

# SYMPTOMS OF VERBAL DYSPRAXIA IN CHILDREN DIAGNOSED WITH SPECIFIC LANGUAGE IMPAIRMENT (SLI)

## ПРОЯВИ НА ВЕРБАЛНА ДИСПРАКСИЯ ПРИ ДЕЦА СЪС СПЕЦИФИЧНИ ЕЗИКОВИ НАРУШЕНИЯ (СЕН)

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**Abstract:** *The purpose of this article is to provide information on the study of deficits in the functioning of praxis in children diagnosed with Specific Language Impairment (SLI). The performance of three groups of language disordered children, divided by age, and the respective control groups on tasks related to articulation, speech motor control and diadochokinesis are put on discussion.*

**KEYWORDS:** PRAXIS; VERBAL DYSPRAXIA; SPECIFIC LANGUAGE IMPAIRMENT (SLI); FINE MOTOR CONTROL; ARTICULATION; DIADOCHOKINESIS;

### 1. Introduction:

Dyspraxia means dysfunction at the level of speech praxis. But dysfunctions occurring by the same mechanism appear in children diagnosed with Specific Language Impairment (SLI), too. For this reason, from historical and contemporary points of view the fundamental question is whether the symptoms associated with impaired functioning of the higher cortical function praxis should be added to the symptom complex of Specific Language Impairment.

So far there is no study conducted in Bulgaria to reveal details on the functioning of verbal praxis mechanisms within the contingent of children diagnosed with Specific Language Impairment (SLI).

### 2. Experimental stand:

The samples presented below are part of wider research aimed to provide some answers related to that fundamental issue.

The study covered a total of 170 children - some diagnosed with "Specific Language Impairment" and a group with no language deficits at all. They were divided into three age groups as follows: 35 children aged between 4 and 5 years, 30 children aged between 5 and 6 years and 20 preschool children (6-7 years). The three experimental groups (EG) were composed of children with proven language pathology identified by an expert speech therapist. In view of the precision, prior acquaintance with individual records of each child, including details related to their personal history, were undertaken. The control groups (CG) mirrored the number and age of the children with language impairment. The research was conducted in three kindergartens in the country, two of which specialize in speech and language therapy in Sofia and Varna, and one non-specialized kindergarten. The survey was conducted individually with each participant, after a statement of consent was signed by the parents.

The following three diagnostic tasks were strictly connected to the articulation praxis level of one syllable (type CV) and the articulation praxis level of the diadochokinesis. The main focus of the samples was to define the maximum speed and duration of delivery of one syllable type CV, and then a combination of two and three syllables that each child must pronounce as many times as possible within 15 seconds. The

time of execution was measured. When the child does not utter anything, it scores 0 points. The maximum score is individual, according to the capabilities of each participant.

It is important to clarify that articulation praxis is examined in its kinetic aspect.

The first task for each child is to utter the syllable "PA" as many times as they can for 15 seconds. Every spoken syllable is scored 1 point. The sample represents the easiest level in the study of articulation praxis. It is known that the sound "P" is part of the speech sounds typical of the early articulation stage. In this sense, the combination of "P" with the wide open vowel "A" should not be an obstacle to the children tested. The instruction is: "Please, repeat "PA" as quickly as you can as many times as you can. I will give you a start!" The speech therapist demonstrates a task example.

The second task is upgraded in difficulty. Each child must pronounce two open syllables "PA-KA". Again the time and number of syllables pronounced is measured. Any pronouncement of the combination gets 1 point. The instruction is analogous to that of the previous sample, but refers to a combination of two syllables.

The third task is related to the pronunciation of three open syllables (PA-TA-KA) and is a classical sample of diadochokinesis in which the articulation starts from the lips, then goes onto the tip of the tongue and after that ends at the back of the tongue. The informative purpose of the sample consists in the different articulation posture during the pronunciation of the speech sounds "P", "T" and "K". Of all three tasks, this is the one with highest level of complexity. The instruction is similar: "Please, pronounce PA-TA-KA as quickly as you can and as many times as you can!"

Although being divided into three separate conditions, the described samples are interrelated. We are looking for information regarding the smoothness, successiveness, speed, switching on from the level of simple pronunciation of one syllable to pronunciation of a group of syllables. The aim is to find whether there are deficits in brain mechanisms that control planning of voluntary motor and speech skills. The samples described above possess a certain level of abstraction. The child has no language support in terms of communication or images, which means complete exclusion of meaningful code.

For the purposes of our research we formed two hypotheses :

1. We expect that between children with Specific Language Impairment and children with normal language development there will be no significant difference in terms of verbal praxis.
2. We assume that in children with Specific Language Impairment, the verbal praxis will improve in parallel with the age.

Comparing children with normal speech and those with Specific Language Impairment we were looking exactly for two things - a manifestation and development of speech praxis in three distinct ages.

### 3. Results and discussion:

The following graph (Fig. 1) gives the results of both groups - EG and CG from the first task "Repetition of one syllable".

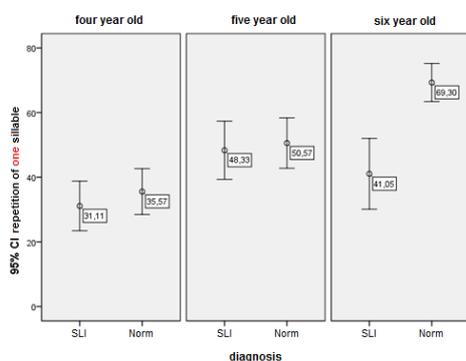


Figure 1: Mean value of **repetition of one syllable** divided by age;

At the first task the children between 4 and 5 years of experimental group showed an average subgroup score of 31 points. For the same task the result of children in the control group was 35 points.

Obviously, for the respective sample there is no significant difference between the results of the control and experimental groups. This was confirmed statistically by the coefficient "t" expressing significant differences, in this case less than 0.01 (less than 1%).

It could be concluded that the repetition of an open syllable, type "PA" for a specified time is equally difficult for 4-5 years old children which means that the assumption expressed at the first hypothesis is confirmed for that age.

The same task performed by 5-6 years olds shows subgroup average score of 48 points for EG and 50 points for CG. Obviously, for this sample at that age there is no statistically significant difference between the two groups, as shown by the ratio "t", which is less than 0.01 and again we can confirm the first hypothesis.

An interesting twist is observed in the sample with preschool children (6-7 years). Here it clearly outlines statistically significant differences between the results of EG and CG. Children from EG subgroup have 41 points, while children from CG - 69 points. The assumption embedded in the first hypothesis is not confirmed only for this age group. That means differences in articulation mechanisms at the level of praxis for serial naming of one syllable between children with normal speech and children with SLI, are established only in preschool. Brain mechanisms needed for the implementation of that sample are formed for the normally speaking children. But the same process of maturation

is not performed in children with SLI, whose results remain close as a statistical value to these of the smaller ones (5 - 6 years). From the graph (Fig. 1) it can be seen, also, that the results of the 6 years old children with SLI are lower than those of 5 years old with the same diagnosis. This suggests that the brain mechanisms at the level of naming of one syllable are not only entirely unformed in children with SLI, but there is also some decline concerning instrumental realization of the described level. How to explain this fact? Maybe it is worth mentioning here the main symptom associated with the concept of children's verbal dyspraxia, the ineffectiveness of the applied therapy, which might positively affect language development, but fails to support the maturation of praxis functions. On the other hand, the individual temp of formation of praxis skills in that period of age matters.

The results of the second task related to the repetition of a combination of two open syllables are graphically presented at Figure 2.

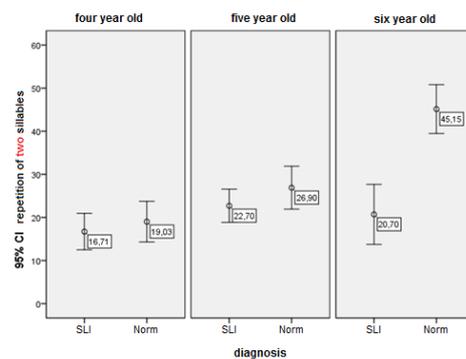


Figure 2: Mean value of **repetition of two syllables** divided by age;

As mentioned above, the sample represents a second level of difficulty compared to the previous one. Besides standard naming, here we have a switching between the two articulation postures associated with phonation of two different consonants - P and K. The first articulated with lips and the other through the back of the tongue. There is also a smoothness of the performance.

The task was harder for the children compared to the previous one. This was shown by the fact that some of them made an inert repetition of the syllable „PA“ from the previous sample, which required re-submission of the instruction.

It is interesting that here we have again statistically significant differences between the results of the experimental and control groups only for 6-7 years old. The graph (Fig.2 above) clearly shows the recurring trend in which 6 years old children with SLI have lower scores compared with 5 years old children with the same diagnosis. In our opinion this should not be regarded as a decrease in the formation of verbal praxis, but rather as an individual specifics of the studied groups of children. The line of skills in children with normal language development of all three ages unfolds through a gradual rise in results, while that of children with language pathology is expressed with an unequal dynamics.

The results from the third, the most difficult task, are presented graphically in Figure 3. The sample has a high diagnostic value as praxis symptoms associated with impaired diadochokinesis (switching between three or more articulation postures) are considered main characteristic of the verbal dyspraxia.

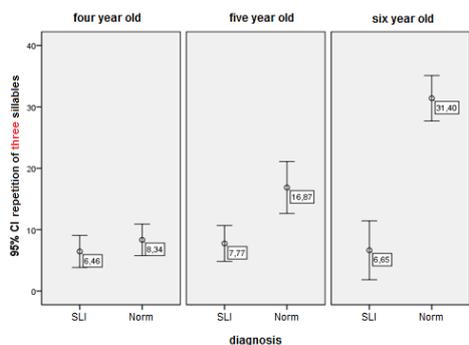


Figure 3: Mean value of repetition of three syllables divided by age;

We can see that the first hypothesis is confirmed partially and is not valid only for 5-6 and 6-7 years old children. In the results of 4-5 years olds we can't observe reliable differences in the performance. The results of children with normal speech development rise gradually which speaks of a stabilization of the mechanisms of speech praxis. While in the results of children with SLI we can't see dynamics in serial repetition of syllables, because the points of 4-5 years olds are approximately the same as those of 6-7 years old. We can conclude that we see an improvement of speech praxis skills and fine motor mechanisms connected with precise and fast switching between two or more articulation postures only in children with normal speech development. The same mechanisms practically do not develop in children with SLI at age period between 4 and 7 years of life.

To define more clearly the connection between the improvement of speech praxis skills and the children's age we made an Analysis Of Variance (ANOVA), disposed at the following tables.

Table 1: Mean Values of verbal praxis components in deferent age groups in children with Specific Language Impairment (SLI);

Task	Age	Number of children	Average	Standard deviation	F
Repetition of one syllable	4 years olds	35	31,11	22,37	4,49
	5 years olds	30	48,33	24,13	
	6 years olds	20	41,05	23,35	
	Total	85	39,53	24,18	
Repetition of two syllables	4 years olds	35	16,71	12,29	1,98
	5 years olds	30	22,7	10,32	
	6 years olds	20	20,7	14,89	
	Total	85	19,76	12,46	
Repetition of three syllables	4 years olds	35	6,46	7,59	0,22
	5 years olds	30	7,77	7,82	
	6 years olds	20	6,65	10,24	
	Total	85	6,96	8,28	

The results demonstrate that a dependence between the advancing age and improvement of speech praxis skills in children diagnosed with SLI exists only for the first task. Only at starting level of repetition of one syllable type CV we find a positive development in the praxis functioning. This conclusion is confirmed by index  $F = 4,49$ , bigger than  $0,01$ .

Table 2: Mean Values of verbal praxis components in deferent age groups in children with normal speech development;

Task	Age	Number of children	Average	Standard deviation	F
Repetition of one syllable	4 years olds	35	35,57	20,63	19,94
	5 years olds	30	50,57	20,83	
	6 years olds	20	69,3	12,6	
	Total	85	48,8	23,06	
Repetition of two syllables	4 years olds	35	19,03	13,72	24,93
	5 years olds	30	26,9	13,35	
	6 years olds	20	45,15	12,11	
	Total	85	27,95	16,58	
Repetition of three syllables	4 years olds	35	8,34	7,46	40,8
	5 years olds	30	16,87	11,32	
	6 years olds	20	31,4	7,89	
	Total	85	16,78	12,7	

Table 2 above represents the results of the control groups, the children with normal speech development. We can see that at all consecutive ages, we have statistically significant differences. This means that children's performance on each of the tasks has improved alongside with age.

### 3. Conclusion:

Both the vowels and the consonants sounds differ in the different phonetic context in which they are located. In this sense, a fundamental element in studying the speech skills of children with doubts about dyspraxia should be the syllable. The three tasks presented begin at the level of one syllable and are graded by difficulty. The kinetic aspect of verbal praxis - serial naming, smooth passage and switching between two articulation postures, diadochokinesis - was observed. Establishing deficiencies in the functioning of these processes is important for the diagnosis of dysfunctions at the level of verbal praxis naturally involving the planning of the movements required for articulation and hence for communication.

The main goal of our research was to define clearly the exact symptoms of impaired praxis skills in children diagnosed with Specific Language Impairment. The results from the three tasks have shown clearly the existence of such difficulties in that particular contingent. Also we tried to specify the levels of manifestation throughout three different and consecutive ages of childhood.

At the praxis level for repetition of one syllable and repetition of two syllables we have statistically significant differences between EG and CG at the preschool age. We may

say that our first hypotheses doesn't confirm only for that period of age. The results from the third sample, concerning diadochokinesis, show that the children with normal speech development have higher scores than the others with SLI at the age of 5 years. So the differences in articulation capabilities start at an earlier age. The CG have better performance than the EG. If we look separately at the scores of both groups, we see that praxis functions improve with age only for the control group. Practically voluntary fine motor mechanisms do not develop in children with SLI at age period between 4 and 7 years of life.

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