

REVIEW

PHONOLOGICAL AWARENESS IN CHILDREN WITH DEVELOPMENTAL LANGUAGE DISORDER

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Key words: developmental language disorder, phonological awareness, typical language development, children***Correspondence:** Mile Vukovic. University in Belgrade, Faculty for Special Education and Rehabilitation, Belgrade, Republic of Serbia. E-mail: mvukovic@fasper.bg.ac.rs**Received:** 21-Dec-2021; **Revised:** 18-Mar-2022; **Accepted:** 20-Mar-2022; **Published:** 25-Jun-2022**Copyright:** © 2022. Mile Vukovic, Mira Jovanovska, Lana Jerkic Rajic. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited.**Competing Interests:** The author have declared that no competing interests**Abstract**

Children with developmental language disorder have impaired developmental pattern of language structure. Literature data speak in favor of delay and/or difficulties in development of phonological, lexical, morphological and syntactic structure, but the nature of developmental language disorder (DLD) has still not been elucidated. The aim of this paper was to present and analyze data about phonological awareness in children with DLD based on a systematic literature review. Also, we wanted to point out some methods of assessment and stimuli/encouragement in development of phonological abilities. The research presented in the analyzed literature have shown that current knowledge regarding phonological awareness in children with DLD is mainly obtained from comparative studies of children with developmental language disorder and children with normal language development. A large number of results has revealed that different components of phonological awareness in children with DLD are less developed compared to their peers with typical development. Studies have also presented current assessment techniques and importance of phonological awareness preventive stimulation programs, which are an important indicator/parameter for the development of reading and writing as well as for onset of impairments in learning these skills.

ПРЕГЛЕД НА ЛИТЕРАТУРА

ФОНОЛОШКА СВЕСНОСТ КАЈ ДЕЦА СО РАЗВОЈНО ЈАЗИЧНО НАРУШУВАЊЕ

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Клучни зборови: развојно јазично нарушување, фонолошка свесност, типичен јазичен развој, деца***Кореспонденција:** Миле Вуковиќ. Белградски универзитет, Факултет за специјална едукација и рехабилитација, Србија. E-mail: mvukovic@fasper.bg.ac.rs**Примено:** 21-декр-2021; **Ревидирано:** 18-мар-2022; **Прифатено:** 20-мар-2022; **Објавено:** 25-јун-2022**Печатарски права:** ©2022 Миле Вуковиќ, Мира Јовановска, Лана Јеркиќ Рајиќ. Оваа статија е со отворен пристап дистрибуирана под условите на нелокализирана лиценца, која овозможува неограничена употреба, дистрибуција и репродукција на било кој медиум, доколку се цитираат оригиналниот(ите) автор(и) и изворот.**Конкурентски интереси:** Авторот изјавува дека нема конкурентски интереси.**Извадок**

Децата со развојно јазично нарушување имаат изменет образец на развојот на јазичната структура. Податоците од литературата сведочат во прилог на доцнење и/или абнормалности во развојот на фонолошката, лексичката, морфолошката и синтаксичката структура, во природата на развојното јазично нарушување (РЈН) сеуште е непозната. Цел на овој труд е врз основа на преглед на литература, на систематски начин да се прикажат и анализираат податоци за фонолошката свесност кај децата со РЈН. Исто така сакавме да истакнеме некои методи на проценка и поттикнување на развојот на фонолошките способности. Резултатите од анализата на податоци од литературата покажуваат дека современите сознанија за фонолошката свесност кај децата со РЈН воглавно потекнуваат од компаративните студии на достигнувања на децата со развојнојазично нарушување и деца со типичен развој. Поголемиот број резултати покажуваат дека различните компоненти на фонолошка свесност кај децата со РЈН се развиени во помала мерка во споредба со нивните врстници со типичен развој. Исто така, прикажани се актуелните техники на проценка и истакнато е значењето на превентивните програми за поттикнување на развојот на фонолошката свесност, која претставува важен показател на развојот на читање и пишување и покава на пречки во учењето на овие вештини.

Introduction

Phonological awareness is the conscious awareness of the phonological structure of words in one's language which along with phonological representation presents a unique construct.¹ The concept of phonological representation is an abstract one and in a broader sense it means storage of phonological information in the long-term memory.² There is considerable debates in the scientific literature about distinctive features of phonological processes. Regarding phonological abilities, no clear distinction exists in determination and usage of the terms phonemic and phonological awareness and very often they are used as synonyms in the literature. Phonemic awareness means segmenting words into phonemes and blending phonemes into words, and it is a part of the concept of phonological awareness. Phonological awareness is a wider construct than phonemic awareness.^{3,4} It is the ability to analyze and synthesize syllables and words, i.e., longer language units than phonemes, but also manipulation with phonological elements of the words. In other words, phonological awareness is defined as the ability of a child to recognize words as parts of a sentence, to recognize and reproduce words that rhyme, and to recognize syllables in a word.⁵ It is considered that phonological awareness is established when a child develops the ability to identify and reproduce words that rhyme, to identify sounds in the words and to segment a word into sounds.⁶ Its development and the development of the other components of phonological awareness are thought to be very important for children before they start going to school. However, phonologi-

cal awareness is a narrower construct than meta-linguistic awareness.^{3,4} Phonological skills include usage of phonological representations along with consciousness and metacognitive skills by fast and serial identification and working and short-term memory.⁷

Until recently, developmental language disorder (DLD) has been referred to as specific language impairment (SLI) while in the past this type of impairment was called developmental dysphasia. It is defined as a developmental language disorder found in children without intellectual disabilities, visible cerebral pathology, sensory and serious motor disorders.⁸ Diagnosis is established in children who present with at least a 12-month expressive language delay, a 6-month receptive language delay and in situations when there is a 12-month difference between mental and language maturity. In addition, in children with DLD the intelligence coefficient is above 85, which means it ranges from average to above the average intellectual abilities.⁹

Children with developmental language disorder exhibit altered developmental patterns of particular linguistic categories, that is, disharmonious language development. In fact, there is a significant delay and abnormalities in the development of certain elements of language structure. Children manifest lexical deficits by expressing themselves with shorter words; they have restricted vocabulary and evident difficulties in using polysyllabic words. Grammar deficits are manifested at the level of morphology and syntax. Phonological disorders are manifested by making reversal, inversion and metathesis

of phonemes in the words, and very often a larger number of sounds are either spoken or used.¹⁰

The aim of this study was to make a literature review and analyses of empirical data about phonological awareness in children with developmental language disorder (DLI). Also, current techniques for assessment of phonological awareness as well as methods of stimulation the development of phonological awareness in these children have been presented.

Material and methods

A systematic literature search was made by using the following databases: Google Scholar, KoBSON, Cross Reference and PubMed. The following keywords were used: *developmental language disorder, specific language disorder, phonological disorder, phonological deficits in children with specific language disorder, assessment of phonological abilities.*

Phonological awareness in children with DLI

In order to better understand the phenomenon of DLI, different assumptions were formulated so as to describe syntactic, phonological, semantic and speech disorders. Literature review has shown that nowadays there has been considerable debate about the most appropriate theoretical approach regarding the nature of developmental language disorder. As a result, several hypotheses were formulated. Some of them speak in favor of the existence of various deficits such as deficit in the specialized module for learning a language, disorders in auditory perception, memo-

ry deficit and disorders in the domain of information processing.^{11,12}

Studies that investigated phonological awareness in children with disorders in the language development showed that these children performed significantly weaker results in different types of tasks of phonological awareness than children with typical language development (TLD). For example, in the study conducted by Milosevic and Vukovic (2018) statistically significant differences were observed in identification and production of rhyme between children with DLD and children with TLD.¹³ Having in mind that the ability of finding words that rhyme is one of the earliest components of phonological awareness which is developed in children, the authors made a comparative analysis where they compared children with DLD with their peers with TLD. They found out that children with DLD had weaker performance than their peers with TLD. The authors concluded that the ability of identifying and production of rhyme is an important indicator of the phonological development, but also an important component of pre-reading skills.¹³

Certain empirical data show that children with DLD in preschool period have not developed ability of more complex phonological word processing. Therefore, children achieve better results in simpler tasks relying solely on their working memory (synthesis and segmentation at the level of phonemes and syllables) and weaker performance in more complex tasks (deleting phonemes, substitution of phonemes, production of rhyming words).¹⁴

Colic (2015) confirmed that preschool children with DLD diagnosis showed statistically significantly worse results on complex elements of phonological awareness (rhyming, deleting phonemes, substitution of phonemes, segmentation, synthesis of phonemes, syllables and words) when compared to children with TLD. However, the author emphasized that children with DLD successfully accomplished tasks that required simpler aspects of phonological processing (analysis and synthesis of words in/to syllables and words) probably owing to the developed phonological memory, although they showed poorer results compared to children with TLD.³

In a study by Australian authors, a more detailed comparative analysis was made between phonological awareness in children with DLD and children with TLD. Children with DLD were compared to their peers with TLD matched for age (one subgroup) and matched for receptive language skills (the other subgroup). The authors noticed that children with DLD were more successful in the tasks of naming speed than younger children matched for linguistic skills, but still less successful than their peers with TLD. As for the tasks of phonological short-term memory and working memory, as well as the tasks of phonological representation, children with DLD had weaker performance than both subgroups of typically-developing children.¹⁵

Farquharson et al. (2014) in their study demonstrated that children with DLD had the same pattern of phonological processing as the children without language impairment regarding tasks of repeating and deleting sounds in the words and non-

words, although children with DLD performed less well than children with TLD. Children with DLD were very successful in the task of phonologically similar words and in cases when the initial and final two sounds were different. The authors concluded that the difference between typically-developing children regarding language skills and children with DLI were of quantitative rather than of qualitative character.¹⁶

In the literature, phonological and lexical influences on phonological awareness are explained by two theories. According to the first theory, in which frameworks the hypothesis of phonological deficit was formulated, children with poor phonological skills have difficulties in storing and processing sounds in words. The other theory is based on the lexical restructuring model and is focused on the role of phonemic features that enable children to discern similar words from one another. It is supposed that as the vocabulary grows an increased phonemic processing is required.¹⁶

Literature data show that some cognitive processes influence on performing language tasks in children with DLD. Some researchers think that the primary deficit in DLD is in the memory (sensory, short-term, working and long-term memory), which might explain the weaker performance in phonological awareness of children with this impairment. It is almost certain that all three memory systems are necessary for phonological processing of words. Sensory or perceptual memory stores information obtained through the senses, in this case auditory, from half a second to several seconds, whereby this piece

of information is not transformed and processed. Having in mind these assumptions, some authors believe that children with DLD probably have the same achievements in the task of identifying the initial sound in a word as children with TLD since this task does not depend on memory function.^{17,3} More complex tasks of phonological awareness, such as eliminating the initial phoneme in a word, require a good sensory short-term and long-term memory and, hence, children with DLD perform less well in these tasks than children with TLD due to phonological memory deficit.

In spite of the large number of studies conducted on phonological memory, lexical approach and phonological awareness in children with DLD, there is a lack of comparative studies of these skills in order to determine which one is the most developed and which one is affected. Such findings might contribute in creating targeted intervention plans, but also in reducing the negative impact on the development of reading in children with DLD due to deficit of the mentioned skills.

Numerous studies have emphasized the correlation of phonological awareness with subsequent literacy difficulties in children. One of them is the longitudinal study of Zourou et al. (2010) presenting interesting results.¹⁸ The authors found improved phonological awareness in their examinees after certain time interval. However, the fragile nature of phonological awareness was also shown as well as the fact that children with DLD failed to cope with the acquire-reading and spelling skills that require a high level to manipulate phonemes.¹⁸

Research conducted in Serbia has revealed a high correlation between phonological ability expressed through phonological awareness and syntactical awareness with initial reading.¹⁹ A recent study conducted in the Serbian-speaking area has also shown that children with difficulties in reading have weaker phonological awareness than children with typical-reading development.²⁰ Other studies have also indicated the risk of impairment in literacy acquisition due to limited phonological awareness.²¹ It is considered that children with reading problems have weaker phonological awareness compared to children with normal reading development. In spite of the fact that phonological awareness is not fully developed before mastering reading and writing, there is still no precise answer to the question to what level phonological awareness in children is developed before they master these skills.²² The development of reading skills, as we all know, requires much more activity than only encoding (transformation of sounds into letters) and decoding (transformation of letters into sounds).

The study of Ramus et al. (2013) examined the phonological abilities in children with DLD and children with dyslexia by using a broad battery of tests. It was found out that children with DLD did not necessarily have phonological deficit or reading difficulties, and that the nature of phonological disorder was different in these two groups of children. In other words, the authors of this study suggest that DLD and developmental dyslexia do not necessarily appear as comorbidities, i.e., they can appear independently of each other. Children with DLD show impairments

in both phonological representations and phonological skills at the same degree, whereas children with dyslexia show significant disorders in phonological skills.²³ Also, the authors think that deficits in phonological representation are rather a result of involving cognitive skills that are associated with phonological representation than of the representation themselves. This means that there is a relationship between impairments in phonological representations with deficits in focusing attention, short-term and long-term memory, meta-cognitive skills, understanding instructions, etc.²³

Assessment of phonological awareness

Some of the tasks that assess phonemic and phonological awareness are extracting the initial sound in a word, extracting the final sound in a word, finding a word in a group of words that differs from the others by the initial or final phonemes, segmentation of one word into constituent phonemes and syllables, blending phonemes into syllables and words.^{4,24} Tasks for assessment of phonological awareness include finding rhyming words, i.e., identifying rhyming pairs of words in a group of words or providing a rhyme with a given word. The analysis of these tasks suggests no clear boundary between those that measure or assess phonemic awareness from those that assess phonological awareness. In the English speaking countries, phonological awareness in children is assessed by Phonological Awareness Test-2 – PAT-2 (from 5 to 9.11 years), Sutherland Phonological Awareness Test – Revised SPAT-R, Comprehensive Test

of Phonological Processes – CTOPP and Pre-Literacy Skills Screening – PLSS.²⁵⁻²⁸ Also, screening tests have been developed such as Phonological Awareness Screening Test – PAST.²⁹

One of the operational models or tests of phonological awareness developed in the Serbian speaking area and is widely used is the FONT test. It consists of seven subscales: blending syllables, identifying the final syllable, recognizing rhyme, phoneme segmentation, identifying the final phoneme, phoneme substitution and phoneme elimination/deletion. Having in mind that the validation of the test is still an ongoing process, the authors have suggested framework norms for children aged five to nine years.⁴ However, when they applied this test in children with TLD, it was not possible to make a general division into less and more demanding tasks with which phonological awareness was examined in children with speech and language disorders. It was assumed that the majority of tests would be more difficult to be performed by children with language disorders regardless of their age.³⁰

One of the instruments that is used in phonological awareness in children is the Emerging Literacy & Language Assessment - ELLA.³¹ ELLA is an American test translated and adjusted for the research needs in the Serbian language and where three important features (length of words, frequency of words, combination of vowels and consonants in words) have been taken care in order to find adequate substitutions for the original text that would match the Serbian language. It consists of three parts, each of which contains several scales. The first part refers to examination of phonological

awareness, the second examines decoding and the third is intended for examination of memory.¹⁹

One valuable method for testing naming speed in children with DLD is PredČiP test aimed at a more detailed inspection of phonological skills in children with DLD.³² PredČiP is a test for evaluation of pre-skills of reading and writing, i.e., a screening test for assessment of children's linguistic readiness to master initial academic skills. This test contains tasks for assessment of phonology, phonological memory, pragmatics and visual perception.³³

Stimuli/encouragement for the development of phonological ability

It is generally accepted that phonological awareness and naming speed are good predictors of reading and writing in children with normal development of speech and language skills. Naming speed is important for the development of fluent reading (holistic word recognition) and for reading comprehension and is associated with reading speed. Good skills in naming speed are a good predictor of later recognition of graphemes. Results obtained in studies discussing naming speed show that children with DLD significantly slower perform task of this kind than children with TLD. Empirical evidence show that naming speed deficit is associated with reading deficit, and hence, it is believed that the assessment of these skills in preschool children may be of preventive character. Therefore, some researchers of language disorders in children emphasize the importance of therapeutic program contents in children with DLD. Taking into account their own research, state that treatment program of chil-

dren with DLD should contain a larger number of tasks aimed at development of naming speed skills.³²

Finally, during the development of the mother tongue structure individual differences are mainly seen at the level of language expression, which is important since individual deviations in the normal development of language expression should not be characterized as delayed development or language disorder. Knowledge about any problems in phonological awareness has resulted in experts' increased interest in creating programs directed to encouraging the development of phonological abilities in typically-developing children, but also in children who show deficits in speech and language development. Some authors suggest targeted programs that would encourage development of phonological awareness, which would be performed two to three times per week in sessions of 10 to 30 minutes during preschool period. Also, it is recommended to perform these activities throughout plays/games and in accordance with the age.³⁴

Conclusion

Literature review has shown that former knowledge regarding phonological awareness in children with DLD is primarily a result of comparative studies involving these children and children of normal language development. A large number of studies has demonstrated that children with DLD have weaker performance in phonological awareness tasks, especially in the more complex ones. According to empirical evidence, simpler types of tasks such as analysis and synthesis of sounds and syllables in words, do

not pose difficulties for children with DLD. Further analysis of empirical data has shown that the delayed phonological awareness development in preschool children is associated with difficulties later in acquiring academic skills, especially the reading skill.

For the assessment of phonological ability different types of tasks are being used and they measure different components comprised by phonological awareness. Literature review has revealed that the FONT test is a valuable tool for assessment of phonological ability in children whose mother tongue is Serbian having in mind the vast amount of empirical findings based on the application of this test, mainly in children with TLD. Also, important instruments for examination of phonological abilities are the PredČip and Emerging Literacy & Language Assessment (ELLA) tests, which have been used in both, children with DLD and children with delayed/slower progression in initial reading.

Finally, literature data give evidence about risks that exist in children with phonological awareness disorders regarding their mastering of school skills, that is, reading and writing. Given the fact that children with reading difficulties have delayed phonological awareness development, it is assumed that intervention during preschool period could be of crucial importance to prevent or reduce literacy difficulties.

References

1. Torgesen J K, Wagner RK, Rashotte CA. Longitudinal studies of phonological processing and reading. *Journal of Learning Disabilities* 1994;27(5).
2. Sutherland D, Gillon GT. Assessment of phonological representations in children. *Language Speech and Hearing Services in Schools* 2005; 36: 294–308.
3. Čolić G. Phonological awareness of children with developmental dysphasia and children with typical language development. *Specijalna Edukacija i Rehabilitacija* 2015;14(2): 155–168.
4. Subotić S. Konstrukcija testa fonološke svijesti na srpskom jeziku. *Primenjena Psihologija*, 2011;4(2): 127–149.
5. Ivšac Pavliš J, Lenček M. Fonološke vještine i fonološko pamćenje: Neke razlike između djece urednoga jezičnoga razvoja, djece s perinatalnim oštećenjem mozga i djece s posebnim jezičnim teškoćama kao temeljni prediktor čitanja. *Hrvatska Revija Za Rehabilitacijska Istraživanja*, 2011; 47(1):1–16.
6. Milošević N. Fonološka sposobnost i fonološki poremećaji. *Visoka škola socijalnog rada*. 2019
7. Ramus F, Marshall CR, Rosen S, Van Der Lely H K J. Phonological deficits in specific language impairment and developmental dyslexia: Towards a multidimensional model. *Brain* 2013;136 (2): 630–645.
8. Vuković M. Afaziologija (Četvrto izdanje). *Udruženje logopeda Srbije* 2016.
9. Leonard L B. *Children with Specific Language Impairment*. MIT Press. 1998
10. Vuković M. Afaziologija (Peto izdanje). *Planeta print* 2019.

11. Bishop DVM. What causes specific language impairment in children? *Current Directions in Psychological Science* 2006; 15(5): 217–221.
12. Vandewalle E, Boets B, Ghesquière P, Zink I. Development of phonological processing skills in children with specific language impairment with and without literacy delay: A 3-year longitudinal study. *Journal of Speech, Language, and Hearing Research* 2012; 55(4): 1053–1067.
13. Milošević N, Vuković M. Awareness of rhyme in preschool children with specific language impairment and without language difficulties. *Croatian Journal of Education* 2018; 20(2): 237–257.
14. Šcapec K, Kuvač Kraljević J. Rana pismenost kod djece s posebnim jezičnim teškoćama (PJT). *Hrvatska Revija za rehabilitacijska istraživanja* 2013; 49: 120–134.
15. Claessen M, Leitão S, Kane R, Williams C. Phonological processing skills in specific language impairment. *International Journal of Speech-Language Pathology* 2013; 15(5), 471–483.
16. Farquharson K, Centanni TM, Franzluebbers C E, Hogan TP. Phonological and lexical influences on phonological awareness in children with specific language impairment and dyslexia. *Frontiers in Psychology* 2014; 5: 1–10.
17. Čolić G, Golubović S. Procena nekih elemenata fonološke svesnosti kod dece sa razvojnom disfazijom. U S. Kaljača i M. Nikolić (Ur.), *Unapređenje kvalitete života djece i mladih. Udruženje za podršku i kreativni razvoj djece i mladih i Univerzitet u Tuzli, Edukacijsko-rehabilitacijski fakultet*. 2014.
18. Zourou F, Ecalte J, Magnan A, Sanchez M. The fragile nature of phonological awareness in children with specific language impairment: Evidence from literacy development. *Child Language Teaching and Therapy* 2010; 26(3): 347–358.
19. Čolić G, Vuković M. Doprinos fonološke i sintaksičke svesnosti u početnom čitanju. *Psihološka Istraživanja* 2018; 21(1): 75–90.
20. Milankov V, Golubović S, Krstić T, Golubović Š. Phonological awareness as the foundation of reading acquisition in students reading in transparent orthography. *International Journal of Environmental Research and Public Health* 2021; 18(10). <https://doi.org/10.3390/ijerph18105440>
21. McNamara JK, Van Lankveld J, Vervaeke SL, Gutnecht N. An exploratory study of the associations between speech and language difficulties and phonological awareness in preschool children. *Journal of Applied Research on Learning* 2010; 3(7): 1–9.
22. Dich N, Cohn A C. A review of spelling acquisition: Spelling development as a source of evidence for the psychological reality of the phoneme. *Lingua* 2013; 133: 213–229.
23. Ramus F, Ahissar M. Developmental dyslexia: The difficulties of interpreting poor performance, and the importance of normal performance. *Cognitive Neuropsychology* 2012; 29 (1–2), 104–122.

24. Čolić G. Rani pokazatelji disleksije i disgrafije [doktorska disertacija, Univerzitet u Beogradu]. NaRDuS. 2018
25. Robertson C, Salter W. Phonological awareness test - 2:NU. Linguistics. 2018
26. Neilson R. Sutherland Phonological Awareness Test: Revised. Language Speech and Literacy Services. 2003
27. Wagner R K, Torgesen J K, Rashotte CA, Pearson NA. Comprehensive test of phonological processing: CTOPP. Pro-ed Austin, TX. 1999.
28. Crumrine L, Lonigan H. Pre-literacy Skills Screening: PLSS. PRO-ED. 1999.
29. Kilpatrick D. Equipped for reading success: A comprehensive, step-by-step program for developing phonemic awareness and fluent word recognition. Casey & Kirsch Publishers 2016.
30. Golubović S, Ječmenica N, Subotić S, Kobac D. Development of phonological awareness in six to eight years old children. *Primenjena Psihologija* 2019;12(2):157-182.
31. Wiig E, Secord W. Emerging literacy and language assessment (ELLA). Super Duper Publications 2006.
32. Milošević N, Vuković M. Rapid naming in children with specific language impairment and in children with typical language development. *Journal of Special Education and Rehabilitation* 2017; 18(1-2): 42-54.
33. Kuvač Kraljević J, Lenček M. Test za procenjivanje predvještina čitanja i pisanja (PredČiP test). Naklada Slap 2012.
34. Nikolić M, Milenković S. Predlog programa za podsticanje razvoja predveština čitanja u predškolskoj ustanovi. *Inovacije u Nastavi* 2019; 32(1): 125-138.