

Initial literacy: Influence of phonemic awareness and teaching method

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Abstract: This longitudinal study investigates the importance of two methods for the success of the learning of reading and spelling and for the development of the phonemic awareness (PA) ability. It also verifies the contribution of PA and its predictive capacity for literacy learning in Brazilian Portuguese (PB). Two groups of children who started the first year (Mage = 5;10 years), one from a school that adopted a phonic method and the other from a school that adopted a nonphonic method, were followed until the end of the 2nd year, and were assessed on PA, reading and writing in three moments. The main findings of studies in other transparent orthographies are confirmed: PA is a strong predictor of reading and writing. It was also found that in PB the ability to read words is achieved quickly, with both methods, while the learning of writing is influenced significantly by the phonic method.

Keywords: phonemic awareness; reading; spelling; literacy; teaching method.

PROCESSO INICIAL DE ALFABETIZAÇÃO: INFLUÊNCIA DA CONSCIÊNCIA FONÊMICA E MÉTODO DE ENSINO

Resumo: Este estudo longitudinal investiga a importância de dois métodos de alfabetização para o sucesso da aprendizagem da leitura e da escrita e para o desenvolvimento da habilidade de consciência fonêmica (CF). Verifica ainda a contribuição da CF e sua capacidade preditiva para a alfabetização no português brasileiro (PB). Duas turmas de crianças que iniciavam o 1º ano (Midade = 5;10 anos), uma proveniente de uma escola que adotava método fônico e a outra, de uma escola que adotava um método não fônico, foram seguidas até final do 2º ano, com avaliações de CF, leitura e escrita, aplicadas em três momentos. Os principais achados de estudos em outras ortografias transparentes são confirmados: a CF é um forte preditor da leitura e da escrita. Encontrou-se ainda que no PB a habilidade de leitura de palavras é alcançada rapidamente, com ambos os métodos, ao passo que a aprendizagem da escrita é influenciada significativamente pelo método fônico.

Palavras-chave: consciência fonêmica; leitura; escrita; alfabetização; método de ensino.

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PROCESO INICIAL DE ALFABETIZACIÓN: INFLUENCIA DE LA CONSCIENCIA FONÉMICA Y DEL MÉTODO DE ALFABETIZACIÓN

Resumen: Este estudio longitudinal investiga la importancia de dos métodos de alfabetización en el éxito del aprendizaje de la lectura y la escritura y para el desarrollo de la habilidad de conciencia fonémica (CF). También verifica la contribución de la CF; y su capacidad predictiva, para dicho aprendizaje en portugués brasileño (PB). Dos grupos de niños que empezaban el primer curso (Medad = 5;10 años), uno proveniente de una escuela que adopta un método fónico y la otra, de una escuela que adopta un método no-fónico, fueron seguidos hasta el final del segundo curso, con evaluaciones de CF, lectura y escritura, aplicadas en tres momentos. Los principales hallazgos de estudios en otras ortografías transparentes son confirmados: la CF es un fuerte predictor de la lectura y la escritura. Se ha encontrado que en el PB la habilidad de lectura de palabras se alcanza rápidamente, con ambos métodos, mientras que el aprendizaje de la escritura es influenciado significativamente por el método fónico.

Palabras clave: consciencia fonémica; lectura; escritura; aprendizaje inicial del lenguaje escrito; método de enseñanza.

Introduction

There is an extensive investigation on phonological awareness abilities due to their close relationship to reading and spelling learning in the alphabetic writing systems. While rhyme and syllable skills depend on general linguistic experience and develop before the onset of literacy, phonemic abilities, the highest level of phonological awareness and the last to develop, are subject to alphabetic instruction, and do not arise spontaneously (Defior & Serrano, 2011). However, once the learning of reading and writing is triggered, the phonemic abilities establish a reciprocal relationship with the emerging literacy: learning to decode facilitates the development of phonemic awareness, which in turn promotes the understanding of the alphabetic principle. Because of this reciprocal relationship, the development of phonological awareness, particularly the contribution of the different levels of this ability, may have a greater or lesser influence on the learning of an alphabetic system (Caravolas et al., 2013). That will depend on the characteristics of the orthography to be learned as well as on literacy method (Duncan et al., 2013; Landerl, 2000). The classification of alphabetic orthographies ranks from transparency to opacity. The relationship between phonology and spelling is consistent when it comes to transparent orthographies. In this case, the student can produce a more efficient analysis of the relationship between graphemes and phonemes and more easily develop phonemic awareness, which will, in turn, facilitate the understanding of the alphabetic principle. This discovery enables the learners to decode new words autonomously, as well as to store their lexical representations, thus becoming increasingly literate (Share, 1995).

Several studies dealing with transparent orthographies, as it is the case of Brazilian Portuguese at least for reading (Scliar-Cabral, 2003), have shown that the contribution of phonemic abilities to reading, in comparison to spelling, is more specific and decisive at the beginning of literacy, and only for a short time (Defior & Serrano, 2011; Moll et al., 2014; Vaessen & Blomert, 2010).

Regarding literacy teaching methods, particularly for transparent orthographies, if the technique explicitly focuses on grapheme-phoneme correspondences, it may favor the development of phonemic skills and, consequently, a quicker reading (Scliar-Cabral, 2014) and spelling (Landerl, 2000; Dehaene, 2012) learning. Even in the case of opaque orthographies, Connelly, Johnston, and Thompson's work (2001) has demonstrated that methods explicitly focused on decoding rules do contribute to reading development. Several studies dealing with transparent orthographies have also shown that as the learner develops the decoding processes, phonological abilities at the phonemic level are triggered. It is worth saying that, for a brief period at the beginning of literacy, the contribution of the decoding ability to the learning of reading is specific and decisive (Jong & van der Leij, 1999).

Brazilian Portuguese orthography (henceforth BP orthography) is more orthographically consistent about grapheme-phoneme correspondences (GPC or spelling to sound) than it concerns phoneme-grapheme (PGC or sound-spelling), as happens in many other alphabetic orthographies. In BP, GPC is governed, in most cases, by context-independent rules or even context-dependent ones. According to Scliar-Cabral (2003), there are only three inconsistent graphemes in reading, as they can represent different phonemes and are not rule-governed. For instance, the grapheme *x* in intervocalic position can represent three different sounds: /ʃ/, as in "*abacaxi*" (pineapple); /s/ as in "*máximo*" (maximum), and /ks/, as in "*táxi*" (taxi). Apart from this grapheme, when the vocalic graphemes *e* and *o* are not marked by a diacritic, they can each represent two different phonemes. For instance, "*ele*" (he), read as /ɛli/, means the name of the letter 'l', but read as /eli/, means 3rd person singular personal pronoun; and "*gosto*" may be read as /gostu/ (noun: flavour) or /gɔstu/ (1st person singular, verb "like"). With the outcome of the new orthographic agreement in 2009, changes related to two other diacritic marks began to create ambiguities in reading: the elimination of the umlaut in words such as "*linguiça*" (sausage) and "*frequência*" (frequency); and the omission of the acute accent in the open diphthongs *éi* and *ói*, in paroxytone words such as "*geleia*" (jam) and "*jiboia*" (boa constrictor). Correct decoding of these graphemes in such contexts depends on the use of morphosyntactic and semantic information in combination with the search for that item in the mental orthographic lexicon.

Unlike reading, spelling in BP presents many inconsistencies. There is only a small number of phonemes whose codification is governed by simple rules such as (/p/ = *p*; /b/ = *b*; /t/ = *t*; /d/ = *d*; /f/ = *f*; /v/ = *v*; /m/ = *m*; /n/ = *n*; /ɲ/ = *nh*; /ʎ/ = *lh*). Additionally, the codification of some phonemes, namely those which are governed by context-dependent rules, may also require morphosyntactic information. That is the case, for example, of the spelling form of the nasal diphthong /ãw/ in paroxytone words, a case in which the writer needs to know whether the word is a noun or a verb to be able to write it correctly. For instance: "*órfão*" – "orphan" /ɔɾfãw/ (a noun) and "*matam*" – (they) "kill" /matãw/ (3rd person singular of the verb "*matar*" – kill). To produce the correct graphemes for this type of words, the writer needs some metalinguistic

knowledge, and this can interfere negatively with the learning process at the beginning of schooling. Furthermore, the written format of many words is not conditioned by rules, and this requires the storing of the word in the mental orthographic lexicon. Also note that, in some cases, inconsistency can be dealt with through the formal teaching of morphosyntax and morphological derivation, and can also be predicted by examining the word's etymology (for a detailed description, see Scliar-Cabral, 2003).

For studies on phonological awareness carried out in BP, we can turn to Cardoso-Martins' pioneer work (1995), in which the author shows that, among a whole set of phonological abilities, phonemic awareness, measured at the beginning of pre-school, was the best predictive factor in reading and spelling performance in the middle and end of the 1st grade. It must be said that the results of Cardoso-Martins did not indicate whether, in the period investigated, the phonemic awareness influences reading and spelling in the same manner.

The studies in PB, especially those of phonological awareness training, have demonstrated the importance of this ability both to facilitate alphabetic learning (Capovilla & Capovilla, 2000; Santos & Maluf, 2010; Santos & Barrera, 2017) and to overcome learning difficulties in reading and writing (Justino & Barrera, 2012; Fukuda & Capellini, 2012). Some of these studies have emphasized the importance of the phonic approach, that is, the association of activities of phonemic awareness with the explicit teaching of the grapheme-phoneme correspondences and vice-versa. In this sense, the crucial role of phonemic awareness for alphabetic learning has been broadly reaffirmed, however, what further needs to be considered is whether phonemic awareness has distinct weight to reading and writing learning.

With this in view, the present study attempts to verify whether in BP there is any similarity in the way phonemic awareness influences reading learning on the one hand and spelling learning on the other. We hypothesize that the power of phonemic awareness will restrict itself to a short period for reading, as happens in other transparent orthographies, but for a longer period for spelling, like in opaque orthographies. Another purpose is to investigate the impact of a specific literacy teaching method with an explicit focus on the grapheme-phoneme relationship on the development of phonemic abilities and the learning of reading and spelling in BP, as opposed to an approach with a more global focus. We hypothesize that a phonic method may facilitate the development of phonemic abilities, as well as the learning of reading and writing, as suggested in the scientific literature (Hempenstall, 2016).

Method

This is a longitudinal and exploratory study. It did not involve any intervention and neither experimental group nor control group. It consists of the follow-up over two years of children starting the first year in two distinct schools, that is, one classroom in each school. In each classroom the methodological proposal for literacy teaching was

defined by the pedagogical option of the school, being Montessorian in one school and Constructivist in the other, which resulted in the definition of a “phonic” and a “nonphonic” teaching group.

Participants

Two classrooms of children, who were initiating the 1st grade of primary school ($M_{age} = 5$ years and 10 months), each in a different school, participated. The classroom in the Montessorian school consisted of 23 children, who were taught the sound value of each grapheme systematically and explicitly, assigning to it the corresponding phoneme and vice-versa. This group is defined as phonic method group (P). The other classroom, in the Constructivist school, consisted of 18 children who were being taught by a method which emphasized the contextual features of the reading and focused on the global characteristics of the words, with no explanation of the GPC rules. This group is referred to as nonphonic method group (NP). Both schools were part of the network of private education and the literacy teaching method adopted by either was not chosen by the teacher, but rather by the education orientation determined by their respective principles. In both cases, teachers were specifically trained on the methodology followed by the school. The families of the children in both groups came from a high middle-class background, and all children were native speakers of BP, presenting no difficulties concerning the spoken language, according to their teachers. Parents gave informed consent for their children’s participation in the study. All proceedings for the ethical conduct were taken. At the end of the investigation, the children’s ages were, on average, 7 years and 4 months and they were concluding the 2nd grade. The investigation was carried out over a two-year period, and assessment was made in three phases:

1. Phase 1 at the beginning of the school year, when the children were entering the 1st grade of primary school and had not yet been taught the alphabetic writing system;
2. Phase 2 at the end of the school year, completing the 1st grade;
3. Phase 3 in the middle of the 2nd grade, after approximately 18 months of learning the alphabetic code.

In all three phases, the literacy progress of both groups was assessed using the same task sequence and for an equal period.

Materials

Phonemic Awareness Tasks (Phases 1, 2, and 3). Three phonemic awareness tasks were used: segmentation, subtraction, and inversion. The last two tasks were adapted for use in BP by Godoy (2001) from battery BELEC (Mousty, Leybaert, Alegria, Content,

& Morais, 1994). Further study demonstrated the factorial structure validity of the segmentation and subtraction phonemic tasks (Godoy & Cogo-Moreira, 2015).

Phonemic segmentation. The task was composed of eight nonword items with varying syllabic structures (CV, CVC, and CVCV), plus five training items. The children's task consisted in counting and pronouncing the segments of each item.

Phonemic subtraction. The task was composed of twenty monosyllabic nonwords, 10 with the structure CVC and 10 with the structure CCV, plus four training items. The children should mentally subtract the initial segment of each stimulus and then pronounce the remaining segments.

Phonemic inversion. The task was composed of ten nonwords, 5 with the structure VC and 5 with the structure CV, plus four training items. The children's task consisted in inverting the segments presented orally and pronouncing the resulting structure.

These three tasks were applied only in Phases 1 and 2. In Phase 3, the Phonemic Segmentation task was not used and the Phonemic subtraction task had only 10 items with the structure CCV. This alteration was done since all the items of the first task and half of the second were too easy for children of Phase 3, judging from the results of Phase 2.

Grapheme-Phoneme Correspondence Task (Phases 1 and 2). The task consisted in presenting the graphemes *é, ó, f, s, j, v, ch* and *m* in individual cards measuring 6 x 6 cm – all written in lowercase letters, type Times New Roman, size 78. The child was asked to say the sound of each grapheme. However, in order to rule out the possibility of a correct response be given by chance, which could happen in the situations in which the sound of the grapheme would coincide with the name of its letter, as it is the case of the grapheme *b*, each one of the above graphemes was chosen so that a response given on the bases of its letter's name would lead to an error. For example, for the grapheme *f* the correct response is /f/ and not "éfi".

Reading Aloud Tasks (Phases 1, 2, and 3). Two tasks were used.

Reading simple words (Phases 1 and 2). The Simple List consisted of 15 high-frequency monosyllabic and disyllabic words, 2 to 5 letters long. They were displayed on individual cards measuring 9 x 4 cm, using Arial type, uppercase, size 48.

Reading complex words (Phase 3). The Complex List, developed by Pinheiro (2003), was made up of 72 words which were classified according to regularity (regular/irregular), occurrence frequency (high-frequency/low-frequency), length (short – 4 to 5 letters/long – 6 to 7 letters), and syllable structure. The child was asked to read each word from a computer screen as quickly and correctly as possible. Words were displayed after instruction and training on six items.

For both, the Simple List and the Complex List, it was considered correct the enunciation produced without hesitation. Self-correction was not allowed either: the child was required to read the word correctly all at once.

Spelling Tasks (Phases 2 and 3). A word dictation task was carried out only during Phases 2 and 3 since during Phase 1 the children were too young and had not yet been

formally exposed to this type of task. The list of words was the same one used for the reading task, i.e., the Simple List was used in Phase 2 and the Complex List in Phase 3. The examiner pronounced the stimulus word once and then repeated it. Each child should then write it down on their sheets.

Procedures

The tests were all conducted individually, except for the word dictation, which involved group work. The phonemic awareness tasks were recorded beforehand, and the children's responses to all tests were recorded. Two or three sessions were necessary to complete the application of the tests at each phase, each session taking up no more than thirty minutes. The spelling tasks were always applied one week after the reading tasks.

The statistical analyzes were conducted with the statistical package SPSS, version 22. Different analyzes were carried out. Each of them will be described together with the results obtained in the pertinent result section.

Results

The children's results on all tasks are presented regarding mean percentage of correct responses (Table 1). Considering that the overall performances on the three phonemic awareness tasks were correlated and to reflect the performance in this ability in a holistic way, they were transformed by weighted means in a single composite score named "Compound" to be used in the global analysis [for example, $(20.9 \cdot 8 + 31.7 \cdot 20 + 28.9 \cdot 10) / 38 = 28.7$], for NP, Phase 1].

Table 1. Mean percentage of correct responses (standard deviation), in all the task by phase and teaching method group.

Variables	Phase 1		Phase 2		Phase 3	
	NP	P	NP	P	NP	P
PA						
Segmentation	20.9 (31.2)	9.3 (23.6)	61.2 (39.7)	77.9 (31.3)	-	-
Subtraction	31.7 (30.4)	15.2 (29.1)	64.7 (37.0)	73.0 (32.8)	84.4 (22.3)	87.4 (18.4)

(to be continued)

Table 1. Mean percentage of correct responses (standard deviation), in all the task by phase and teaching method group.

Variables	Phase 1		Phase 2		Phase 3	
	NP	P	NP	P	NP	P
Inversion	28.9 (33.9)	12.6 (26.8)	71.7 (36.2)	78.3 (29.6)	92.2 (11.7)	89.1 (21.1)
Compound	28.7 (27.4)	13.3 (25.5)	65.8 (33.3)	75.4 (30.6)	88.3 (14.8)	88.3 (18.0)
GPC	32.1 (28.1)	29.4 (28.8)	70.0 (25.1)	80.4 (22.9)	-	-
WR						
Simple list	21.5 (25.4)	22.4 (26.8)	60.7 (31.7)	70.3 (26.4)	-	-
Complex list	-	-	-	-	66.7 (21.1)	76.7 (18.1)
WS						
Simple list	-	-	81.9 (10.0)	86.5 (10.9)	-	-
Complex list	-	-	-	-	70.9 (10.5)	79.6 (10.6)

Note. NP = nonphonic; P = phonic; PA= phonemic abilities; Compound = composite measure of phonemic awareness; GPC = grapheme-phoneme correspondences; WR= word reading; WS = word spelling.

Source: The authors.

The Relationship between Phonemic Awareness and Reading and Spelling Learning, across the Three Phases

Results taking all the participants together show that the compound phonemic awareness measure correlates significantly in all phases with word reading, word spelling, and GPC, with moderate to strong correlations values depending on Phase (see Table 2).

Table 2. Pearson's Correlation between Compound Phonemic Ability and Word Reading, Word Spelling and Grapheme-Phoneme Correspondence (GPC), by Phase.

Tasks	Compound Phonemic Ability		
	Phase 1	Phase 2	Phase 3
Word reading	.63**	.81**	.40*
Word spelling	-	.73**	.46**
GPC	.62**	.69**	-

Note. GPC= Grapheme-Phoneme Correspondences

Significance Level: * $p < .05$; ** $p < .01$

Source: The authors.

Predictive Factor in Reading and Spelling at the end of the 2nd Grade (Phase 3)

To analyze which of the phonemic awareness abilities (segmentation, subtraction and inversion) is more important as a predictive factor of reading and spelling at the end of the 2nd grade (Phase 3) we carried out a regression analysis. For this end, the two groups of children were considered as a single group and the performance of the group on each of the tasks involving phonemic abilities were considered, as well as GPC knowledge and reading in Phases 1 and 2 and spelling in Phase 2.

Table 3 shows the correlations of word reading and word spelling in Phase 3 with all the measures taken in Phases 1 and 2. No significant correlations were observed between reading in Phase 3 and variables measured in Phase 1. Yet for Spelling in Phase 3 only significant correlations, with GPC and reading in Phase 1, were found. However, both reading and spelling in Phase 3 are significantly correlated with all variables measured in Phase 2.

Table 3. Pearson's Correlation between Word Reading and Word Spelling in Phase 3 and Phonemic Abilities (Segmentation, Subtraction and Inversion), Grapheme-Phoneme Correspondence (GPC), Word Reading and Word Spelling in Phases 1 and 2.

Phase 3	Phase 1					Phase 2					
	Segmentation	Subtraction	Inversion	GPC	Reading	Segmentation	Subtraction	Inversion	GPC	Reading	Spelling
Reading	-.04	-.02	.02	.14	.09	.60**	.51**	.51**	.43**	.49**	.39*
Spelling	.08	.21	.27	.37*	.31*	.71**	.55**	.63**	.38*	.61**	.06*

Note. GPC= Grapheme-Phoneme Correspondences

Significance Level: * $p < .05$; ** $p < .01$

Source: The authors.

Multiple bivariate analyses using linear regression were carried out to determine which of the phonemic abilities measured in Phase 2 was the most effective predictive factor for reading and spelling in Phase 3, controlling the effects of GPC knowledge and reading in Phases 1 and 2, and spelling in Phase 2. The distribution of the reading data was not normal, so it was necessary to proceed to its cubic moment. As for the spelling variable, it presented normal distribution. Exploratory variables with p -values $p \leq .20$ in the bivariate analysis were included in the multiple models. In the final model, those variables with $p \leq .05$ in the multiple models were maintained.

Bearing in mind the assumptions discussed above, the analysis for reading shows that the variables with greater explanatory power which constitute the multiple model are: Segmentation, Phase 2 ($R^2 = 0.38$; $p < .001$); Reading, Phase 2 ($R^2 = 0.27$; $p < .001$); Subtraction, Phase 2 ($R^2 = 0.25$; $p = .001$); Inversion, Phase 2 ($R^2 = 0.21$; $p = .001$); Spelling, Phase 2 ($R^2 = 0.16$; $p = .005$), and GPC, Phase 2 ($R^2 = 0.13$; $p = .01$). For spelling the variables are: Segmentation, Phase 2 ($R^2 = 0.49$; $p < .001$); Inversion, Phase 2 ($R^2 = 0.38$; $p < .001$); Reading, Phase 2 ($R^2 = 0.35$; $p < .001$); Subtraction, Phase 2 ($R^2 = 0.28$; $p < .001$); Spelling, Phase 2 ($R^2 = 0.27$; $p < .001$); GPC, Phase 2 ($R^2 = 0.13$; $p = .01$); GPC, Phase 1 ($R^2 = 0.12$; $p = .01$); Reading, Phase 1 ($R^2 = 0.07$; $p = .04$); Inversion, Phase 1 ($R^2 = 0.05$; $p = .09$), and Subtraction, Phase 1 ($R^2 = 0.02$; $p = .19$).

Results, according to the model described above, show that, among the phonemic abilities, the Phase 2 phonemic segmentation skill stood out as the best indicator of both literacy skills (Reading: $R_{\text{model}} = .45$, $R^2_{\text{Corrected model}} = .35$, $p = .007$; Spelling: $R_{\text{model}} = .53$,

$R^2_{\text{Corrected model}} = .45$, $p = .007$), keeping under control the effects of GPC knowledge and reading in Phases 1 and 2 and of spelling in Phase 2.

Influence of the Teaching Method over Phonemic Awareness Development across Phases 1, 2 and 3

In this analysis, we considered the performance of each group as related to their compound phonemic awareness ability. An analysis of variance (ANOVA) of repeated measures was carried out with the PHASE (Phase 1, Phase 2, Phase 3) and METHOD (NP, nonphonic vs P, phonic) factors. Results show a significant effect of PHASE ($F(1,39)=126.18$; $p < .001$); the paired comparison analyses (Bonferroni's adjustment) revealed significant differences among all the Phases (1-2; 2-3; 1-3; with $p < .001$). As to the METHOD factor, no principal effect was observed ($F(1,39)= 0.10$; $p > .05$), but PHASE and METHOD interacted ($F(1,39) = 4.11$; $p < .05$), suggesting that the performance in phonemic awareness of the phonic method group tend to be significantly better than that of the nonphonic method group. Thus, in Phase 1, the performance of the phonic method group was poorer than that of the nonphonic method group, a difference marginally significant ($F(1,42)=1.97$; $p = .09$). In Phase 2 and 3 the performance of the phonic group surpasses that of the nonphonic group, although by a non-significant difference ($F(1,41) = 0,67$; $p > .05$).

Influence of the Teaching Method over Reading and Spelling Learning at the end of the 2nd Grade (Phase 3)

Concerning the learning of reading, a repeated measures ANOVA shows that there is a significant effect of PHASE ($F(1,39) = 72.50$; $p < .001$), non effect of METHOD ($F(1,39) = 1.32$; $p > .05$), nor PHASE-METHOD interaction ($F(1,39) = 0.65$; $p > .05$). Paired comparison analyses according to Bonferroni's adjustment, show that there were significant differences between all the Phases (1-2; 2-3; 1-3; $p < .001$).

Regarding spelling learning, the repeated measures ANOVA shows a significant PHASE ($F(1,39) = 29.58$; $p < .001$) and METHOD ($F(1,39) = 5.39$; $p < .05$) main effects, and no PHASE-METHOD interaction ($F(1,39)= 1.50$; $p > .05$), suggesting that the phonic method group is better than the nonphonic group.

Discussion

The results of this study confirm that phonemic awareness contributes significantly to the learning of reading and spelling in BP. Moreover, in agreement with previous studies, it was found that segmentation, compared to all the other phonemic abilities, is the most important predictive factor of success in reading and spelling at the end of the 2nd grade. The contribution of phonemic awareness to these skills varied as a

function of the learning phase. As for reading, it tended to decrease at the end of the 2nd grade, possibly owing to reading transparency in BP, a condition that allows for rapid mastering of the decoding processes and, consequently, of phonological awareness. This finding seems to suggest that phonemic awareness can be a critical factor early in the learning process (Melby-Lervag, Lyster & Hulme, 2012). However, its influence becomes less important as certain mastery of the reading skill is achieved (Paolucci & Ávila, 2009; Vaessen & Blomert, 2010). The contribution of phonemic awareness seems, thus, restricted to a short period, at the very beginning of the learning process. On the other hand, the contribution of phonemic awareness to writing at the end of the 2nd grade, though moderate, seems to be more significant than to reading. This might reflect the asymmetry that exists in transparency in the GPC and PGC in the BP orthography and the greater complexity of spelling as a productive skill.

These results are in accordance with studies on different transparent orthographies, such as Spanish (Suárez-Coalla, García-de-Castro & Cuetos, 2013), Greek (Porpodas, 1991), Italian (Cossu, Shankweiler, Liberman, Katz, & Tola, 1988) or Dutch (Jong & van der Leij, 1999), that have shown the importance of phonemic awareness as a predictive factor of literacy. They also point out that phonemic awareness develops more easily and faster in such orthographies than in opaque ones (Caravolas et al., 2013).

Moreover, the development of phonemic awareness is shown to be associated with reading and spelling development, as expected, in a reciprocal well-established relationship. At the beginning of the 1st grade, the children in both groups showed low performance in the phonemic tasks. After a short period of alphabetic teaching (at the end of the 1st grade), they achieved a rapid development of these abilities, and at the end of the 2nd grade, the two groups obtained a similar result. This might reflect the influence of orthographic knowledge on the execution of phonemic tasks, possibly motivated by reading transparency in BP. Also, it was observed that in Phase 2 the development of phonemic awareness was more clearly marked in children taught through phonics. However, the difference with the nonphonic group was not significant.

Considering the reading ability, both groups achieve a similar level at the end of second grade. These results confirm that, when orthographies are transparent, decoding is achieved rapidly by children, irrespective of the teaching method used (Landerl, 2000).

Regarding spelling, the phonic group had a significantly better performance than the nonphonic group, at the end of the 2nd grade. Thus, in line with the literature, the phonic method proved to be more efficient for promoting spelling learning (Hempenstall, 2016; Dehaene, 2012). Because of the greater opacity of BP writing, the phonemic awareness skills were called for upon a longer term. This better performance of the phonic group in spelling reflects parallel differences in phonemic awareness development between the two groups. Even though better performance in phonemic awareness was observed only in Phase 2, children may have been helped to discover

the alphabetic principle and to construct self-teaching strategies (Share, 1995) more quickly and effectively than the children of the nonphonic group. In this way, the phonic method children had the benefit of both, better phonological representations and clear explanation of the orthographic correspondences. A fact worth mentioning is the progression in reading performance as opposed to spelling performance observed between phases 2 e 3. As mentioned, in Phase 3 the words in the task varied as to regularity, length, and frequency of occurrence. The introduction of words with larger complexity in comparison with the ones of the previous phases brings about bigger challenges to the mastery of the spelling ability, whereas in reading, the children in both groups could be seen to have easily overcome such obstacles, probably because of the transparency of reading, which helps its learning. These data show that the spelling learning process in BP is slower than that of reading.

In this direction, another study in PB comparing the independent contribution of phonemic awareness skills, knowledge of grapheme, memory and rapid automatized naming (RAN) to the writing of words throughout the first five years of schooling, confirmed phonemic awareness as the most influential predictive factor during the 1st and 2nd year. The contribution of the RAN occurred only in the 4th year (Godoy, 2016).

Summing up, it seems that phonemic awareness contributes to children's performance in reading and spelling in BP. However, the duration of this effect differs in those two skills. As for reading, possibly because of greater transparency, phonemic awareness plays a critical role at the very beginning of literacy. This does not apply to spelling, where this influence continues for a longer time.

The results of this investigation concerning the learning of reading seem to be more in line with Landerl's (2000) conclusions, when she states that, in a transparent orthography, even when a global method is used, the orthographic system itself provides clear and unmistakable information about the grapheme-phoneme relationship, and this facilitates the decoding development process. The orthographic consistency of reading in BP may itself help the decoding process and, consequently, the development of phonemic awareness. Another hypothesis to be considered would be that the contrast provided by the literacy teaching methods in this study has not been sufficiently strong to cause significant differences in both phonemic awareness and reading development in the two groups.

Yet, as for the learning of spelling, the greater opacity of the BP orthographic system requires the participation of phonemic awareness over a longer period, and the phonic method group was capable of developing the coding processes in a more significant way, probably due to having developed better phonological representations, and to having been exposed to the explicit teaching of orthographic-phonological correspondences. Therefore, the teaching method does seem to influence the process of learning to write in BP, with better results attributed to the phonics teaching method, which gives support to the mentioned Brazilian studies (Santos & Maluf, 2010; Santos & Barrera, 2017; Capovilla & Capovilla, 2000).

From an educational viewpoint, these results suggest that in order to achieve the domain of literacy in an effective way, the BP learner should be provided with clear and explicit coding instruction, which is in agreement with what has been shown in many studies in other alphabetic systems (Hempenstall, 2016) as well as with the national intervention studies with children with learning difficulties (Justino & Barrera, 2012; Fukuda & Capellini, 2012).

Although most results presented here agree with the literature, it is important to point out that due to limitations such as sample size, number of classrooms followed and the exploratory nature of the of the current study, its findings are not generalizable. However, it is also important to realize that exploratory studies have the value of indicating a tendency to be explored in further research. In this sense, experimental studies of longitudinal character are very welcome and can confirm, clarify and amplify the results achieved here.

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