PERFORMANCE IN PHONOLOGICAL AWARENESS OF CHILDREN WITH PHONOLOGICAL DISORDER: COMPARISON OF TWO INSTRUMENTS

Desempenho em consciência fonológica por crianças com transtorno fonológico: comparação de dois instrumentos

Marcela Rosolen Stefanini[1], Breila Vilela de Oliveira[2], Fabiana Carla Marcelino[3], Luciana Paula Maximino[4]

ABSTRACT

Purpose: to analyze and compare the performance of phonological awareness in two groups of children with phonological disorder, one in speech therapy and the other without intervention using two instruments of evaluation. **Method**: sample of 21 children, both genders, aged from 5 years and 6 months old to 8 years and 10 months old, with phonological disorder. Ten of these children belonged to Group 1, which includes children who have not undergone speech therapy treatment; and 11 children composed Group 2, corresponding to those in speech therapy intervention for a period longer than 4 months. Two instruments of evaluation were used: Profile of Phonological Abilities and Phonological Awareness Test **Results:** 85% of the children in Group 1 and Group 2 presented low performance in at least one of the two tests applied. The Profile of Phonological Abilities showed phonological alteration in 13 (62%) subjects and the Phonological Awareness Test in 16 subjects (76%). Moreover, there was consistency between the tests in 14 cases (66.7%). There was no statistically significant difference when we compare the results obtained by the two groups evaluated with phonological disorders for both the PPA and the PAT in general, even though the consistency between the findings happened in the majority of the cases. However, considering the age variables and schooling, in the PAT we found statistically significant difference. The results showed that there is certain variance in the findings obtained of the PPA and the PAT, in the age group of 5, 6 and 8 years old, whereas in the age group of 7 years old both instruments had revealed themselves sensible to the detection of the alteration of phonological awareness and for the follow up of the therapeutical process. **Conclusion:** most children in the sample (85%), independent of speech therapy, showed inferior performance than the expected for their age group in one of two instruments of evaluation, demonstrating the importance of speech therapy with emphasis on this aspect, because this will be reflected directly in the process of literacy of the children.

KEYWORDS: Child Language; Speech Disorders; Evaluation; Articulation Disorders

INTRODUCTION

Child develops its phonologic system gradually and naturally, however this development respects

[1] Speech-Language Pathologist and Audiologist; Student of the Clinical and Educational Audiology specialization course at the Hospital for Rehabilitation of Craniofacial Anomalies, University of São Paulo.

[2] Speech-Language Pathologist and Audiologist; Master's Degree Student in Biological Sciences (Genetics) by the Institute of Biosciences of Botucatu at the State University of São Paulo, IBB-UNESP, Botucatu – SP, Brazil.

[3] Speech-Language Pathologist and Audiologist; Professor at IESB-Preve; Therapist at the *Criarte* Clinical and Education School, Bauru-SP, Brazil.

[4] Speech-Language Pathologist and Audiologist; Professor, Doctor at the Department of Speech-Language Pathology and Hearing of the Bauru School of Dentistry, University of São Paulo, FOB-USP, Bauru-SP, Brazil;

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stages of matureness and depends on the environment in which he/she is inserted on due to the stimulus received. During the phonologic acquisition, simplification processes are normal in the child, however such processes are abandoned and more complex productions are adopted. When the phonologic acquisition do not occur as expected, the child presents an alteration in the phonologic system, which differs of what is considered normal in the adult pattern, it is called phonologic disorder[1].

The phonologic disorder is the child's difficulty in uses the rules of the phonologic systems that include phonemes and its distribution, and also the types of syllabic structures related to language. Thus, it would be identified a child with phonologic disorder, by the speech of difficult understanding caused by presence of phonologic processes unexpected for her age. The cause of the phonologic disorder still is unknown and the speech's intelligibility is varied, that is why there are several studies which relate causes biological, psychosocial, environmental and the family aspect to this disorder[2].

Since children with this pathology have alterations in the phonologic sensibility, they may have problems with learning reading and writing during alphabetization, making evident the importance in verifies the phonologic disorder in the pre-scholar phase[3].

The phonologic awareness is part of the development of the phonological aspect of language and it is defined as the skill to manipulate, detect and distinguish the sound's structure of words from the substitution of a sound until its segmentation in smaller units. The alphabetization process comprises phonologic tasks such as analyze words and its components, i.e., significant and meaning (phoneme and grapheme) of word[4].

The development of the phonologic awareness and of the work memory depends on the chronologic age and maturity of the individual. These skills are correlated and are extremely important in the beginning of the orthography acquisition[5].

Different authors concluded in their studies4 that the phonologic awareness occurs parallel to the literacy development, although initially they do not have a great level of dependency. As the alphabetization gets improved, the phonologic awareness also gets structured and they progress together supporting the child on the improvement of her cognitive functions, reflecting on the whole construction process of learning.

The effectiveness of the therapeutics models that employs tasks of phonologic awareness is described by several authors. These models improve the capacity of letters identification, phonologic analysis, global recognition of word, reading isolated words, literacy, among others, whether for prevention or intervention. Thus, they make easier the acquisition of alphabetic code, necessary to skill of reading and writing[6-10].

Due to its frequency and its damage in the development of children, the phonologic disorder preoccupies the Speech Therapist, who has extending his actuation on the prevention and rehabilitation of these language alterations. Thereby, this project aims to analyze and compare the performance of the phonologic awareness in two groups of children presenting phonologic disorder, one undergoing speech therapy and the other without intervention, using two evaluation instruments.

METHOD

The study included 21 children of both sexes, group age about five years and six months to eight years and ten months, presenting phonologic disorder that was not part of a global picture of development delay.

The study was conducted at the Speech-Language therapy and Audiology Clinic of the Bauru School of Dentistry, University of São Paulo (FOB-USP).

Among the 21 children, 10 of them pertained to group 1 (G1) which refers to children who were not undergoing the speech therapy and 11 children pertained to group 2 (G2), in which were undergoing intervention by a period of minimum four months and maximum of eight months. The speech intervention aimed to reorganize the sound systems of children, focusing to generalization and improvement of the speech understanding. The therapy model used was the Modified Cycles Approach[11].

As criteria for inclusion in groups, were considered able to participated in the research individuals who: were authorized by parents or they tutors to participate by assigning a Consent Form; presented phonologic disorder according to literature and were between five and eight years old.

The exclusion criteria were: evident alteration on the neurological, cognitive, psychological and/or emotional aspects, and also hearing alteration.

In table 1 is described the participants' features regarding the chronological age and the school level.

Table 1 – Description of the individuals sample in G1 and G2

GROUP	INDIVIDUAL	AGE	SCHOOL DEGREE
1	1	5y 6m	preschool 2
1	2	5y 8m	preschool 2
1	3	6y 4m	preschool 3
1	4	6y 5m	preschool 3
1	5	6y 7m	preschool 3
1	6	6y 9m	preschool 3
1	7	7y 1m	1st grade
1	8	8y 3m	2nd grade
1	9	8y 7m	2nd grade
1	10	8y 9m	2nd grade
2	11	5y 6m	preschool 2
2	12	5y 9m	preschool 2
2	13	6y 1m	preschool 3
2	14	6y 3m	preschool 3
2	15	6y 7m	preschool 3
2	16	6y10m	preschool 3
2	17	7y 5m	1st grade
2	18	7y 5m	1st grade
2	19	7y 8m	1st grade
2	20	8y 8m	2nd grade
2	21	8y10m	2nd grade

Children were submitted to a formal evaluation by the following instruments: Phonological Awareness Test[12] and Phonological Ability Profile[13].

Phonological Awareness Test (PAT)

The test aims to evaluate the phonologic skills under written language. It is composed by ten subtests: Syllabic Synthesis; Phonemic Synthesis; Rhyme; Alliteration; Syllabic Segmentation; Phonemic Segmentation; Syllabic Manipulation; Phonemic Manipulation; Syllabic Transposition; Phonemic Transposition.

Each subtest is composed by four items and by two initial examples in which the researcher explained to the child what it is to be done and corrects its answer in case to be incorrect.

The results were analyzed by the percentage of scores, ranging from zero to 40 points and to standardization of these scores in different levels of school degree proposed by the Capovilla studies, Capovilla and Silveira[14].

Different studies verified the Phonological Awareness Test, as an instrument sensible to the level of phonologic development of children, and the performance measured, highly correlated to the reading and writing performance and of great predictive value to the subsequent performances.

Phonological Abilities Profile (PAP)

This instrument is composed by items which identify and compose the phonologic skills of analysis, addiction, segmentation, subtraction, substitution, rhymes, sequential rhymes, syllabic reversion and articulatory image; and may be applied on children among five to 10 years old, although, the items that evaluate the phonemic level only are applied on children with age higher than 7.

At the beginning of each level there is an order and a pattern pre-established. In the pattern, the first two statements are utilized to demonstrate the task. Since the activity is understood, the child must answer the four items selected.

In the items initial analysis, lexical segmentation, rhymes reception, sequential rhyme and articulatory image, the scores totalize two points; while in the tests of final and mean course analysis, addiction and subtraction of syllables and phonemes, phrasal segmentation, syllabic substitution and reversion, the positive score it will be of one point. In case of error the value zero will be assigned. These scores are sum up at the end of each item and at the end

of the application, aiming to obtain the total scores which are analyzed regarding the child age.

In case of the child presents difficulties working on the abstract hearing level, it is necessary to assist her with concrete tips (material used as visual instrument).

It is a classification instrument developed to gather data about the individual capacity in process the phonologic aspects of language[13].

By means a research with normal children were established values that classify quantitatively their performance (Table 2)[13].

Table 2 – Group age values

Age	Under attention	Expected	Total Score
5	26 – 32	33 – 46	64
6	29 – 39	40 – 61	76
7	48 – 54	55 – 68	76
8	48 – 54	55 – 68	76
9	53 -58	59 – 71	76
10	63 – 64	65 – 71	76

This project had the previous approval conceded by the Committee of Ethics in Research with Humans of the Bauru School of Dentistry, University of São Paulo (FOB-USP), under protocol nº 121/2007. All legal concerns were respected as demand the Resolution 196/196 of the National Committee for Ethics in Research (CONEP). All individuals and their tutors were informed about the objectives and procedures of the study (information letter to the patient) and signed the Consent Term.

The results were organized into a database to facilitate its analysis. In this condition, the statistical analysis respected the criteria procedures of the evaluator's manual of each instrument used. Also, were developed a relevant statistical analysis aiming the comparing between the categories of analysis.

In this study were applied the following statistical tests: Exact Test of Fisher, McNemar Test and Mann-Whitney Test, with significance level of $p<0.05$.

RESULTS

Tables 3 and 4 presented the classification of G1 in the Phonologic Abilities Profile and the Phonological Awareness Test, respectively.

Tables 5 and 6 presented the classification of G2 in the Phonological Abilities Profile and the Phonological Awareness Test, respectively.

Table 7 shows the comparing of sensibility on results of the tests PAT and PAP in groups 1 and 2.

Table 3 – Sample description regarding the classification of the Phonological Abilities Profile in G1

INDIVIDUAL	AGE	EXPECTED SCORE	PAP SCORE	CLASSIFICATION
1	5y 6m	33-46	50	EXPECTED
2	5y 8m	33-46	27	UNDER ATTENTION
3	6y 4m	40-61	34	UNDER ATTENTION
4	6y 5m	40-61	35	UNDER ATTENTION
5	6y 7m	40-61	39	UNDER ATTENTION
6	6y 9m	40-61	11	UNDER ATTENTION
7	7y 1m	55-68	46	UNDER ATTENTION
8	8y 3m	55-68	61	EXPECTED
9	8y 7m	55-68	63	EXPECTED
10	8y 9m	55-68	34	UNDER ATTENTION

Table 4 – Description Sample regarding the Phonological Awareness Test in G1

INDIVIDUAL	AGE	MEDIUM SCORE	PAT SCORE	CLASSIFICATION
1	5y 6m	13,67	09	INFERIOR
2	5y 8m	13,67	11	INFERIOR
3	6y 4m	18,94	10	INFERIOR
4	6y 5m	18,94	09	INFERIOR
5	6y 7m	18,94	15	INFERIOR
6	6y 9m	18,94	04	INFERIOR
7	7y 1m	27,57	27	INFERIOR
8	8y 3m	31,79	32	EXPECTED
9	8y 7m	31,79	29	INFERIOR
10	8y 9m	31,79	11	INFERIOR

Table 5 – Sample description regarding the classification of the Phonological Abilities Profile in G2

INDIVIDUAL	AGE	EXPECTED SCORE	PAT SCORE	CLASSIFICATION
11	5y 6m	33 – 46	26	UNDER ATTENTION
12	5y 9m	33 – 46	0	UNDER ATTENTION
13	6y 1m	40 – 61	43	EXPECTED
14	6y 3m	40 – 61	34	UNDER ATTENTION
15	6y 7m	40 – 61	32	UNDER ATTENTION
16	6y10m	40 – 61	52	EXPECTED
17	7y 5m	55 – 68	48	UNDER ATTENTION
18	7y 5m	55 – 68	50	UNDER ATTENTION
19	7y 8m	55 – 68	68	EXPECTED
20	8y 8m	55 – 68	73	EXPECTED
21	8y 10m	55 – 68	58	EXPECTED

Table 6 – Description Sample regarding the Phonological Awareness Test in G2

INDIVIDUAL	AGE	MEDIUM SCORE	PAT SCORE	CLASSIFICATION
11	5y 6m	13,67	12	INFERIOR
12	5y 9m	13,67	3	INFERIOR
13	6y 1m	18,94	10	INFERIOR
14	6y 3m	18,94	9	INFERIOR
15	6y 7m	18,94	18	EXPECTED
16	6y10m	18,94	12	INFERIOR
17	7y 5m	27,57	20	INFERIOR
18	7y 5m	27,57	28	EXPECTED
19	7y8 m	27,57	29	EXPECTED
20	8y 8m	31,79	40	EXPECTED
21	8y 10m	31,79	24	INFERIOR

Aiming to compare the performance of G1 and G2 in the PAT and PAP, was developed the statistically analysis by the Exact Test of Fisher, verifying results with no significance as both to PPS (p=0.65944) and PCF (p=0.31078).

The agreement level between tests, PAT and PAP, was accomplished by the McNemar Test, describing agreement in 14 cases (66.7%), however, it was not observed difference statistically significant (p=0.44969).

Mann-Whitney Test was used to compare the results of PAT and PAP with variables of age and school degree.

Comparing the PAP to the variables age and school degree, it was not observed difference statistically significant, with p=0.185 and p=0.161, respectively. Comparing the PAT to the variables, as can be observed in Table 8, it was proved difference statistically significant to age and school degree, with both tests resulting in p=0.04. Therefore, it is observed, that children with performance lower than expected presented higher age and school degree.

Table 7 – Comparing the sensibility between results in PAT and PAP tests in G1 e G2

AGE	G1	G2
5 Years	PCF: 100% alterated PHF: 50% alterated	PCF: 100% alterated PHF: 100% alterated
6 Years	PCF: 100% alterated PHF: 100% alterated	PCF: 50% alterated PHF: 75% alterated
7 Years	PCF: 100% alterated PHF: 100% alterated	PCF: 75% alterated PHF: 75% alterated
8 Years	PCF: 66% alterated PHF: 33% alterated	PCF: 50% alterated PHF: 0% alterated

Table 8 – Comparing between results of PAP by age and school degree

VARIABLES	PAP - INFERIOR	PAP – EXPECTED	U	p	SIGNIFICANCY
AGE	151.5	79.5	15.5	0.040	YES
SCHOOL DEGREE	151	80	15	0.040	YES

DISCUSSION

It was observed that 85% of children in G1 and G2 presented inferior performance in at least one of the two tests, agreeing with findings of studies that have found difficulties in phonological skills of children with phonologic disorders[15-17], regardless the therapy.

Several authors relates the phonologic processing development to the precocious skills of reading and writing, that is why a child with dysfunctions in its phonologic capacity may present difficulties on language and reading, in the last case, it is due to the deficits on integrating orthographic and phonological cortical level, making use of different routes to children without difficulties[18-21].

Considering the capacity of the two instruments of detect alterations, it was verified that PAP presented phonologic awareness alteration in 13 (62%) individuals and the PAT in 16 (76%) individuals, besides, it had agreement between tests in 14 cases (66.7%), of the total of 21 individuals.

It is important to emphasize that even with adjacent percentages, the results in G2 differed in 45% of the sample, if analyzed on the global context, in other words, five children presented different performance when comparing the instruments; while in G1, 20% of results differed between themselves, i.e., in two individuals only. Literature do not relates studies in this context.

Considering the school degree, the age and the performance of individuals, it is evident that the most

children of first and second grades of elementary school had inferior performance in the application of PAT with difference statistically significant; although considering the same parameters in PAP it was not find difference statistically significant.

Due to the most children with unsatisfactory performance on G1 and G2 are in the first and second grade of elementary school in process of alphabetization or already alphabetized, this results disagree with the findings of studies which assume a mutual relation between the phonologic awareness and learning on reading and writing[4,22-25]. During the scholar development, children who present oral skills slight developed, as in the cases of phonologic disorders, are overwhelmed. This aspect denotes the importance of oral language to aspects of learning on written language, as the phonologic awareness is a skill to be integrated in the academic environment.

Analyzing all the phonologic skills in PAT and correlating to the education level, it is observed that all children had the expected score to their level in some skills, both in G1 and G2, even the children that was not alphabetized. That agrees with different studies[26,27] that assume that in some levels of phonologic awareness it is previous to the acquisition of the written language, while others are possibly one more result of this acquisition?

A study with pre-scholars, which received specialized training of phonologic awareness and of the perception in general, based on the stimulation of the phonologic awareness to the learning of reading and writing, showed this to be unnecessary, being the perceptual training enough[28]. Another author concluded in his study that, generally, the phonologic awareness develops during the learning of reading and writing, when it is correlated to these three variables between the first four years of the elementary school, reinforcing the idea of these skills development to children without disorders on the phonologic aspect[29].

Also, it is possible to observe that even after time superior to four months and the therapy focusing the aspects related to phonologic skills, on the case of group 2, still it is evident the difficulty in skills involved to phonologic awareness, which confirm a different study[30] that compared the performance on phonologic awareness skills of individuals with the history in phonologic disorder after its overcome, by a phonologic therapy with individuals in typical phonologic development, and demonstrated that even after phonologic intervention, the individuals with the cited dysfunction presented performance inferior in the phonologic awareness skills.

Considering the results obtained by age in G1 and G2, it is observed that almost all children on age of five years old presented varied results such in PAT as in PAP, that shows the sensibility in both instruments in follow the phonologic disorder and higher sensibility of PAT in detect a alteration of phonologic awareness in those children.

On the age of six years old, both instruments are sensible in the evaluating the detection of alterations, but to reassessments of following, the PAP presented itself as more sensible. At the age of seven years old the PAT and the PAP present the same sensibility of 100% to the evaluation moment and to the moment of following the therapeutic evolution. And at the age of eight years old, the PAT showed to be more sensible to the initial detection of alterations in phonologic awareness and to the following of cases in this age.

Therefore, the phonologic awareness may be seen as a hierarchy of processes based on complex levels of the phonologic system. A higher level of awareness requires a detailed analysis of the minor units of phonologic system, as, e.g., the phonemes; and a primordial level requires a superficial analysis of the higher units of sound, the syllables[9,23,31,32].

Regarding the necessity of precise instruments to diagnosis and following of the phonologic disorder, the present study showed that the performance of children with phonologic disorder in both tests (PAT and PAP) were similar in the sample G1 and differ in most of the sample evaluated in G2. Also, it is emphasized that the exams provide important elements to choose the pattern of intervention which will be applied in each individual, since the phonologic awareness related to the hearing discrimination and the therapy of minimum contrast are therapies more popular to phonological issues, among United Kingdom therapists[33]. The speech therapy approach based on the hierarchy of distinctive traces and in the phonologic awareness also presented to be effective in the overcome of phonologic processes and in the development of children with phonologic disorder[27].

CONCLUSION

It was concluded that the most of children of sample (85%), regardless the phonologic therapy, presented performance inferior to the expected to their age in one of the evaluation instruments of phonologic awareness, demonstrating the importance of phonologic intervention with emphasis in this aspect, since it will be reflected directly in the process of alphabetization of the individual.

RESUMO

Objetivo: analisar e comparar o desempenho em consciência fonológica em dois grupos de crianças com transtorno fonológico, sendo um em tratamento fonoaudiológico e outro sem intervenção, a partir de dois instrumentos de avaliação. **Método**: amostra de 21 crianças, de ambos os sexos, na faixa etária de 5 anos e 6 meses a 8 anos e 10 meses de idade, com transtorno fonológico. Dez crianças pertenciam ao Grupo 1 que se refere às que não foram submetidas a tratamento fonoaudiológico; e 11 crianças compunham o Grupo 2, correspondente àquelas em intervenção fonoaudiológica por um período superior a 4 meses. Foram utilizados dois instrumentos de avaliação: Perfil de Habilidades Fonológicas (PHF) e Prova de Consciência Fonológica (PCF). **Resultados:** 85% das crianças do Grupo 1 e Grupo 2 apresentaram desempenho inferior em, pelo menos, um dos dois testes aplicados. O Perfil de Habilidades Fonológicas mostrou alteração de consciência fonológica em 13 (62%) sujeitos e a Prova de Consciência Fonológica em 16 sujeitos (76%), além disso, houve concordância entre os testes em 14 casos (66,7%). Não houve diferença estatisticamente significante comparando os resultados obtidos pelos dois grupos avaliados, tanto pelo PHF quanto pelo PCF de forma global, embora a concordância dos achados ocorreu na maioria dos casos. Porém, considerando as variáveis idade e escolaridade, no PCF constatou-se diferença estatística significante. Os resultados mostraram que há certa variabilidade nos achados obtidos da PCF e do PHF, nas faixas etárias de 5, 6 e 8 anos, enquanto que na faixa etária de 7 anos ambos os instrumentos mostraram-se sensíveis para a detecção da alteração de consciência fonológica e também para o acompanhamento do processo terapêutico. **Conclusão:** a maioria das crianças da amostra (85%), independente da terapia fonoaudiológica, apresentou desempenho inferior ao esperado para sua faixa etária em um dos dois instrumentos de avaliação da consciência fonológica, demonstrando a importância da intervenção fonoaudiológica com maior ênfase neste aspecto, já que este irá refletir-se diretamente no processo de alfabetização do indivíduo.

DESCRITORES: Linguagem Infantil; Distúrbios da Fala; Avaliação; Transtornos da Articulação

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Mailing address:
Marcela Rosolen Stefanini
Alameda Dr. Octávio Pinheiro Brizola, 7-12 –
Cidade Universitária
Bauru – SP
E-mail: marcelastefanini@yahoo.com.br