

# PHONOLOGICAL ABILITIES IN CHILDREN WITH STUTTERING

## *Habilidades fonológicas em crianças com gagueira*

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### ABSTRACT

**Purpose:** to study the phonological development characteristics of stuttering and non-stuttering children, and to investigate possible association between stuttering and phonological processes. **Methods:** 20 children (10 stuttering), female and male, between 4 to 8 years old, matched by gender and age. Children in the experimental group diagnosed with Stuttering and classified to severity of disease through the Stuttering Severity Instrument-3. Those who had evidence of deafness, neurological diseases and/ or psychiatric disorders were excluded. Children in both groups underwent speech and phonology evaluations by ABFW – Child Language Test. **Results:** 60% of phonological processes not expected for age were observed in the experimental group. Moreover, in the control group were only 10%. Differences between groups were not statistically significant on the incidence of phonological processes. There is evidence that the group of stuttering children is more likely the presence of at least one phonological process. **Conclusion:** the methodology applied in the investigation of phonological processes was effective, but due to small sample not been possible to develop the issue and verify if there is a difference in performance as the stuttering children phonological processes when compared to non-stuttering.

**KEYWORDS:** Stuttering; Child; Language

### ■ INTRODUCTION

Stuttering is a speech fluency disorder manifested by involuntary disruptions in the flow of speech. A disorder affects the temporal characteristics of subsystems involved in speech production<sup>1</sup>.

The developmental stuttering appears in childhood, between the acquisition phase and language development<sup>2</sup>. It may be transient, which shows that the child recovers naturally and persistent, if the child is not treated, it can stutter for

three years or more years. Persistent and transient stuttering seem to be the result of a common genetic factor. The persistent stuttering probably has additional factors that may influence recovery. Natural recovery of stuttering appears to be linked to factors such as, good performance on tests of phonology, language, non-verbal skills, have no family history of stuttering or family members who have recovered, and being female<sup>3, 4</sup>.

The language develops quickly and an increase in the complexity and extent of emissions of children who exceed their abilities to speech production. The selection of words, phonological coding, syntactic and prosodic planning for effective emission occur when the child is just starting production of speech. There is evidence that delays in language acquisition, especially in phonological development may be associated with risk of persistent stuttering. One study found that about 30% of stutterers have an increased rate of phonological changes compared with non-stutterers, with values ranging between 2% and 6%<sup>5</sup>.

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The process of phonological acquisition and development occurs gradually until the establishment of the phonological system<sup>6</sup>. Most children go through this process without difficulty and are able to produce the sounds of language properly in the expected age<sup>7</sup>.

Phonological disorder considered a problem of language, characterized by inappropriate use of phonological rules that observed in speech. Phonological disorders can appear at different levels of language processing or involving phonological information such as discrimination of sounds, recognition of phonological contrast (different sounds for each phoneme), and the representation of these contrasts in the lexicon. The modified sounds of speech production due to inappropriate use of phonological rules or not the accuracy articulation can be classified as phonological disorder<sup>8</sup>. These disorders may be related to difficulties with the organization of phonological rules of the language that characterizes a cognitive-linguistic difficulty with auditory perception and / or production of sounds. These modifications can generate substitutions, omissions, or distortions of speech sounds. The cause of the disorder is unknown, but the severity and speech intelligibility classified in varying degrees<sup>9</sup>.

The interest in the interaction between factors of language and speech fluency in children who stutter has grown in the last 20 years<sup>10</sup>. Studies that investigated the abilities and disorders of language in children, who stutter, indicated that this group compared with those who do not stutter, had presented lower scores on several indices of receptive and expressive language<sup>11-29</sup>.

There is evidence that preschool children who stutter have difficulty with metalinguistic skills, especially with Meta phonological. There is a qualitative difference found between stuttering and non-stuttering children<sup>12</sup> related to the type of linguistic unit where disfluencies occurred: children with stuttering and disfluency on phonemes and syllables were more frequent, not stuttering children, treated the whole word, sintagma and/ or sentence. Another study investigated issues between phonology and fluency and observed that stuttering children with phonological disorder did more prolongations in speech and repetition of words when compared with children who stutter, but that had no phonological disorder<sup>28</sup>.

In this research, to continue the search for possible relationships between phonological skills and early childhood stuttering, some aspects of the

phonological system in stuttering children investigated. The following hypothesis was raised:

- The performance of stuttering children according to the phonological process is different from non-stutterers.

Thus, this paper aims: to study the characteristics of phonological development of stuttering and non-stuttering children, and to investigate possible association between stuttering and phonological processes.

## ■ METHODS

This research was conducted at the Clinical Assessment and Diagnosis Speech Therapy, Universidade Federal de São Paulo – UNIFESP, between 2009 and 2010.

For the experimental group were selected 10 children (aged four to eight years) with a diagnosis of stuttering and, for the control group, 10 children, matched by gender and age, no complaint about communication. All children in both groups underwent conventional speech evaluation: anamnesis, audiological evaluation, phonological evaluation, evaluation of speech organs, and specific stuttering. We excluded those who had evidence of deafness, neurological and/ or psychiatric disorders. Phonological evaluation applied to the task of phonology Child Language Test – ABFW<sup>13</sup>, in imitation tasks and nomination.

For specific evaluation of stuttering, a recording of spontaneous speech was performed on average 200 syllables flowing through a camcorder. The recordings were transcribed and disfluencies were canonically mapped into typical and atypical. The presence of at least 3% atypical disfluencies was the criteria for establishing the diagnosis and application of the specific protocol of stuttering, Stuttering Severity Instrument – 3 (SSI-3)<sup>14</sup> to determine the degree of severity. Individuals with scores below 11 points in the SSI instrument – 3, which is equivalent to a mild stuttering, were excluded from this study.

Selection procedures initiated after the approval of the Research Ethics Committee (UNIFESP) under No. 1801-08 protocol. All parents and guardians of the participants informed about the study and signed a consent form.

The results submitted to a statistical analysis in which Fisher's test applied, comparing the performance of children with and without stuttering. The level of 0.05% for statistical significance was considered.

## ■ RESULTS

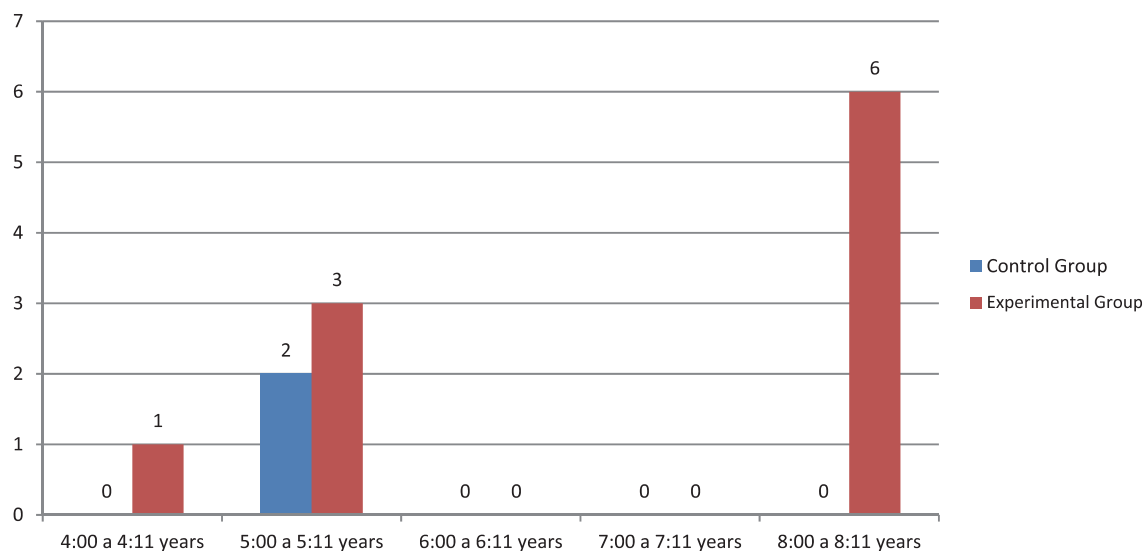
The children studied were distributed as 20% female and 80% male. For severity of stuttering, more children stutter moderate (10% mild, 70% moderate, 20% severe, very severe 0%) according to the SSI-3 protocol.

As for phonological processes, we observed higher concentrations in both groups, aged between 8:00 am and 8:11 years (Figure 1).

To verify the distribution of the amount of phonological processes found by comparing the group of stuttering children with a control group, it noted that males had a higher percentage of phonological processes in both the experimental group and the control group (Table 1).

A greater number of phonological processes in the group of stuttering children ( $N = 9.90\%$ ), with occurrences classified as palatal backing, gliding of liquids, cluster reduction, plosives devoicing, fricatives devoicing and others compared the children in the control group ( $N = 4.40\%$ ), who presented plosives devoicing and fricatives devoicing. The distribution of the number of phonological processes in both groups (Figure 2).

The distribution of the occurrence of phonological processes in both groups is presented in Table 2, according to the phonology test, ABFW. There was a higher occurrence of phonological processes in the experimental group, including a tendency to statistical significance.



**Figure 1 – Distribution of the presence of phonological processes in stutterers and control groups by age**

**Table 1 – Distribution of the number of phonological processes in both groups separated by gender**

Number of Phonological Process	Experimental group			Control Group		
	Female	Male	Total	Female	Male	Total
0	2	2	4	2	7	9
1	0	5	5	0	0	0
2	0	0	0	0	1	1
> 2	0	1	1	0	0	0

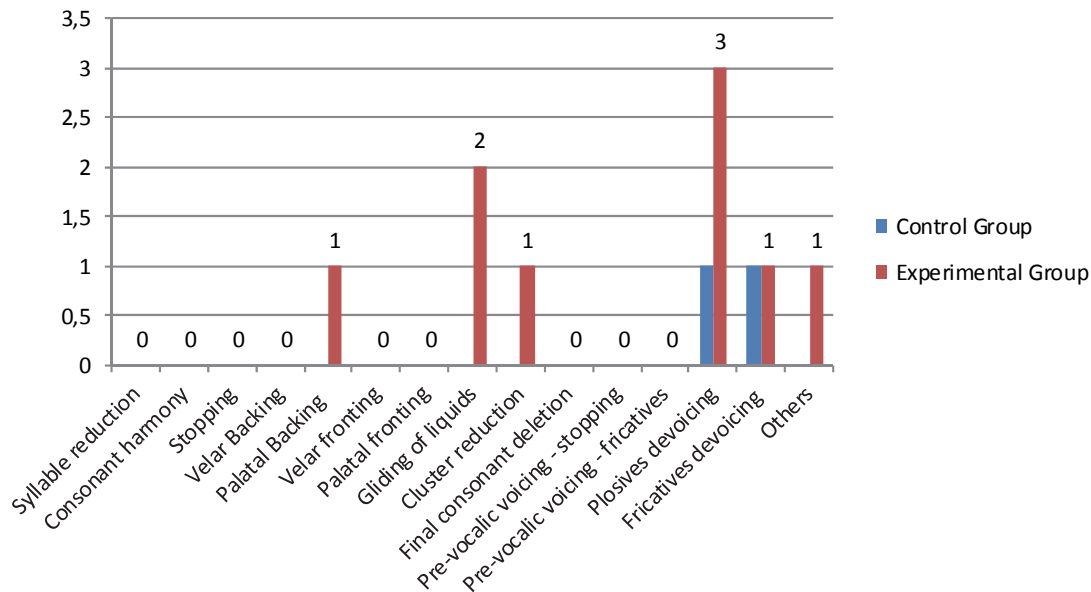


Figure 2 – Distribution of phonological processes in the experimental and control groups

Table 2 – Relationship between the presence and absence of phonological processes in both groups

	Occurrence of at least one productive phonological process	Absence of productive phonological process	Total	Fisher's Exact Test
Experimental group	6	4	10	0,057 <sup>#</sup>
Control Group	1	9	10	

\* p-value ≤ 0,05; # tendency to significance

■ DISCUSSION

This research aims to verify and compare the performance of stuttering and non-stuttering children by presence of phonological processes.

Distribution for the sample group, with no stuttering and stuttering children, it was found that the amount of male children is higher than that of female children in a ratio of four boys to one girl.

It is consensus in the literature that stuttering affects more men than women and it manifests in all cultures, with estimated around 4% incidence. The relationship between men and women, in school children and adults is 3:1, but can be lower, close to 1:1, in many younger children who started to stutter. During childhood, most girls are recovered from stuttering, and the proportion increases in men with the disorder after pre – school<sup>3,4,15</sup>.

As for age, it was observed higher concentrations of children in both groups between 5:00 to 5:11 and 8:00 to 8:11 months.

For severity of stuttering was found that 70% of children had a moderate degree. As for phonological processes, it is observed that the number of children who had at least one phonological process is more prevalent in males in both groups (Figure 1 and Table 1). The girls performed better in language strategies than boys according to a study described in the literature<sup>16</sup>. Moreover, a study of preschoolers<sup>17</sup>, revealed that gender is not a factor influenced on phonological tasks. In contrast, age influences on phonological tasks and the higher the age the better the performance in these tasks. These data are confirmed by the findings of this study described in Figure 1, where it is observed that stutterers and non-stuttering children who had at least one phonological process was higher in the younger age group (4:00 to 5:11 months).

Regarding the occurrence of phonological processes, it is observed that the plosives devoicing phonemes was more frequent (Figure 2). This fact can be confirmed with the findings described in the literature<sup>18,19</sup>. As for the other processes can

highlight the gliding of liquids phonemes, cluster reduction and final consonant deletion, which are also highlighted in other studies<sup>18-21</sup>. These processes have a higher prevalence in children with disorders in phonological abilities.

The result depends on the performance of phonological linguistic variable to which children were exposed. For example, is common in low-income populations to verify the occurrence of replacing the liquid phoneme [l] for [r] in consonant clusters. This change in speech can not be regarded as a phonological disorder<sup>22</sup>.

Regarding phonological skills, it was observed that 10% of children in the control group had at least one phonological processes investigated. Stuttering children in the experimental group this number increases to 60%. These results are similar to another study<sup>28,29</sup>. The statistical analysis in Table 2 showed that the observed difference in the incidence of phonological processes between groups were not statistically significant. The data revealed that the differences were close to being significant.

A study among speakers of the English language<sup>23</sup>, revealed differences in speech and language skills of children who stutter and children who do not stutter. The authors reported a greater dissociation between linguistic domains in children who stutter compared to fluent. Another study said that the same methodology used in the previous study, we found similar results in different populations of children<sup>11</sup>.

These findings confirm with others who found no statistical significance between the phonological abilities of the group of stuttering and non-stuttering children<sup>24,25</sup>.

As for the association of phonological abilities and severity of stuttering was also found that the

degree can affect the activities of speech (including phonological), with significant differences between the performance of a stuttering child with mild and severe degree<sup>25</sup>.

As stuttering, uptime and phonemic selection for speech is reduced. If speech is initiated quickly or too fast can be a positive point for the break occurs<sup>3,4,12,15,25-27</sup>.

Disfluencies would reflect the errors of phonetic planning, increasing susceptibility to phonological disorders.

Other studies<sup>5, 16</sup> revealed that children with developmental stuttering are more likely to have articulation errors, and that children in the early stage of stuttering may have multiple articulation or phonological problems.

## ■ CONCLUSION

Analyze the results obtained; we can conclude that there was no statistically significant difference in performance of stuttering children (60%) than the non-stutterers (10%) phonological processes investigated. The methodology, Test Phonology – ABFW was effective, but as the sample was small, it was possible to deepen the issue and see if there is a difference in performance as the stuttering children phonological processes when compared to non-stuttering. There was no significant difference in both groups as to any type of phonological process. Although it was not significant, came close to being. There is evidence that the group of stuttering children have at least the presence of a phonological process changes associated with their developmental stuttering.



**RESUMO**

**Objetivo:** estudar as características de desenvolvimento fonológico de crianças gagas e não-gagas, e investigar possível associação entre a presença de gagueira e a de processos fonológicos. **Métodos:** foram selecionadas 20 crianças (10 gagas), do sexo feminino e masculino, entre 04 a 08 anos de idade, pareadas por sexo e idade. As crianças do grupo de estudo tiveram diagnóstico de Gagueira e foram classificadas quanto a gravidade da patologia por meio do Stuttering Severity Instrument-3. Foram excluídas aquelas que apresentaram evidência de surdez, doenças neurológicas e/ou psiquiátricas. As crianças de ambos os grupos foram submetidas à avaliação fonoaudiológica e à aplicação das provas de Fonologia do Teste de Linguagem Infantil- ABFW. **Resultados:** no grupo de estudo foram observados 60% de processos fonológicos não esperados para a idade, enquanto que no grupo controle foram apenas 10%. As diferenças entre os grupos não foram estatisticamente significativas quanto à incidência de processos fonológicos. Há indícios de que o grupo de crianças gagas esteja mais predisposto à presença de pelo menos um processo fonológico. **Conclusão:** conclui-se que a metodologia utilizada na investigação dos processos fonológicos foi eficaz, mas devido à amostra reduzida não foi possível o aprofundamento da questão, ou seja, verificar se há uma diferenciação no desempenho de crianças gagas quanto aos processos fonológicos quando comparadas com as não-gagas.

**DESCRIPTORIOS:** Gagueira; Criança; Linguagem

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