

Оригинални научни рад  
Образовање и васпитање (Штампано изд.). –  
ISSN 2956-1779. - God. 19, br. 21 (2024), str. 67-78  
159.922.7-053.4:81`233  
COBISS.SR-ID [147677449](#)  
doi: [10.5937/obrvas19-51332](#)

Рад примљен: 31.5.2024.  
Рад прихваћен: 16.6.2024.

## THE RELATIONSHIP OF DEVELOPMENTAL DISORDER OF ARTICULATION AND ORAL PRAXIS

Gordana R. ČOLIĆ<sup>1</sup>

University of Priština in Kosovska Mitrovica, Teacher Education Faculty,  
Leposavic, Serbia

Miljan D. MILJKOVIĆ<sup>2</sup>

University of Priština in Kosovska Mitrovica, Teacher Education Faculty,  
Leposavic, Serbia

Jovana P. JANJIĆ<sup>3</sup>

International Nursery and Primary School, Belgrade, Serbia

---

<sup>1</sup>  <https://orcid.org/0009-0006-5293-1917>, e-mail: [gordana.colic@pr.ac.rs](mailto:gordana.colic@pr.ac.rs)

<sup>2</sup>  <https://orcid.org/0000-0002-6081-1038>

<sup>3</sup>  <https://orcid.org/0000-0002-6081-1038>

# THE RELATIONSHIP OF DEVELOPMENTAL DISORDER OF ARTICULATION AND ORAL PRAXIS

**Summary:** *Articulation disorder is a developmental disorder that manifests in the early development period. It may occur due to a primary disorder such as anatomical deviations and sensory disorders, but they can also exist without any clear cause as a specific articulation disorder, most often related to the immaturity of oral praxis. The aim of this paper is to determine the frequency of articulation disorders and its relationship with oral praxis in preschool children. The sample consisted of preschool age children, of both sexes, with typical development (N=60). The quality of voice pronunciation was determined based on the Triage Articulation Test, while oral praxis was examined using the Oral Praxis Test. It was found that a large number of the examined children have a disorder in the pronunciation of one or several voices. A statistically significant correlation was found between immature oral praxis and articulation disorders ( $\rho=0.364$ ;  $p=0.004$ ). Although there is a significant association between articulation disorder and immature oral praxis, without evaluating other possible causes, it cannot be confidently asserted that immature oral praxis is the cause of developmental articulation disorder.*

**Key words:** *developmental disorder, articulation disorder, oral praxis, preschool age.*

## INTRODUCTION

Articulation is most simply defined as the ability to pronounce sounds. It implies the movement and precise coordination of the speech organs in order to generate sounds. It is the key to intelligible and clear speech. The ability to articulate develops gradually in children during the developmental period. There is a typical sequence or developmental order of which sound a child should pronounce, so a child at the age of three and a half should pronounce eighteen sounds (vowels, plosives, nasals, half-vowel j, and sounds h, f, v), and up to five and a half years a child is expected to pronounce all the sounds of his native language correctly (Vuletić, 1990). However, individual developmental differences, as well as numerous factors, can affect the development of articulation.

Each voice has its own articulation and acoustic characteristics, and if the spoken voice deviates from one or both characteristics, it is an atypical realization of the voice (Punišić et al., 2009a, 2009b). Deviations from the typical realization of the voice manifest themselves as omissions (not pronouncing voices), substitutions (replacing one voice with another voice) and distortions (deviation from the correct pronunciation of the voice, i.e., incorrect pronunciation of the voice) (Benc Štuka, 2010). These deviations can be individual and/or combined for one voice and/or groups of voices and are called articulation disorders. Articulation disorder belongs to the group of speech disorders. In addition to articulation disorders, the group of speech disorders includes stuttering (disruption of the rhythm and pace of speech), children's speech apraxia (difficulties in planning and programming speech movements) and dysarthria (syndrome of respiratory disorders, phonation, resonance, articulation and prosody). These disorders differ in their cause of origin, i.e., etiology, and their common feature is a production disorder, while linguistic abilities are intact (Bishop & Leonard, 2014). Developmental articulation disorders, like other developmental disorders, has manifestations in the early development period, exist during growing up and may occur in adulthood (Stevanović, 2021). Accordingly, articulation disorder is an expressive manifestation of many speech, language, speech-language developmental disorders, as well as adulthood. The subject of this paper is not articulation disorders that arise as a consequence of some

primary disorder, but a *specific articulation disorder*. According to DSM-5 (American Psychiatric Association, 2013) articulation disorder belongs to the group of *Specific disorders of speech and language development* and in this group articulation disorder is designated as *Specific pronunciation disorder*. Specific articulation disorders are developmental voice pronunciation disorders that do not cause anatomical irregularities (clefts, progeny, protrusions, diastemas), sensory impairments (hearing and vision impairment), intellectual disabilities, motor disorders and social deprivation. According to ICD-11, a specific articulation disorder is an atypical realization of the voice that is not in accordance with the age and cannot be explained by a clear cause, while language development proceeds without deviation (WHO, 2020).

Given that the specific articulation disorder cannot be explained by anatomical and sensory disorders, it is considered a functional disorder, the causes of which are most often found in the environment and, in particular, in immature speech motor skills, i.e., oral praxis. Oral praxis is defined as the ability to perform voluntary, skillful, precise, fast and coordinated movements of the tongue, lips and jaw necessary for articulation and therefore speech (Namasivayam et al., 2013). The development of this motor skill begins around the age of two and has a progressive course together with speech development (Bertagnolli et al., 2015). According to some authors, oral praxis develops from the first year and reaches its full development by the sixth year, and has a significant connection with articulation (Narayanan, 2022, Torres et al., 2020), and some authors consider oral musculature dysfunction to be one of the causes of articulation disorders. (Dobrota-Davidović and Čalasan, 2018).

## MATERIALS AND METHODS

The aim of this paper is to determine the frequency of articulation disorders and its relationship with oral praxis in preschool children.

The sample consisted of children of preschool age, of both sexes (N=60), who attended a preschool institution in Belgrade. Only children with typical development whose mother tongue is Serbian were included.

The Triage Articulation Test (Kostić and Vladislavljević, 1983) was used in data collection to determine the quality of voice pronunciation. This test examines the pronunciation of each individual sound. The

examiner says a word, and the child repeats the word. The words that the child repeats contain the tested voice in initial, medial and final position. The correct pronunciation of the tested voice in all three positions is scored with 1 point, while the incorrect pronunciation of the voice is scored with 0. The Oral Praxis Test was used to test oral praxis (Radičević and Stanković, 1992). The test contains 21 tasks ranging from simple to more complex. The examiner speaks and shows the model to the child, such as purse lips, stick out the tongue, raise the tongue up behind the teeth, lower the tongue down behind the teeth, and the child repeats the given model. Each successfully repeated model was scored with 1 point, while an unsuccessfully repeated model was scored with 0.

Descriptive statistics were used to present basic statistical data. Spearman's rank correlation was used to determine the correlation of certain variables. A T-test was applied to determine the differences between boys and girls in relation to articulation disorder.

## RESULTS

The results of descriptive statistics on the pronunciation of sounds are shown in Table 1. 55% of children had the correct pronunciation of all sounds (SD=2.03). 45% of children had incorrect pronunciation of one or more sounds (SD=1.81).

*Table 1. Distribution of voice pronunciation scores for the entire sample*

Pronunciation of voices	N	%	SD
correct pronunciation	33	55	2.03
incorrect pronunciation	27	45	1.81
Total	60	100	

The results of descriptive statistics on incorrect pronunciation of voices in relation to gender are shown in Table 2. Incorrect pronunciation of one or more voices was experienced by 67% of boys and 33% of girls. Differences in relation to the pronunciation of voices between boys and girls were examined with the T-test and are shown in Table 2. Using the T-test, no statistically significant differences between the sexes were determined in relation to the incorrect pronunciation of the voices ( $t=-0.143$ ;  $df=58$ ,  $p=0.885$ ).

Table 2. Distribution of results on incorrect pronunciation of sounds in relation to gender

Incorrect pronunciation	t	df	p
boys	-143	58	0.885
girls			

The results of descriptive statistics on the prevalence of different types of articulation disorders are shown in Table 3. The largest number of children have lambdacism (22%). An equal number of children have rotacism and sigmatism (19%). Of the associated articulation disorders, 15% of children exhibited lambdacism and rotacism, while 3% of children exhibited sigmatism and rotacism.

Table 3. Distribution of results in relation to the type of articulation disorder

Type of articulation disorder	N	%
lambdacism	6	22
irregular pronunciation of the voice r (rotacism)	5	19
sigmatism	5	19
rotacism and lambdacism	4	15
sigmatism and lambdacism	3	11
sigmatism, rotacism, lambdacism	3	11
sigmatism and rotacism	1	3

Using Spearman's rank correlation, the relationship between oral praxis and articulation disorders was examined. The results are shown in Table 4. A statistically significant positive correlation was found between immature oral praxis and articulation disorder ( $\rho=0.364$ ;  $p=0.004$ ), which means that the more immature oral praxis is, the more frequent the articulation disorder. A statistically significant, but low and negative association was found between mature oral praxis and articulation disorder ( $\rho=-0.326$ ;  $p=0.011$ ), which means that more mature oral praxis is accompanied by less frequent articulation disorder.

Table 4. Correlation between oral praxis and articulation disorders

Oral praxis	Articulation disorders	
	Spearman's rank correlation	p
mature oral praxis	-0.326	0.011
immature oral praxis	0.364	0.004

## DISCUSSION

The research examined the pronunciation of each individual voice in order to determine the frequency of articulation disorders in preschool children. Based on the results of our research, almost half of the children in the sample have irregular articulation. Research by domestic authors that also determined the frequency of articulation disorders also showed a high frequency of this disorder in preschool children (Golubović and Čolić, 2010; Mihajlović et al., 2015; Tasić et al., 2019). In some studies, the presence of articulation disorders in a high percentage among school-aged children has been recorded (Čolić and Savić, 2023). However, such a result about the frequency of articulation disorder in preschoolers is not expected considering that, according to the developmental norms of voice pronunciation, a child is expected to correctly pronounce all the sounds of his native language at the age of five and a half (Vasić, 1971; Vuletić, 1987; Vladislavljević, 1997).

In the research, we did not find a statistically significant difference between boys and girls in relation to incorrect pronunciation of sounds, although there are more boys who pronounce sounds incorrectly than girls. Authors who examined the differences in articulation between boys and girls cite different data, so some authors state that girls have a better quality of articulation (Mihajlović et al., 2015), while others state that boys have a better quality of articulation, emphasizing that the relationship between gender and articulation is not statistically significant (Đurić-Zdravković et al., 2017).

In addition to the frequency of articulation disorders, this research also provided data on the frequency of individual types of articulation disorders, as well as data on the frequency of combined types of articulation disorders. According to the data from Table 3, the largest number of children have deviations in the pronunciation of the voice L and the voice R, as well as the sounds S, Z, C, Š, Ž, Ć, Đ, Č and Dž, which means that the most frequent types of articulation disorders are lambdacism, rotacism and sigmatism. This finding is in agreement with previous domestic research, such as the Punišić research, in which a set of sounds was singled out that are most frequent in terms of atypical pronunciation, not only in children with typical development, but also in children with hearing impairments (Ristić et al., 2023). That set contains seven sounds, namely Š, Ž, C, Ć, L, Dž and R

(arranged from the most frequent atypical pronunciations to less frequent atypical pronunciations (Punišić, 2012; Bilibajkić, 2016). The aforementioned research is based on the results of identifying problematic (atypically pronounced) sounds in agreement with our research, but it differs in frequency because according to the results of our research, the pronunciation disorder of the sounds L and R (lambdacism and rotacism) is more frequent, while according to Punišić, the pronunciation disorder of the sounds Š and Ž (sigmatism) is more frequent. In the literature, there is information about a group of so-called critical sounds that contains twelve sounds that are difficult for children to pronounce, and these are, in addition to the seven sounds mentioned above, five more sounds: S, Z, Ć, Đ and Lj (Jovicic, 1999) which is in agreement with our research considering that sigmatism was singled out as a separate articulation disorder and, in addition, in three groups of children who exhibited joint articulation disorders (the first group of children exhibiting sigmatism and lambdacism combined, the second group of children exhibiting sigmatism and rotacism combined and the third group of children who exhibit sigmatism, lambdacism and rotacism combined). In a study on articulatory acoustic deviations of voices in the Serbian language, it was determined that the most common deviations from correct pronunciation (typical pronunciation) are different types of sigmatisms (Bilibajkić, 2016).

In our research, a statistically significant association was registered between oral praxis and articulation disorders. Such a finding is expected considering that the pronunciation of sounds, especially from the group of fricatives and affricates, requires precise, coordinated, synchronized and quick positioning of the speech organs. However, the research findings of certain authors point to the conclusion that articulation disorder does not have to be caused by immature oral praxis (Bjelić & Đoković, 2023). In the mentioned research, no statistically significant connection between articulation and the quality of oral praxis was established. On the other hand, some authors who examined the connection between speech (articulation and stuttering) and oral praxis report that children who have disorders of the rhythm and pace of speech (stuttering) have less developed oral musculature control, then report that children who stutter as well as those who do not stutter may have irregular articulation as well as the inability to perform some movements of the speech organs, emphasizing the fact that in their



research they did not determine that the dysfunction of the oral musculature affects the appearance of speech disorders (Dobrota-Davidović and Čalasan, 2018). The connection between praxis and speech is also indicated by the results of research in which oral praxis was examined in children with developmental dysphasia (Vuković and Vuković, 2010). According to the mentioned research, children with a specific speech and language disorder are more unsuccessful in oral praxis tasks than children with typical speech and language development, therefore the conclusion of the mentioned research is that the speech and language disorder is accompanied by a praxis disorder (Vuković and Vuković, 2010). It is important to note that connection does not mean causation, so we cannot consider immature oral praxis as the cause of articulation disorders because it is not the only variable that is related to the correct pronunciation of sounds, i.e., correct articulation.

## CONCLUSION

The research provided an insight into the frequency of articulation disorders in preschool age children. The high frequency of articulation disorders recorded in children of this age is a worrying result. The obtained results also indicate that articulation and oral praxis are interconnected, which implies the conclusion about the importance of oral praxis for articulation ability. Although there is a significant connection between immature oral praxis and articulation disorders, it cannot be confidently asserted that immature oral praxis is the cause of articulation disorders. In order to obtain a more reliable insight into the possible causes of such a high prevalence of articulation disorders among children of typical preschool age development, it is necessary to examine the influence of other possible factors on the quality of articulation in future research.

Given that articulation disorders can persist during growing up, they can therefore be the cause of language disorders such as articulation-phonological disorders and specific reading and writing disorders, i.e. specific learning disabilities, it is necessary to work on the prevention of articulation disorders as well as on the early identification of these disorders.

## REFERENCES

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*.
- Bishop, D. V., & Leonard, L. B. (Eds.). (2014). *Speech and language impairments in children: Causes, characteristics, intervention and outcome*. Psychology press.
- Bertagnolli AP., Gubiani MB., Ceron M. & Keske-Soares M. (2015). Orofacial Praxis Abilities in Children with Speech Disorders. *Int Arch Otorhinolaryngol*, 19(4): 286-92.
- Benc Štuka, N. (2010). Poremećaj izgovora. U D. Andrešić N. i Benc Štuka (ur), *Kakodijete govori? Razvoj govora i jezika, najčešći poremećaji jezično-govorne komunikacije djece redškolske dobi*, 19-27. Zagre: Planet Zoe.
- Bjelić, M. i Đoković, S. (2023). Odnos artikulacije i oralne praksije kod dece oštećenog sluha predškolskog uzrasta. U: *Zbornik rezimea: Dani defektologa Srbije, stručno-naučna konferencija sa međunarodnim učešćem; Zlatibor 16-19. februara*, 44-44. Društvo defektologa Srbije.
- Bilibajkić, R. (2016). Prepoznavanje artikulaciono-akustičkih odstupanja glasova u patološkom govoru. Doktorska disertacija. Elektrotehnički fakultet, Univerzitet u Beogradu.
- Čolić, G. i Savić, J. (2023). Učestalost poremećaja artikulacije kod dece školskog uzrasta. *ALOPS 23: Vunerabilnost savremenog doba: pojedinac i porodica, Zbornik rezimea međunarodnog naučnog skupa; Beograd 30. novembra – 1. decembra*, str.81. *Visoka škola socijalnog rada*.
- Dobrota-Davidović, N. i Čalasan, S. (2018). Status of orofacial musculature and articulation in children who stutter. *Biomedicinska istraživanja*, 9(2), 187–195.
- Golubović, S. i Čolić, G. (2010). Artikulacione sposobnosti dece predškolskog uzrasta. *Specijalna edukacija i rehabilitacija*, 16(2), 301-315.
- Đurić Zdravković, A., Ranković, S., Japundža Milisavljević, M. i Gagić, S. (2017). Artikulacija glasova kod učenika s cerebralnom paralizom i intelektualnom ometenošću. *Specijalna edukacija i rehabilitacija*, 16(2), 131-147.
- Jovičić, S. T. (1999). *Govorna komunikacija: fiziologija, psihoakustika i percepcija*. Beograd: Nauka.
- Kostić, Đ., Vladisavljević, S. i Popović, M. (1983). *Testovi za ispitivanje govora i jezika*. Beograd: Zavod za udžbenike i nastavna sredstva.
- Mihajlović, B., Cvjetičanin, B., Veselinović, M., Škrbić, R. i Mitrović, S. M. (2015). Articulation of speech sounds of Serbian language in children aged six to eight. *Medicinski pregled*, 68(7-8), 240-244.
- Narayanan S., Vijayan K., Vastare Guruprasad M., Prabhu P P. & Barman A. (2022). Oral and Verbal Praxis in Impaired Language Learners. *Percept Mot Skills*, 129(1): 33-46.

- Namasivayam, A. K., Shin, H., Nisenbaum, R., Pukonen, M. & van Lieshout, P. (2023). Predictors of Functional Communication Outcomes in Children With Idiopathic Motor Speech Disorders. *Journal of Speech, Language, and Hearing Research*, 1-16.
- Punišić, Č., Subotić, M. i Čabarkapa, N. (2009a). The articulatory-acoustic and auditive aspect of sound deviation in pathological articulation. In: *Speech and Language, 3rd International Conference on Fundamental and Applied Aspects of Speech and Language, Jovičić S. and Sovilj M. (Eds). Proc., Belgrade, 151-158.*
- Punišić, Č., Subotić, M. i Čabarkapa, N. (2009b). Stability of articulatory-acoustic characteristics in fricatives of the serbian language. *Speech*, vol. XXVI(2).
- Punišić, S. (2012). Artikulaciono-akustički i auditivni aspekt odstupanja glasova u patološkom govoru. Doktorska disertacija. Univerzitet u Beogradu.
- Ristić, I., Jolović, T. i Čolić, G. (2023). Artikulacione sposobnosti kod dece oštećenog sluha. *ALOPS 23: Vunerabilnost savremenog doba: pojedinac i porodica, Zbornik radova međunarodnog naučnog skupa; Beograd 30. novembra – 1. decembra*, 183-197. *Visoka škola socijalnog rada.*
- Stevanović, D. (2021). Neurorazvojni poremećaji u međunarodnoj klasifikaciji bolesti, 11 izdanje (MKB-11): pregled. *Engrami*, 43(1), 50-69.
- Tasić, R., Kekuš, D., Stanislavljević, S. i Antić, G. (2019). Javnozdravstveni značaj poremećaja izgovora glasova kod dece predškolskog uzrasta. *Sestrinska reč*, 22(78), 19-23.
- Torres, F., Fuentes-López, E., Fuente, A. & Sevilla, F. (2020). Identification of the factors associated with the severity of the speech production problems in children with comorbid speech sound disorder and developmental language disorder. *Journal of Communication Disorders*, 88, 106054.
- Vasić, S. (1971). *Razvitak artikulacije kod dece na uzrastu od tri do devet godina*. Beograd: Naučna knjiga.
- Vladislavljević, S. (1997). *Patološki nerazvijen govor dece*. Beograd: Zavod za udžbenike i nastavna sredstva.
- Vuković, M. i Vuković, I. (2010). Procena oralne praksije kod dece sa razvojnom disfazijom. *Beogradska defektološka škola*, (1), 143-150.
- Vuletić, D. (1987). *Govorni poremećaji, izgovor*. Zagreb: Školska knjiga.
- Vuletić, D. (1990). *Test artikulacije*. Zagreb: Fakultet za defektologiju Sveučilišta u Zagrebu.
- World Health Organization. (2020). *International Classification of Diseases for Mortality and Morbidity Statistics (11th rev.)*.

Гордана Р. ЧОЛИЋ

Универзитет у Приштини са привременим седиштем у Косовској  
Митровици, Учитељски факултет, Лепосавић, Србија

Миљан Д. МИЉКОВИЋ

Универзитет у Приштини са привременим седиштем у Косовској  
Митровици, Учитељски факултет, Лепосавић, Србија

Јована П. ЈАЊИЋ

Интернационална ИПС школа, Београд, Србија

## ПОВЕЗАНОСТ РАЗВОЈНОГ ПОРЕМЕЋАЈА АРТИКУЛАЦИЈЕ И ОРАЛНЕ ПРАКСИЈЕ

**Резиме:** Поремећај артикулације је развојни поремећај који се манифестује у раном развојном периоду. Може настати због примарног поремећаја као што су анатомска одступања и сензорни поремећаји, али могу и постојати без неког јасног узрока као специфични поремећај артикулације, везујући се најчешће за незрелост оралне праксије. Циљ рада је да се утврди учесталост поремећаја артикулације и његова веза са оралном праксијом код деце предшколског узраста. Узорак су чинила деца предшколског узраста, оба пола, типичног развоја ( $N=60$ ). Квалитет изговора гласова утврђиван је на основу Тријажног артикулационог теста, док је орална праксија испитана коришћењем Теста оралне праксије. Утврђено је да велики број испитане деце има поремећај у изговору једног гласа или више гласова. Утврђена је статистички значајна повезаност између незреле оралне праксије и поремећаја артикулације ( $\rho=0.364$ ;  $p=0.004$ ). Иако постоји значајна повезаност поремећаја артикулације и незреле оралне праксије, без процене других могућих узрока не може се са поузданошћу тврдити да је незрела орална праксија узрок развојног поремећаја артикулације.

**Кључне речи:** развојни поремећај, поремећај артикулације, орална праксија, предшколски узраст.