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COMPARISON OF A BRIEF TRAINING IN SYLLABIC VERSUS PHONEMIC AWARENESS IN KINDERGARTNERS' EMERGENT LITERACY SKILLS

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Abstract

Studies in Reading Cognitive Psychology area refer to phonological awareness as one of the main predictors of literacy. However, there is no scientific consensus about the size of the phonological unit (e.g., rhymes, alliterations, syllables, phonemes) that most contributes to the initial development of reading and writing skills, considering the languages' regularity degree. In view of this, the present work elaborated, applied and verified the effects of two brief training in phonological awareness, one syllabic and the other phonemic, on emerging literacy skills of Brazilian Portuguese speaking preschoolers. The 64 children that took part in this research were enrolled in the last year of Pre-school, from a public educational institution. The research followed an experimental design, which consisted of the pre-test, intervention and post-test stages, with the participation of a control group. In the pre-test and post-test stages, children were assessed through phonological awareness (PA), knowledge of letters (KL), reading and writing words tasks, as well as an intelligence test. After the pre-test, the participants were randomly divided into three groups, seeking to obtain equivalence between them in relation to the results of the pre-test. The intervention took place in 12 sessions, in the school environment, lasting 30 minutes each, twice a week. The Phonemic Group (PG; n = 21) underwent phonemic awareness training; the Syllabic Group (SG; n = 21), to syllabic awareness training and the Control Group (CG; n = 22) participated in storytelling sessions. Interventions with the PG and SG took place in parallel, in small groups (4 to 6 children) and were carried out by the researcher. At the end of the interventions, all participants went through the post-test, performing again the tests applied in the pre-test (except the intelligence test). The results showed that the children who participated in the interventions in the PG and SG had significantly higher performance than the children in the CG ($p < 0.05$) in the PA skills. In the skills of KL and word reading, the differences were marginally significant ($p < 0.10$) and in the case of writing there was no significant difference between the groups. When the intervention groups (PG x SG) are compared, the results point to the PG's superiority in most of the evaluated skills, with high effect sizes, with the exception of writing. Children will be reassessed soon, already in the 1st year of elementary school, in order to follow up the effects of the interventions.

Keywords: *Reading, writing, syllabic awareness, phonemic awareness, emergent literacy.*

1. Introduction

Before starting the formal literacy process, kindergartners can and must develop skills that will be important for reading and writing learning. These are "Emerging Literacy" skills are a set of knowledge, abilities and attitudes that favor the literacy process. Among the emerging literacy skills, knowledge of the alphabet and phonemic awareness stand out (NELP, 2008). Several studies in the area of Cognitive Psychology of Reading refer to phonological awareness, as one of the main predictors of reading and writing (Dehaene, 2012; Snowling & Hulme, 2013). Phonological awareness, defined as the ability to consciously analyze and reflect on the sound structure of oral language (Capovilla & Capovilla, 2004), involves the ability to deliberately isolate, manipulate and combine the phonological units of language (Barrera & Maluf, 2003). Therefore, phonological awareness is a metalinguistic skill, that is, it is linked to the subject's ability to distance himself from the communicative language's use to focus the attention on its linguistic properties (Gombert, 2013).

Although phonological awareness is identified as one of the most important predictors of reading and writing learning, there are controversies about the specific role of different levels of phonological awareness at the beginning of literacy. Some studies suggest that the syllabic units' awareness would be more important for the initial learning of reading and writing (Chetail & Mathey, 2009; Doignon & Zagar, 2006), while other studies claim that the phonemic awareness is the most relevant factor for literacy (Melby-Lervag et al, 2012).

This theoretical controversy, based on several empirical results, is related to the structural differences between languages, which have different spellings, according to the complexity and regularity of the relationship between letters (graphemes) and sounds (phonemes). An orthography is called "shallow" or "transparent" when it has a single written symbol (letter or set of letters) for each phoneme. But, when the relations between graphemes and phonemes are more irregular, it is said that the spelling is "deep" or "opaque" (Seymour, 2013). Brazilian Portuguese is considered a relatively transparent language with a predominance of a simple and prominent syllabic structure. Therefore, researchers have suggested that Portuguese-speaking children may benefit more from the syllable than from the phoneme in the process of learning the written language (Anthony & Francis, 2005; Melo & Correa, 2013). In contrast, there is experimental evidence to suggest that children benefit more from the analysis of phonemes than from syllables, during the literacy process (Cardoso-Martins, Mesquita & Ehri, 2011; Yçadorva et al., 2015). A meta-analysis carried out by Melby-Lervag et al (2012), including 135 studies, sought to identify the relationship between phonological skills (phonemic awareness and rhyme) and children's ability to read words. A higher correlation was found for phonemic awareness and decoding ($r = 0.57$) than for rhyme awareness and decoding ($r = 0.43$). This meta-analysis indicates that the smallest unit of phonological awareness, the phoneme, contributes more strongly to the growth of reading ability in children.

In view of this, although studies have shown that the ability to reflect on speech sounds is closely related to the reading and writing learning, there is no scientific consensus on what is the size of the phonological unit that most contributes to the initial development of these skills for Brazilian children. This study seeks to contribute to clarifying this issue.

2. Method

The experimental design of the research was composed by three phases: pre-test, intervention and post-test with the participation of a control group and aimed to compare the effects of a brief training in phonemic awareness and another in syllabic awareness, on the performances in phonological awareness, knowledge of letters, reading and writing of preschoolers.

The participants were 64 children of both sexes, students from four classes in the last year of Early Childhood Education. At the beginning of the survey, the participants were aged between 59 and 72 months ($M = 64.85$ and $SD = 3.73$). In the pre and post-test phases, children were evaluated using the following instruments: Raven's Progressive Color Matrix Test (Angelini, Alves, Custódio, Duarte & Duarte, 1999) to exclude cognitive deficits suspicious; CONFIAS - Phonological Awareness Test: Sequential Assessment (Moojen et al., 2003); Survey on the knowledge of the Alphabet, and Tasks of reading and writing words (the latter elaborated by the researchers and whose answers were scored according to Ehri's model of phases (2013).

After the pre-test, the participants were distributed in a random and balanced way, in relation to the pre-test assessment, in three groups: Phonemic Group (PG), Syllabic Group (SG) and Control Group (CG). The PG ($n = 21$) underwent phonemic awareness training, the SG ($n = 21$) underwent syllabic awareness training and the CG ($n = 22$) participated in storytelling sessions. The interventions took place in parallel, at different times, in the school environment, with small groups (4 to 6 children) and had 12 sessions of 30 minutes each, twice a week, carried out by the researcher.

The training included the analysis of phonemes (PG) or syllables (SG) and the presentation of the appropriate letters to represent the respective phonological units used in each experimental condition. The intervention activities were developed based on the works of Seabra and Capovilla (2010), Adams (2012) and the experience of the researchers. Activities were carried out to develop phonological awareness through orality, listening and writing. The materials used were images accompanied by their written names, games (e.g. letters and sound bingo), whispers (a kind of toy telephone, which amplifies the spoken sounds) and mirrors. At the end of the interventions, all participants went through the post-test, performing again the tests applied in the pre-test (except the intelligence test). Statistical analyzes were performed to assess the significance of the results obtained.

3. Objectives

- Develop, apply and compare the effects of a brief training in phonemic awareness and another in syllabic awareness for the learning of reading and writing, of Brazilian preschoolers;
- Assess the effects of training in syllabic and phonemic awareness on the phonological awareness skills and letters' knowledge of the participants.

4. Data analysis

Initially, descriptive analyzes were performed in order to summarize the performance of the groups in the different tests at the two moments of the research (pre-test and post-test). The Shapiro-Wilk test was

performed in order to test the normality hypothesis of the data and from the results obtained, parametric or non-parametric statistical analyzes were performed. Variables whose significance level was greater than 0.05 were considered as not rejecting the normality hypothesis. To compare the three groups (PG, SG and CG) in the different phases of the research, the ANOVA statistical test and the Kruskal-Wallis test were used. Then, as a post hoc, to explore possible differences between the groups, the Bonferronni test and the Dunn test were performed. Effect sizes (Cohen's d) were reported and significance levels were previously determined at $p < 0.05$. According to Cohen (1988), the values 0.2, 0.5 and 0.8 are considered small, medium and large effects, respectively. Statistical analyzes were performed using the Statistical Package for Social Sciences, version 17.0, for Windows (SPSS Inc., Chicago, IL).

5. Results

Table 1 describes, for each research group, the maximum and minimum values observed, the mean, median and standard deviation of the variables investigated in the pre-test and post-test: Raven (raw score, syllabic awareness, phonemic awareness, total phonological awareness, letters' knowledge, reading and writing. Table 1 also reports the results of the Shapiro-Wilk test, used to verify the hypothesis of normality of the data.

Table 1. Descriptive data of the dependent variables evaluated in the Pre-test and Post-test of the total sample by group.

		Pre-test						
Group		Raven (raw)	PA Syllable	PA Phoneme	PA Total	Letters	Reading	Writing (error)
PG (n=21)	Min	11	12	2	15	5	0	13
	Máx	24	26	13	39	26	62	83,4
	Average	15,71	17,57	5,52	23,1	20	12,86	35,03
	Median	15	17	5	22	23	8	34,6
	DP	2,96	3,28	2,9	5,71	6,38	18,05	14,06
	Shapiro-Wilk	0,94	0,94	0,89	0,92	0,86	0,7	0,81
	p	0,25	0,25	0,03	0,12	0	0	0
SG (n=21)	Min	10	12	1	23	9	0	16,4
	Máx	22	23	8	42	26	39	66
	Average	15,1	17,48	5	32,57	19,71	10,62	35,75
	Median	14	18	5	32	19	6	36,6
	DP	2,96	3,41	1,94	4,5	5,33	11,72	12,32
	Shapiro-Wilk	0,96	0,93	0,93	0,93	0,91	0,79	0,94
	p	0,63	0,2	0,16	0,17	0,07	0	0,32
CG (n=22)	Min	11	11	1	14	5	0	15,6
	Máx	25	27	8	35	26	47	40,4
	Average	17,05	17,23	4,32	21,55	18	10,73	32,03
	Median	17	17	4	23	19	4	33,8
	DP	3,24	4,89	1,93	6,06	6,73	13,51	6,99
	Shapiro-Wilk	0,95	0,93	0,95	0,92	0,92	0,72	0,86
	p	0,46	0,17	0,43	0,08	0,07	0	0
		Post-test						
Group		PA Syllable	PA Phoneme	PA Total	Letters	Reading	Writing (error)	
PG (n=21)	Min	18	5	23	11	0	3,4	
	Máx	34	19	50	26	66	53,8	
	Average	26,57	11,95	38,24	22,19	27,38	27,72	
	Median	26	12	38	24	23	27,6	
	DP	4,17	4,03	7,5	5,13	23,15	13,66	
	Shapiro-Wilk	0,95	0,93	0,96	0,73	0,86	0,94	
	p	0,41	0,19	0,67	0	0	0,23	
SG (n=21)	Min	18	5	23	11	0	3,4	
	Máx	32	12	42	26	65	46,2	
	Average	24,81	7,76	32,57	20,95	26,33	25	
	Median	24	8	32	22	19	25,8	
	DP	3,2	2,23	4,5	4,79	25,05	10,52	
	Shapiro-Wilk	0,97	0,9	0,98	0,89	0,83	0,94	
	p	0,81	0,03	0,94	0,02	0	0,31	
CG (n=22)	Min	11	2	14	5	0	3,4	
	Máx	29	10	39	26	72	61,6	
	Average	20	5,64	25,64	19,23	15,23	30,09	
	Median	19	6	24,5	20	4,5	32,7	
	DP	5,34	2,36	6,95	5,63	20,88	12,94	
	Shapiro-Wilk	0,96	0,94	0,96	0,9	0,74	0,94	
	p	0,48	0,22	0,51	0,04	0	0,21	

Before the interventions, according to the results of the pre-test, statistical tests were carried out to guarantee the equivalence of the groups. Adopting a significance level of 5% ($p < 0.05$), the tests results (Anova and Kruskal-Wallys) indicated that no significant differences were observed between the Phonemic, Syllabic and Control Groups for any of the skills assessed. However, after the interventions, according to the results of the post-test, the analyzes revealed significant differences for the following skills: syllable PA ($F(2; 61) = 13.21$, $p < 0.001$), phoneme PA ($X^2 = 24.76$, $p < 0.001$) and total PA ($F(2; 61) = 20.54$, $p < 0.001$). Although the analyzes did not show a significant effect for the variables knowledge of letters ($X2 = 5.12$, $p = 0.08$) and reading ($X2 = 5.30$, $p = 0.07$), the p values were shown close to the stipulated value ($p < 0.05$). It is noteworthy that in the evaluation of writing, no significant differences were found between the groups after the intervention ($F(2; 61) = 0.89$, $p = 0.41$).

Post hoc tests were performed to explore the differences between the groups and the effect size (Cohen's d) of the observed differences was also calculated.

When compared to the Control Group, Phonemic Group showed a significant difference, favorable to phonemic intervention, for the variables: syllable PA ($p < 0.001$, $d = 1.37$), phoneme PA ($p < 0.001$, $d = 1.84$) and total PA ($p < 0.001$, $d = 1.74$). The comparison between the Syllabic Group and the Control Group also showed significant differences in favor of children who participated in the syllabic intervention for syllable PA ($p = 0.002$, $d = 1.09$), phoneme PA ($p = 0.030$, $d = 0,86$) and total PA ($p = 0.002$, $d = 1.18$). When we compared the Phonemic and Syllabic Groups, the results show that the children who participated in the intervention with phonemes presented significant higher scores for phoneme PA ($p = 0.003$, $d = 1.20$) and total PA ($p = 0.020$, $d = 0.92$).

6. Discussion

Data analysis showed that there were no significant differences between groups in the pre-test measures. However, the analysis of the results of the Post-test, which compared the children of the PG, SG and CG after the intervention, revealed significant differences for the following skills: syllable PA, phoneme PA and total PA. Although there were no significant differences in letters' knowledge and reading skills, the raw data obtained and the *p* values close to the stipulated suggest favorable effects of the interventions for these skills as well. No significant difference was found for writing performance. This may indicate that this skill would be more complex, requiring more time to be developed, showing more significant evolution in the more advanced stages of schooling. Frith (1985) describes in his model of reading and writing learning, possible differences between the strategies used in reading and writing in each postulated phase. Thus, it is possible to assume that the phonological awareness skills developed during the intervention are still not being used adequately to favor the use of phonological writing strategies. On the other hand, the knowledge of letters acquired with the interventions (which proved to be marginally significant) may be supporting the use of more effective reading strategies (higher frequency of partially alphabetical reading responses, according to Ehri, 2013).

Regarding the *post hoc* analysis, the results showed that the PG, when compared to the CG, showed a significant difference, favorable to phonemic intervention, for the variables: syllable PA, phoneme PA and total PA, indicating the effectiveness of the intervention with phonemes to improve the phonological awareness skills of these children. Large effect sizes ($d > 0.8$) are also observed in phonological awareness tasks. The comparison made between SG and CG also showed that the children who participated in the syllabic intervention showed significant differences in favor of the SG for the variables: syllable PA, phoneme PA and total PA. The effect sizes obtained with the syllabic intervention on the PA skills can also be considered large ($d > 0.8$), although slightly smaller than those obtained by the PG compared to the CG. It is important to point out that, although the PG and SG have presented significant differences in relation to the CG only in the case of phonological awareness skills, the results of these groups (PG and SG) were systematically superior to that of the CG in the other evaluated skills: knowledge of letters, reading and writing (Table 1), which also suggests positive effects of phonemic and syllabic interventions for these skills.

When comparing the PG and SG, the results show significant differences in favor of the PG participants for the variables: phoneme PA and total PA, with effect sizes ($d > 0.8$). Although only the skills of phoneme PA and total PA showed statistical significance, the results of the PG were better than those of the SG in all other skills evaluated, except for the results in writing (Table 1). This means that the phoneme intervention was the one that most enhanced the phonological awareness, letter knowledge and reading skills of the children participating in the research. Therefore, the results suggest the superiority of phonemic interventions when compared to syllabic interventions. This result is in line with the study by Ehri (2014), which showed that graphophonemic mapping is more efficient than graphosyllabic mapping at the beginning of reading and writing learning. Studies carried out with Brazilian children also showed that, for Brazilian Portuguese, despite the syllables having a more prominent structure, the teaching of orthographic mapping of phonemes is more effective than the orthographic mapping of syllables at the beginning of literacy (Cardoso-Martins & Batista, 2005; Sargiani & Maluf, 2018).

7. Conclusion

The results obtained so far suggest that the intervention in phonological awareness, especially in phonemic awareness, when performed with preschoolers, can contribute to the development of fundamental skills and knowledge for the initial learning of reading and writing. New data will be collected in the first semester of 2020, when the participants are attending the first year of elementary school. This follow up will allow us to analyze the effects of this intervention in the long term, in order to better specify their possible contributions to reading and writing learning.

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