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## ARTICULATION OF SPEECH SOUNDS OF SERBIAN LANGUAGE IN CHILDREN AGED SIX TO EIGHT

*ARTIKULACIJA GLASOVA SRPSKOG JEZIKA DECE UZRASTA ŠEST DO OSAM GODINA*

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### Summary

**Introduction.** Phonetic and phonological system of the healthy members of one linguistic community is fully formed around 8 years of age. The auditory and articulatory habits are established with age and tend to be more difficult to be upgraded and completed later. **Material and Methods.** The research was done as a cross-sectional study, conducted at the preschool institution "Radosno detinjstvo" and primary school "Branko Radičević" in Novi Sad. It included 66 children of both genders, aged 6 to 8. The quality of articulation was determined according to the Global Articulation Test by working with each child individually. **Results.** In each individual vowel, plosive, nasal, lateral and fricative, the quality of articulation was statistically significantly better in the first graders compared to the preschool children ( $p < 0.01$ ). In each affricate, except for the sound /č/, the quality of articulation was statistically significantly better in the first graders than in the preschool children ( $p < 0.01$ ). The quality of articulation of all speech sounds was statistically significantly better in the first graders than in the preschool children ( $p < 0.01$ ). **Discussion and Conclusion.** The most common disorder of articulation is distortion, while only substitution and substitution associated with distortion are less common. Omission does not occur in children from 6 to 8 years of age. Girls have slightly better quality of articulation. The articulatory disorders are more common in preschool children than in children who are in the first grade of primary school. The most commonly mispronounced sounds belong to the group of affricates and fricatives. **Key words:** Voice; Child; Speech Articulation Tests; Articulation Disorders; Phonetics; Age Factors; Sex Factors

### Introduction

Speech production is a complex, multi-staged process transforming conceptual ideas into an acoustic signal to be comprehensible to other people. These stages include conceptualization of the intended messages, adopting words, selection of appropriate morphological forms, sequencing of phonemes, word syllables, and phonetic encoding, as well as initiation and coordination of the sequences of tongue move-

### Sažetak

**Uvod.** Fonetsko-fonološki sistem pripradnika jedne jezičke zajednice u potpunosti je formiran oko osme godine života. Sa godinama se slušne i izgovorne navike ustaljuju i sve teže mogu da se nadograđuju i upotpunjuju. **Materijal i metode.** Istraživanje je sprovedeno kao studija preseka u Predškolskoj ustanovi „Radosno detinjstvo“ i Osnovnoj školi „Branko Radičević“ u Novom Sadu. U istraživanju je učestvovalo šezdeset šestoro dece, uzrasta od 6 do 8 godina, oba pola. Kvalitet artikulacije je procenjen na osnovu Globalnog artikulacionog testa, individualno kod svakog deteta. **Rezultati.** Kod svih pojedinačnih vokala, ploziva, nazala, laterala i frikativa kvalitet artikulacije statistički je značajno bolji kod dece u prvom razredu, u odnosu na decu predškolskog uzrasta ( $p < 0,01$ ). Kod svih pojedinačnih afrikata, osim kod glasa /č/, kvalitet artikulacije je statistički značajno bolji kod dece u prvom razredu, u odnosu na decu predškolskog uzrasta ( $p < 0,01$ ). Kvalitet artikulacije za sve glasove zajedno je statistički značajno bolji kod dece u prvom razredu, nego kod dece predškolskog uzrasta ( $p < 0,01$ ). **Diskusija i zaključak.** Najčešći poremećaj artikulacije je distorzija, dok se supstitucija izolovano i udruženo sa distorzijom, rede javljaju. Omisija se ne pojavljuje kod dece uzrasta od šest do osam godina. Blagu prednost u kvalitetu artikulacije imaju devojčice. Artikulacioni poremećaji su učestaliji su kod dece predškolskog uzrasta nego kod dece koja pohađaju prvi razred osnovne škole. Najčešće je poremećen izgovor glasova iz grupa afrikata i frikativa. **KLjučne reči:** Glas; Dete; Artikulacioni testovi; Artikulacioni poremećaji; Fonetika; Uzrast; Pol

ment, lips and laryngeal muscles that cause vibration of the vocal folds and respiratory control for phonation and prosodic characteristic of speech [1].

From the acoustic point of view, different speakers pronounce each sound differently. From the range of possible sounds, every language "chooses" its specific speech sounds [2]. Speech production is a continuous order of speech sounds in an apparently discontinuous sequence of phonemes, whose connection forms semantic units (words and sentences) [3]. Pho-

neme is the smallest distinctive unit, without a meaning but it sets the meaning of higher units. Different phonemes have different acoustic characteristics and different phonological features [2].

According to Golubović [4], the articulatory base is especially important for the proper articulation of speech sounds, which is a system of speakers' automated habits of pronunciation. This set of articulatory habits of a language, now tentatively called articulatory base, cannot be linked to an individual or even to a group of people. It represents the collective heritage of all members of a particular linguistic expression and it tends to change both in time and space [5].

The auditory and articulatory habits are established with age and tend to be more difficult to be upgraded and completed later. Therefore, if erroneous auditory and articulatory habits occur, they will become a part of the automatic activities in the domain of everyday life [5]. Preschool period is especially important due to the possibility of adapting erroneous habits, which can lead to significant morphological changes in the face region and thus jeopardize the proper acquisition of speech habits and the adoption of clean and clear pronunciation of sounds [6].

If speech and language disorders develop, they may hinder the child's functioning in their social environment [7]. According to Vladislavljević (quote Lazarević) [8], speech and language disorders can affect all modes of speech, sound articulation, language structure, reading, writing and they are caused or influenced by either environment or pathological changes in the speech system, and often by both of them. The study objective was to investigate the articulation in children before they start primary school and children in the first grade and to determine the most common type of disorder of the voice pronunciation. The hypothesis was that the articulatory abilities are less improved in preschool children than in children who are in the first grade of primary school, that the quality of articulation is better in girls than in boys, and specific for some sounds.

## Material and Methods

The research was a cross-sectional study, conducted at the preschool institution "Radosno detinjstvo" and primary school "Branko Radičević" in Novi Sad. It included 66 children of both genders, from 6 to 8 years of age. The children were divided into two groups: one group had 33 preschool children and the other included 33 first graders. The native language of all children was Serbian, and the children were tested by two researchers, one of them being a speech therapist.

The quality of articulation was determined according to The Global Articulation Test [9] in each child individually. The test consisted of 30 words with the examined sounds in the inter-consonant position (vowels) or in the initial position (consonants). The protocol consisted of a table divided by vocal groups and a summary table for the results of The

Global Articulation Test. There were 30 words in the test and each word corresponded to a single sound from Serbian language. A certain sound was observed in each word and the quality of its pronunciation was evaluated and scored with marks from 1 to 7.

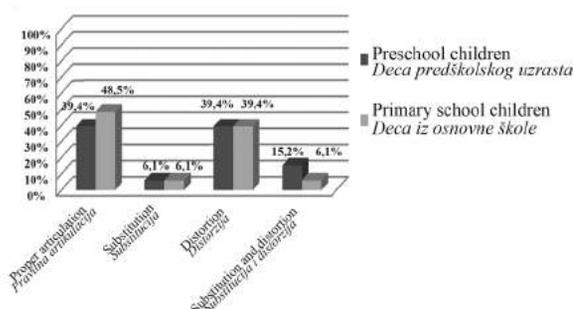
Marks 1, 2 and 3 indicated well-articulated speech sounds, marginal sounds got 4. There were sounds graded 5, but they were distorted. Mark 6 was for the sounds that were so badly damaged that they could not be identified out of context. The pronunciation of these sounds was distorted. Mark 7 was for the sounds that had been omitted (discharged) or substituted (replaced with a different sound). Finally, the marks by which the sounds were evaluated were summed up. The results were compared with the Mann-Whitney U Test, which is a non parametric test of the null hypothesis and has a high efficiency. The results were processed with SPSS 21 statistical software.

## Results

The study sample consisted of 36 boys (55%) and 30 girls (45%). As for the age distribution, the number of children 7.5 to 8 years of age (30.3%) was slightly higher. The length of stay of children at the preschool institution was from less than 12 months (25.8%) to 4 years (66.7%).

Most of primary school first graders had proper articulation (49%), whereas substitution and substitution associated with distortion was recorded in only 6% of the study sample. Proper articulation was observed to a lesser degree (40%) in the preschool children than in the first graders. Substitutions were as rare in the preschool children (6%) as in the first graders and it was the least common speech disorder. Omission of speech sounds was found neither in the preschool children, nor in the first graders (**Graph 1**).

The results of the Global Articulation Test showed that the quality of articulation for all individual vowels was significantly better in the first graders than in the preschool children,  $p < 0.1$ . Statistically, the quality of articulation of all vowels



**Graph 1.** The structure of the sample according to the type of articulation disorders in preschool and primary school children

**Grafikon 1.** Struktura uzorka prema vrsti poremećaja artikulacije kod dece predškolskog i školskog uzrasta

**Table 1.** The quality of articulation of individually shown affricates in both groups of children  
**Tabela 1.** Kvalitet artikulacije pojedinačno prikazanih afrikata u obe grupe dece

|    |                            | $\Sigma$ | $\bar{X}$ | SD    | Minimum<br><i>Minimalno</i> | Maximum<br><i>Maksimalno</i> | Mann-Whitney<br><i>U test</i> | p     |
|----|----------------------------|----------|-----------|-------|-----------------------------|------------------------------|-------------------------------|-------|
| C  | 1st group/ <i>1. grupa</i> | 84       | 2,55      | 0,711 | 2                           | 4                            | 91,000                        | <0,01 |
|    | 2nd group/ <i>2. grupa</i> | 41       | 1,24      | 0,614 | 1                           | 3                            |                               |       |
|    | Total/ <i>Ukupno</i>       | 125      | 1,89      | 0,930 | 1                           | 4                            |                               |       |
| Ć  | 1st group/ <i>1. grupa</i> | 93       | 2,82      | 1,261 | 2                           | 7                            | 412,500                       | >0,05 |
|    | 2nd group/ <i>2. grupa</i> | 83       | 2,52      | 1,906 | 1                           | 7                            |                               |       |
|    | Total/ <i>Ukupno</i>       | 176      | 2,67      | 1,611 | 1                           | 7                            |                               |       |
| Đ  | 1st group/ <i>1. grupa</i> | 80       | 2,42      | 0,561 | 2                           | 4                            | 351,500                       | <0,01 |
|    | 2nd group/ <i>2. grupa</i> | 69       | 2,09      | 1,400 | 1                           | 7                            |                               |       |
|    | Total/ <i>Ukupno</i>       | 149      | 2,26      | 1,071 | 1                           | 7                            |                               |       |
| Č  | 1st group/ <i>1. grupa</i> | 98       | 2,97      | 1,447 | 2                           | 7                            | 136,000                       | <0,01 |
|    | 2nd group/ <i>2. grupa</i> | 47       | 1,42      | 0,792 | 1                           | 4                            |                               |       |
|    | Total/ <i>Ukupno</i>       | 145      | 2,20      | 1,395 | 1                           | 7                            |                               |       |
| DŽ | 1st group/ <i>1. grupa</i> | 100      | 3,03      | 1,425 | 2                           | 7                            | 222,500                       | <0,01 |
|    | 2nd group/ <i>2. grupa</i> | 63       | 1,91      | 1,422 | 1                           | 6                            |                               |       |
|    | Total/ <i>Ukupno</i>       | 163      | 2,47      | 1,521 | 1                           | 7                            |                               |       |

was significantly better in the first graders than in the preschool children,  $p < 0.01$ . As for the group of plosives, the quality of articulation of each individual plosive was statistically much better in the first graders than in the preschool children,  $p < 0.01$ . The quality of articulation of all plosives was statistically much better in the first graders than in the pre-school children,  $p < 0.01$ .

An interesting discovery was recorded in the group of affricates. The quality of articulation of all individual affricates, except for the sound /ć/, was statistically much better in the first graders than in the preschool children ( $p < 0.01$ ). There was no statistically significant difference in the quality of articulation of the sound /ć/ between the preschool and primary school children,  $p > 0.05$ . The quality of articulation of all affricates combined was statistically better in the primary school children than in the preschool children,  $p < 0.01$  (Table 1).

In the group of fricatives, the biggest difference in the quality of articulation between the preschool children and the first graders was in the sound /ž/ and /r/. In all other individual fricatives, the quality of articulation was also significantly better in the first graders than in the preschool children,  $p < 0.01$ . The quality of articulation was statistically much better in the first graders than in the preschool children,  $p < 0.01$ .

As for the group of nasals, the worst was the sound /nj/. The quality of articulation of all individual nasals was statistically much better in the first graders than in the preschool children,  $p < 0.01$ . The quality of articulation of all nasals was statistically much better in the primary school children than in the preschool children,  $p < 0.01$ .

The speech sounds from the group of laterals were rated with good marks, 1 and 2 in both groups. How-

ever, the quality of articulation of all laterals was statistically much better in the first graders than in the preschool children,  $p < 0.01$ .

In the first grade, 16 pupils (48.5%) had the proper articulation of all sounds of Serbian language (marks 1, 2, 3), while 9 pupils (27.3%) articulated 29 sounds properly. The sounds were properly articulated by 14 children (42.4%) of preschool age, while 6 children (18.2%) articulated 29 sounds properly. More preschool children had a low sum of properly articulated sounds; namely, 22, 23 and 24 of properly articulated speech sounds. Most of the first graders (60.8%) did not have a marginal sound marked with 4, while that percentage was slightly lower among the preschool children (57.6%). In the group of first graders who scored 4 at the test, 24.2% had one sound scored 4; whereas in the group of preschool children, even five children (15.2%) had three sounds scored 4. Most of the first graders (72.8%) did not have an erroneous sound (marked 5, 6, 7), while that percentage was slightly lower among the preschool children, being (60.7%). In the group of primary school children who were scored 5, 6 or 7 at the test, 21.2% had one erroneous sound; whereas in the group of preschool children, two or three sounds were scored 5, 6 or 7 in four children (12.1%). Although there were more boys than girls in the study sample, the girls had better quality of articulation of all groups of examined sounds of Serbian language (vowels, plosives, nasals, laterals, affricates and fricatives) although the difference between the boys and girls was not statistically significant ( $p > 0.05$ ).

## Discussion

Veselinović et al. [10] have also found the sound distortion to be the most common disorder in tested

children. In their research, the sound distortion was observed in every child of 23.29% of those who had an articulation disorder.

According to this study, distortions are much more common than substitutions and omissions in speech. Distortions were equally observed in both groups of children (39.4%). Golubović et al. [4] reported that substitution was in 3.2% of the subjects, while Veselinović et al. [10] observed sound substitution in one case only (6.25%). This study yielded similar results: substitution was present in 6.1% of children from both groups. When the primary school children were compared in the terms of the frequency of substitution associated with distortion, they showed better articulation; associated substitution and distortion was found in 6.1% of them, whereas that frequency was 15.2% in the children of preschool age. Therefore, it can be concluded that the first graders had better quality of articulation regarding the type of dyslalia (isolated or associated).

According to Veselinović et al. [9], omission did not occur in children 6 to 10 years old, which is in agreement with Golubović and Čolić [11], who state that the omission of speech sounds almost never occurs at this age. In this study, omission of speech sound was not reported in any of the children from both groups, which is in agreement with the findings of the authors above. This suggests that omission as an articulation disorder is not present in the study sample of preschool and primary school children.

The results obtained by Golubović and Čolić [11] show that all tested children from 5.5 and 7 years of age have the proper pronunciation of all sounds, plosives and nasals, which is, according to the authors, expected given that these sounds are the first to be adopted in the speech sound system of Serbian language. Veselinović et al. [10] reported the articulation disorder of affricates in the majority of children (75%), while Vuletić and Ljubešić [12] claim that there is a high frequency of articulation disorders of fricatives in addition to affricates. This study shows too that vowels and plosives are more properly articulated. The frequency of articulation disorders in laterals was 18.18% in the primary school children, while this percentage was less than 3.03% in the preschool children. The worst quality of articulation was when pronouncing affricates and fricatives. The frequency of articulation disorders when pronouncing affricates was 36.36% in the primary school children, whereas it was 33.33% in the preschool children. The frequency of articulation disorders in case of fricatives was 24.24%, in the primary school children and 39.39% in the preschool children. The results are in agreement with the results of Vuletić and Ljubešić.

The frequency of articulation disorders is usually observed according to the age, gender and individual sounds or groups of sounds. According to Vuletić and Ljubešić [12] the significant difference in the development of articulation between boys and girls is in the period between 3 and 5.5 years of age, in favor of girls; furthermore, girls of all ages have

a tendency toward better pronunciation. The number of problems with articulation decreases significantly with age in both genders. Veselinović et al. [10] studied the frequency of articulation disorders in 69 children 6 to 10 years old and have concluded that articulation disorders are more common in boys (25.36%) than in girls (18.51%). According to the research of articulation disorders in children from 5 to 11 years of age, Goulart and Chiari [13] claim that articulation disorders occur with the same frequency in both genders. In this study, it has been proved that there is no statistically significant difference in the quality of the sound articulation between boys and girls, but that girls have slightly better quality of articulation than boys, which is in agreement with most authors.

Vuković and Ilić [14] have found that articulation disorders are in correlation with age: the highest percent of disorders has been recorded in the second and the third grade, being 50% and 20.53%, respectively. Nešić et al. [7] have proved the hypothesis that speech and language disorders, which include the articulation disorders, are more common in children who are just starting school (92.85%) than during education (7.15%). This information is very important because it shows that education has an important role in elimination of speech and language disorders.

Majdevac et al. [15] published the results of research on 992 children from the province of Vojvodina. The children were 7 and 8 years old. Pathological speech conditions were found in 34.97% of the children and they were more common in urban than in rural areas.

In this research, the frequency of articulation disorders in the preschool children was 60.61%, while in the children attending the first grade it was 51.51%. There was a statistically significant difference in the quality of articulation of all sounds of Serbian language, except for the voice /ć/ between the preschool and primary school children,  $p < 0.01$ . This shows that children in the first grade of primary school have statistically much better quality of articulation than preschool children, which may be the result of early affective attachment, different way of working in primary schools which implies more hours of activity, higher concentration and attention to work, the conditions and the atmosphere in the classroom, recognizing speech errors and correcting them on time, as well as repetition and the adoption of grapheme of Serbian language and encouragement to memorize, learning to read and write.

## Conclusion

The most common articulation disorder is distortion, while the isolated substitution and substitution associated with distortion are less common. Omission does not occur in children from 6 to 8 years of age. Girls have slightly better quality of speech sound articulation. The articulatory disorder

ders are more common in preschool children than in children who attend the first grade of primary

school. The most common mispronunciations come from the group of affricates and fricatives.

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