance composition under musical accompaniment. Points were accounted in the same way.

Uniformity of the tested children's group was determined with cluster analysis, included in program StatSoft STATISTICA 10.0.

On the base of such analysis we built classification system of the tested objects and variables in the form of tree (dendrogram) and dividing of objects into pre-set number distant from each other classes.

Results of the researches

By the received data of physical qualities, psycho-physical condition, cognitive functions and dance abilities we fulfilled cluster analysis. It permitted to find uniformity of the tested group, consisting of 14 children before application of dance-cognitive forms.

We determined that the group was non-uniform (it consisted of two sub-groups). The first included children, coded as 2, 3, 6, 13, 14, 4, 12. The second group included children, coded as 1, 5, 7, 8, 10, 9. The first sub-group was composed of children, whose values were at levels average and above average. In the second sub-group there were children with values at average and below average level (see table 1).

Table 1. Change of non-uniformity of cognitive and psycho-physical functions' manifestations in 5-6 years' age children with speech disorders

Before application of dance-cognitive training forms																					After application of dance-cognitive training forms																				
	Physical						Psycho-motor						Cognitive					Dance					Physical						Psycho-motor						Cognitive					Dance			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	8	3	4	3	7	7	5	7	4	7	8	3	3	7	3	3	3	3	4	5	1	7	8	8	8	8	6	6	7	8	6	7	7	6	6	6	7	5	7	7	7
2	8	4	8	8	4	5	6	8	8	8	6	8	8	8	8	8	7	5	7	6	2	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	8	8
3	8	8	6	8	8	8	5	8	7	8	8	8	8	8	8	8	7	8	8	8	3	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
4	8	8	6	6	8	5	5	5	8	6	6	8	8	8	8	8	8	8	8	8	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
5	3	7	4	6	3	7	4	6	3	3	6	7	7	5	6	5	6	6	6	6	5	4	7	5	7	4	5	6	5	7	6	7	7	7	7	7	6	6	6	6	6
6	8	8	6	8	8	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
7	7	7	4	6	3	3	3	7	7	6	7	7	3	3	6	6	4	4	5	4	7	7	7	5	6	4	4	7	7	7	7	7	7	6	7	7	6	6	7	5
8	7	7	3	6	4	7	4	4	7	6	6	7	3	3	6	6	6	6	6	6	8	7	7	4	7	7	7	4	5	7	7	7	7	5	7	7	7	6	6	7	7
9	8	8	4	5	8	8	5	7	6	6	7	8	5	4	4	4	5	8	8	8	9	8	8	5	8	8	8	6	8	8	8	8	8	8	6	6	8	8	8	8	8
10	7	6	3	6	7	6	7	5	7	6	6	3	3	6	5	6	7	7	5	4	10	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7
11	**5**	**7**	**6**	**7**	**2**	**2**	**2**	**7**	**7**	**7**	**3**	**2**	**2**	**2**	**2**	**2**	**8**	**8**	**8**	**6**	11	**7**	**7**	**6**	**7**	**5**	**3**	**3**	**7**	**7**	**7**	**3**	**2**	**3**	**2**	**2**	**2**	**8**	**8**	**8**	**7**
12	8	8	5	8	3	8	8	8	8	8	4	4	4	8	8	8	3	8	8	8	12	8	8	6	8	8	8	8	8	8	8	5	8	8	8	8	8	4	8	8	8
13	8	8	8	8	8	8	8	8	8	8	5	5	8	8	8	8	8	8	8	8	13	8	8	8	8	8	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8
14	6	8	8	8	8	8	8	8	8	8	8	6	6	8	6	6	8	8	8	8	14	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	6	8	8	8	8

Child, who was not included in any group

Sub-group of children, characterized by "average" and "above average" indicators

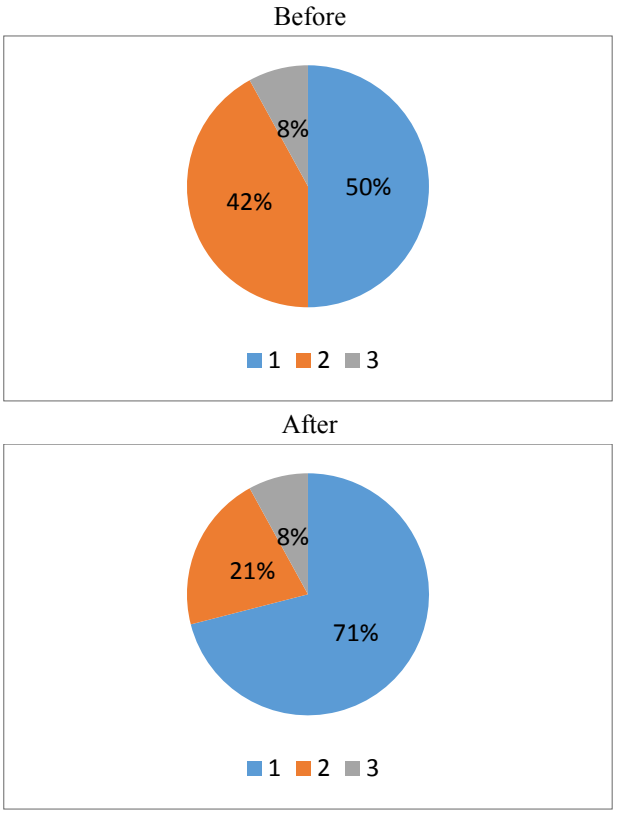
Sub-group of children, characterized by "average" and "below average" indicators

1 – Child's code; 2 – Walking on checkered site; 3 – Lie down – stand up; 4 – Ball throw for accuracy; 5 – Jumps (on 1foot, 2 feet); 6 – Arms' holding with closed eyes; 7 – Test 1 – arms' holding; 8 – Test 2 – touching of nose with closed eyes; 9 – Test 3. Out-jumping; 10 – Test 4. Picking up of coins in box ; 11 – Test 5. Drawing of circles in air; 12 – Test 6. Handshake; 13 – Answer 1; 14 – Answer 2; 15 – Reason 1; 16 – Reason 2; 17 – Reason 3; 18 – Musicality ; 19 – Creativity ; 20 – Coordination of dance movements; 21 – Plasticity.

One of the tested children, coded as 11, was not included in any group, because his psycho-physical condition and cognitive functions were the lowest.

After application of dance-cognitive trainings we fulfilled repeated testing of uniformity of children's grouping. It was found that their distribution into sub-groups changed.

Before application of dance-cognitive trainings 50% of children had level "average" and "above average", 42% - "average" and "below average" and 8% - "below average". After application of dance-cognitive trainings 71% of children had level "average" and "above average", 21% - "average" and "below average" and 8% - "below average" (see fig.1). We found that one child required very special, individual approach. Though, he also demonstrated improvement of some indicators.



1 – Mean values "average" and "above average"
2 – Mean values "average" and "below average"
3 – Values "below average"

Fig.1. Distribution of children's uniformity according to cluster analysis.

The fact that group was re-formed to the side with higher quantity of children with better psycho-physical characteristics, cognitive functions and dance abilities witnesses about positive effect of correcting, rhythm-motor dance trainings. As the following observations showed, from the beginning of new academic year, children of first sub-group successfully started school period. Children from weak sub-group continued learning in pre-school educational establishment.

Discussion

The received results supplement the data about usage of cluster analysis for determination of 5-6 years' age children's grouping (children with speech disorders) in compliance with their psycho-physical condition, cognitive functions and dance abilities. The fulfilled researches prove that pre-school age children with speech disorders lag behind their peers by cognitive functions and by some psycho-physical indicators. Many researchers determined that children with speech disorders can have problems in cognitive functioning, neurologic deviations; limited communication with peers, isolation and aloofness [2, 3, 6, 12, 16, 19, 22].

In other works [3, 6, 12] we observed high prognostic ability for organization of movements with the help of musical rhythm. It facilitated development of children's attention, memory, internal concentration, formation of targeted activity. Dance trainings significantly improve physical qualities, psycho-physical and cognitive development [7, 8, and 11].

The received data supplement awareness of some authors 8, 15, 17] about application of cluster analysis for determination of uniformity of 5-6 years' age children's with speech disorders physical qualities, psycho-physical condition, cognitive functions and dance abilities. Such approach can be used in strategy of increase of dance cognitive trainings' effectiveness.

Conclusions

1. We outlined approaches to grouping of 5-6 years' age children with speech disorders in compliance with their psycho-physical condition, cognitive functions and dance abilities.

2. The fulfilled cluster analysis permitted to register increase of uniformity of children with improved indicators of physical qualities, psycho-physical condition, cognitive functions and dance abilities. Thus, it proved effectiveness of the offered program of dance-cognitive trainings for pre-school age children with speech disorders.

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