Original Article

Artigo Original

Phonological sensitivity to rhyme and alliteration in preschoolers with phonological disorder

Sensibilidade fonológica para rima e aliteração em pré-escolares com transtorno fonológico

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Keywords

Speech disorders
Child, preschool
Articulation disorders
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Child language

ABSTRACT

Purpose: To characterize the performance of a group of preschool children with phonological disorder in metaphonological tasks of identification and production of rhyme and alliteration. **Methods:** Participants were 56 preschool children of both genders, with ages between 4 years and 0 months and 6 years and 11 months, distributed into: Research Group, comprising 28 preschoolers with phonological disorder, and Comparison Group, comprising 28 preschool children with normal speech and no complaints related to oral communication. The following testes were applied: Child Language Test ABFW – Phonology, tasks of identification and production of rhymes and alliteration of the Phonological Awareness Test: Instrument of Sequential Assessment – CONFIAS. Data were statistically analyzed. **Results:** Preschoolers with phonological disorder had worse overall phonological sensitivity performance. In both groups, children had better scores with the segment of alliteration, and there was no difference in performance between the tasks of identification and production. With rhyme segments, preschoolers showed better performance in the identification task, while with alliteration segments they showed better performance in the production task. Rhyme production was the most difficult task, and alliteration production was the easiest. **Conclusion:** Preschoolers with phonological disorder showed worse performance in phonological sensitivity than children with normal speech. However, both groups showed better performance with the alliteration segment, and showed no differences between identification and production tasks.

Descritores

Distúrbios da fala
Pré-escolar
Transtornos da articulação
Transtornos da linguagem
Linguagem infantil

RESUMO

Objetivo: Caracterizar o desempenho de um grupo de pré-escolares com transtorno fonológico em tarefas metafonológicas de identificação e produção dos segmentos de rima e aliteração fonológica. **Métodos:** Participaram 56 pré-escolares de ambos os gêneros, na faixa etária entre 4 e 6 anos de idade, distribuídos em: Grupo Pesquisa, composto por 28 pré-escolares com Transtorno Fonológico; e Grupo de Comparação, composto por 28 pré-escolares com fala normal e sem quaisquer queixas relacionadas à comunicação oral. Foram aplicados: Teste de Linguagem Infantil ABFW - Fonologia; tarefas de identificação e produção de rimas e aliterações, contidas no Teste de Consciência Fonológica: Instrumento de Avaliação Sequencial – CONFIAS. Os dados foram analisados estatisticamente. **Resultados:** Os pré-escolares com transtorno fonológico mostraram pior desempenho geral de sensibilidade fonológica. Em ambos os grupos, os pré-escolares tiveram mais acertos com o segmento de aliteração e não houve diferença de desempenho entre as tarefas de identificação e produção. No segmento de rima, os pré-escolares apresentaram melhor desempenho na tarefa de identificação. Já no segmento de aliteração, apresentaram melhor desempenho de produção. A produção de rima foi a tarefa mais difícil e a produção de aliteração foi a tarefa mais fácil. **Conclusão:** Pré-escolares com transtorno fonológico têm pior desempenho em sensibilidade fonológica do que crianças com fala normal. No entanto, ambos os grupos apresentam melhor desempenho com o segmento de aliteração e não possuem diferenças entre tarefas de identificação e produção.

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Study carried out at the School of Speech-Language Pathology and Audiology, Universidade de Ciências da Saúde de Alagoas – UNCISAL – Maceió (AL), Brazil, and at Universidade Federal de São Paulo – UNIFESP – São Paulo (SP), Brazil.
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INTRODUCTION

The different phases of language acquisition and development require perceptual abilities that contribute to the identification of patterns of the language to which the child is exposed. Identification of such patterns is characterized by sensitiveness to relevant information such as the distribution of speech segments[1]. Therefore, one can assume that from the earliest phases of language development, the child is sensitive to acoustic cues provided by the tonic vowel of the word (or the core of the stressed syllable in the case of rhyme), and to characteristics of the initial syllables and phonemes of the words. In the same way that acoustic cues assist the identification of words in connected speech and direct the phonological acquisition, a few years later this sensitivity will allow the identification of segments of speech in an increasingly conscious manner.

Metacognitive conditions of subtraction, summation, transposition, and identification of syllables or phonemes are not observed in the early phases of development. These conditions will be demanded closer to the literacy period. During the preschool and early literacy years, the ability of children to pay attention to spoken words and analyze them in various segments is enhanced[2]. The ability to consciously manipulate the segments of connected speech has been widely investigated and accepted as the metalinguistic knowledge that children exhibit at the syllabic, intra-syllabic and phonemic levels of words. Most of the studies name this ability as phonological awareness[2-12].

Some studies have investigated the phonological awareness skills in children with phonological disorders. These studies are based on the assumption that the phonological alteration may result from deficits in organization and representation of speech sounds, which may influence the performance of tasks of conscious manipulation of sounds[7,9,13-15]. The studies on phonological awareness in children with phonological disorder, in fact, have found lower meta-phonological performance when compared to their peers with typical speech development[3,4,6-9,12,14].

However, little is known about how children with phonological disorder develop the ability to manipulate speech sounds if, throughout the development, they have failed to reach the expected phonological rules for each age. Although not numerous, some studies sought to understand how the development of early phonological awareness skills occurs in children with phonological disorder, specifically investigating their performance on tasks with rhymes and alliteration[14,16].

In this study, phonological sensitivity was considered as the ability to identify and manipulate sound segments of greater length or from the initial part of the word. Both tasks renounce the domain of meta-phonological identification abilities of smaller and intra-syllabic segments[17]. We investigated the sensitivity to rhyme between words (rhythm) and similarities (or differences) at the beginning of the word. Moreover, as the performance of phonological sensitivity may vary depending on the type of task according to differences in their linguistic-cognitive and perceptual demands[18], the activities proposed in this study (identification and production) were also analyzed according to the segments rhyme and alliteration.

The study of phonological sensitivity in preschoolers with phonological disorder is justified when considering that: (1) phonological sensitivity is a predictor of meta-phonological skills at the phonemic level, which, in turn, are important to the literacy process; (2) phonological alteration, still present at this phase, may also negatively influence this process.

Thus, the present study aimed to characterize the performance of a group of preschoolers with phonological disorder in meta-phonological tasks of identification and production of segments of phonological rhyme and alliteration.

METHODS

The study was approved by the Research Ethics Committee of the Universidade Estadual de Ciências da Saúde de Alagoas (UNCISAL), under number 718/07, and the Universidade Federal de São Paulo (UNIFESP), under number 0300/09. This consisted on a transversal and observational study, developed at the Treatment Unit in Speech-Language Pathology Professor Jurandir Bóia Rocha (UTFONO), School of Speech-Language Pathology and Audiology of UNCISAL, and at the municipal and kindergarten school Parque Monsenhor Luiz Barbosa.

We evaluated 56 preschoolers, 32 boys and 24 girls, aged from 4 years and 0 months and 6 years and 11 months, enrolled in preschools in the public system of Alagoas. The children were divided into two groups: Research Group (RG), composed of 28 preschoolers with phonological disorder; and Comparison Group (CG), composed of 28 preschoolers with normal speech and no complaints related to oral communication, paired with preschoolers from the GP, in a 1:1 ratio, by age and gender. The groups were similar in terms of education.

Despite not having been used as a study variable, the severity of phonological disorder was calculated using the Percentage Consonants Correct – PCC[19] was used to better characterize the sample and showed variation from mild to severe.

For the composition of the RG, the following inclusion criteria were established: age range from 4 years and 0 months and 6 years and 11 months; enrollment in early childhood education; normal hearing for speech; no alterations on global development including language; normality of speech organs; and phonological disorder. The CG inclusion criteria were the same of the RG, except for the presence of phonological disorder. The following exclusion criteria were established for both groups: current or previous speech-language intervention; no parent or guardian consent to participate in the study.

All assessments were individually conducted and in a silent room. The assessments of the RG were conducted at UTFONO. The assessments of the CG were conducted

at the school of each participant. The disposition and pace of performance of the children were respected during data collection.

To ensure the inclusion criteria, the 56 preschoolers participated in the process of sample selection which consisted on completing the Data Collection Form, Scale for Child Development – Denver I development screening, and audiological evaluation. Only preschoolers from the RG underwent structural and functional assessment of Motor Oral System (OMS) with ENT examination. To identify the speech disorders, all preschool children underwent phonological tests performed by the Nomination and Imitation tasks of the Child Language Test ABFW - Phonology[20].

The assessment of phonological sensitivity was achieved by implementing the tasks of identification and production of rhyme and alliteration contained in test "Phonological awareness: sequential evaluation tool – CONFIAS"[21]. The following tasks were selected: identification of initial syllable (IIS), production of a word that starts with the same syllable (PSI), rhyme identification (RI), and rhyme production (PR). These tasks allowed the observation of the performance of preschool children in relation to the segment tested (alliteration or rhyme) and to the required task (identification and production). The analysis of phonological sensitivity was made by the sum of the four tasks. The analysis of the rhyme was made by the sum of activities of rhyme identification (RI) and rhyme production (RP); the alliteration analysis was made by the sum of identification of initial syllable (IIS) and production of a word that begin with same syllable (PSI); the identification analysis was made by the sum of rhyme identification (RI) and identification of initial syllable (IIS); the production analysis was made by the sum of the tasks of rhyme production (RP) and production word that begin with the same syllable (PSI).

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 16.0. The Mann-Whitney U test was used for the between groups comparison of phonological sensitivity. The nonparametric Wilcoxon test was applied for within-group comparison of the tested segment (rhyme and alliteration) and the required task (identification and production) in both groups. Values were considered significant at p smaller than 0.05 ($p<0.05$), with a confidence interval of 95%. The allowed beta error value was 0.01. Results are presented through tables and alpha values will be presented with up to four decimal places.

RESULTS

In both groups, children performed better on the alliteration when compared to the rhyme segment (Table 1). There was no difference between identification and production in neither of the groups (SG and CG) regarding the required task.

There were differences between RG and CG when comparing performances on the identification and production tasks for both rhyme and alliteration (Table 2). In both groups, preschoolers performed better on the task of identification of the rhyme segment. Already in the alliteration segment, preschoolers from RG and CG showed better performance on production.

Differences were observed between the production of rhyme and production of alliteration, such for RG as for CG. However, the identification tasks were similar in both groups (Table 3).

Table 1. Group performance according to task and segment

Group	Segment and task	Mean	p-value
RG	Rhyme	2.7	0.003*
	Alliteration	4.2	
	Identification	3.5	0.597
	Production	3.3	
CG	Rhyme	3.1	0.002*
	Alliteration	5.1	
	Identification	4.0	0.807
	Production	4.2	

* Significant values ($p \leq 0.05$) – Wilcoxon test
Note: RG = research group; CG = control group

Table 2. Group performance on identification and production tasks according to rhyme or alliteration

Group	Segment	Task	Mean	p-value
RG	Rhyme	Identification	2.0	0.000*
		Production	0.6	
	Alliteration	Identification	1.6	0.002**
		Production	2.8	
CG	Rhyme	Identification	2.0	0.018**
		Production	0.9	
	Alliteration	Identification	2.0	0.000**
		Production	3.2	

* Significant values ($p \leq 0.05$) – Wilcoxon test
Note: RG = research group; CG = control group

Table 3. Group performance on identification and production of alliteration and rhyme

Group	Segment	Task	Mean	p-value
RG	Identification	Rhyme	1.9	0.214
		Alliteration	1.6	
	Production	Rhyme	0.6	0.000*
		Alliteration	2.8	
CG	Identification	Rhyme	2.0	1.000
		Alliteration	2.0	
	Production	Rhyme	1.0	0.000*
		Alliteration	3.2	

* Significant values ($p \leq 0.05$) – Wilcoxon test
Note: RG = research group; CG = control group

Between-groups comparison on tasks that assessed phonological sensitivity was carried out according to the

Table 4. Between-group analyses according to segment and task

Group	Segment				Task			
	Rhyme		Alliteration		Identification		Production	
	M	SD	M	SD	M	SD	M	SD
RG	2.7	1.6	4.2	2.0	3.5	1.8	3.3	1.9
CG	3.1	1.7	5.1	1.8	4.0	2.0	4.2	1.7
p-value	0.321		0.143		0.340		0.138	

* Significant values (p≤0.05) – Mann-Whitney U test
Note: RG = research group; CG = control group; SD = standard deviation; M = mean

segment and the task required. The analysis showed no difference between RG and CG (Table 4).

Table 5. Between-group analysis on the phonological sensibility test

Group	Phonological sensibility			
	Mean	SD	Maximum	Minimum
RG	6.9	3.0	15	2
CG	8.2	2.5	13	4
p-value	0.042*			

* Significant values (p≤0.05) – Mann-Whitney U test
Note: RG = research group; CG = control group; SD = standard deviation

The results showed that phonological sensitivity was significantly different between RG and CG, with a better performance of the CG (Table 5).

DISCUSSION

The intragroup comparison of responses obtained according to task (identification and production) and segment of speech showed that, regardless of the cognitive task, both groups showed greater ease in activities involving alliteration. Previous research with children without speech disorders have also reported better performance on initial segments of speech when compared to rhyme[2,5,10,14,22,23]. Our results also indicate that the perception of these segments was similar in preschoolers with and without phonological disorders. These data are in agreement with results from previous studies with children with phonological disorder[3,6].

The better performance for alliteration may be related to school activities that tend to prioritize tasks involving the recognition of sound and first letter of words on the writing acquisition process. Preschoolers are encouraged to recall words that begin with certain sounds or syllables and to identify the initial sound and letter of his own name, of his friends, family and objects. Although rhyming activities are present in childhood educational and social settings through songs, poems, and rhymes, perhaps children have no directed attention to similarities and differences of the final segment of words. This fact could explain the results of this and previous studies.

It was expected that identification activities would be easier than those of production as the latter are more complex and require other cognitive-linguistic processes such as lexical access and vocabulary range. Both RG and CG results showed differences when comparing the types of task. No studies with children with phonological disorder were found to compare this result. However, in children without speech disorders, there was greater ease in performing tasks involving identification when compared to production[5].

On the other hand, the within-group analyses revealed different results of identification and production tasks on the two groups of preschoolers. With regard to rhyme, children performed better at identifying it than at producing it. As for the segment of alliteration, children performed better when producing than when identifying the initial syllable. As discussed in the previous paragraph, it was expected that identification tasks would induce higher accuracy than production tasks – similarly to what occurred in the rhyme segment. The better performance in rhyme identification can be directly related to the fact that it contains a greater acoustic salience in the word since it necessarily involves the nucleus of the stressed syllable.

The length of the segment is another aspect that may have contributed to the improved performance of the task of rhyme identification. On the test used for this purpose, the rhymes to be identified include, in most cases, more than one syllable. Already in the alliteration, the segment to be identified is composed only by one syllable. Most words used as test stimulus is initiated by a pre-tonic syllable (not the tonic) that is, the most salient and better perceived. Therefore, the poorer performance in the identification of alliteration – when compared to its production – may also have been influenced by the fact that the syllable to be analyzed is not the one with greater acoustic salience on the word. Thus, it is observed that the length of the segment to be analyzed and the acoustic salience of this segment are important aspects to consider when investigating the phonological sensitivity, and should also be considered on therapeutic intervention.

The RG and CG identified rhyme and alliteration in a similar way. However, the analysis performed according to production showed that it was easier for both groups to produce or evoke words with the same beginning of a given model (alliteration) than words that ended with the same sound of the model (rhyme). It was observed that the production of alliteration was easier than the production of rhyme. These results corroborate previous studies conducted with children with phonological disorders[6] and without speech disorders[24]. This difference between the production of alliteration and rhyme may be related to how the mental lexicon is accessed. This access appears to be more easily accomplished by the initial segment of the word compared to the final segment.

The current results showed that task type influences the performance of preschoolers, evidencing that phonological sensitivity can vary depending on the type of task required and according to the analyzed segment. Thus, the combination between the segment and the task can determine differences in performance. In fact, the literature indicates that different tasks require higher or lower demand for their implementation[18,25].

Intergroup analysis according to segment and task showed no difference between RG and CG. This result may suggest that the development of sensitivity to rhyme and alliteration occurs independently of phonological disorder. Thus, the results of this study suggest that phonological sensitivity tasks performed with segments of rhyme and alliteration follow a similar path of development in preschoolers with and without phonological disorder. In this sample, this route did not depend on the presence or absence of speech alteration and showed that the abilities of phonological sensitivity in preschoolers with speech disorders seem to develop on an organized and similar manner than that typically evidenced[6].

Although both groups have showed similar development for all the analysis, the comparison of overall mean accuracy for all tasks of phonological sensitivity – for the segments of rhyme and alliteration – evidenced a better performance of the CG. One might assume that despite the similar development throughout the ages, preschoolers with phonological disorder may have poorer overall performance of phonological sensitivity. This result confirms previous studies that have demonstrated the difficulties of individuals with phonological disorders to deal with the segments of rhyme and alliteration[14,16]. However, these results may also suggest that, despite poorer performance, the similar development pattern shows that stimulation for a proper phonological system restructuring may eliminate the difference found.

The poorer performance of preschoolers with phonological disorders on phonological sensitivity may be associated with the difficulty that the disorder determines on the organization and mental representation of speech sounds[7,9,13-15]. Thus, the inaccuracy of phonological representations may have influenced the performance of preschoolers. The current study showed that the difficulty in consciously manipulating the sounds may be present from the perception of larger segments such as rhyme and alliteration. These are skills that develop early and, to some extent, independently from formal instruction[2].

The detailed analysis of the results of phonological sensitivity was important to identify between-groups similarities with regard the development path of phonological sensitivity and differences in relation to the overall average performance. It is noteworthy mentioning the need to expand the study group, both of preschoolers with phonological disorder and other populations to confirm the obtained results.

CONCLUSION

In general, the group of preschoolers with phonological disorder shows poorer performance on tasks of phonological sensitivity to rhyme and alliteration when compared to the group with no speech disorder. However, they also show better responses when producing or identifying words from their initial segments than from rhyme. Similar to the group without speech disorders, the group with phonological disorders exhibits no difference between identification and production of words, regardless of the segment provided.

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