Original Article

Artigo Original

Profile of phonological awareness in bilingual and monolingual children

Perfil das habilidades de consciência fonológica em crianças bilíngues e monolíngues

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Keywords

Language
Child development
Multilingualism
Education
Child

ABSTRACT

Purpose: To compare the performance of phonological awareness skills in bilingual and monolingual students of both genders. **Methods:** This research presents an observational, cross-sectional descriptive study conducted with 17 students from the 3rd grade, aged between seven years and 8 years and 11 months, with similar socioeconomic level, from two private schools, being one a monolingual school, and the other a bilingual one. Children at risk for auditory deprivation of any degree, those with learning difficulties, and children enrolled in the school less than two years were excluded from the research. A total of nine bilingual and eight monolingual students was tested using the Phonological Awareness Profile test. **Results:** The results showed that 64.7% of the 17 students tested reached the performance expected for their age, and 35.3% performed above expectation, being 83.3% of the latter bilingual students. The bilingual children presented better performance in the sequential rhyme skill and in the total test score, and the male bilingual children presented better performance in the phoneme addition skill. There was no statistically significant difference when comparing the performance of bilingual and monolingual female students. **Conclusion:** Bilingual children had greater command of phonemic awareness skill. Male bilingual children showed better performance when compared to their monolingual peers than female bilingual students.

Descritores

Linguagem
Desenvolvimento infantil
Multilinguismo
Educação
Criança

RESUMO

Objetivo: Comparar o desempenho das habilidades de consciência fonológica em escolares bilíngues e monolíngues de ambos os gêneros. **Métodos:** Esta pesquisa apresenta um estudo observacional, transversal, descritivo, realizado com 17 escolares do terceiro ano, com faixa etária entre sete anos e 8 anos e 11 meses, de duas escolas particulares, com nível socioeconômico próximo, sendo uma de ensino monolíngue e a outra bilíngue. Foram excluídos da pesquisa os escolares com risco de privação auditiva de qualquer grau e dificuldade de aprendizagem e as crianças bilíngues matriculadas na escola há menos de dois anos. Ao total, foram testados nove escolares bilíngues e oito monolíngues utilizando o teste Perfil de Habilidades Fonológicas. **Resultados:** Os resultados demonstraram que 64,7% das 17 crianças alcançaram o desempenho esperado para a sua idade, e 35,3% obtiveram desempenho acima do esperado, sendo que dessas, 83,3% eram bilíngues. As crianças bilíngues obtiveram melhor desempenho na habilidade de rima sequencial e no total do teste. As bilíngues do gênero masculino apresentaram melhor desempenho na habilidade de adição de fonemas. Não houve diferença ao comparar o desempenho nas tarefas dos escolares bilíngues e monolíngues do gênero feminino. **Conclusão:** As crianças bilíngues indicaram maior domínio da habilidade de consciência fonêmica e os meninos bilíngues demonstraram melhor desempenho quando comparados aos seus pares monolíngues do que as meninas bilíngues.

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Received: 08/04/2012

Accepted: 01/14/2014

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Conflict of interests: nothing to declare.

INTRODUCTION

As a consequence of sociocultural changes, explained by the growing insertion of Brazil's economy in the globalized world, the number of children enrolled in bilingual schools has been rising gradually.

Currently, there is discussion about the implications that this brings to the phonological abilities of children who study in educational institutions with a bilingual pedagogical approach. It is believed that, due to the perceptive and auditory experiencing of the sounds of two languages, bilingual children have better performances regarding some skills related to phonological awareness (PA) in comparison to monolingual children, who experience the sounds of a single language[1,2].

PA ability is an individual's capability to reflect about the sound structure of words and to manipulate their structural components[3]. It is one of the pre-requisites for learning how to read and write, and it is improved during the learning process[4].

The mental operations involved in the processing of information based on the sound or phonological structure of oral language include quickness to access phonological information (access to the lexicon stored in the memory), the phonological component of memory, and PA[5]. There is a significant link between phonological memory, speech production complexity, and the choice of phonemes used to produce words[6].

Early bilingualism refers to the acquisition of more than one language in the pre-adolescent phase of life[7]. An individual is considered bilingual when he/she utilizes two languages with relative regularity[8].

Current viewpoints define bilinguals as speakers who have a bilingual competence that lies on structured systems with particular articulatory and acoustic properties that depend on the interaction of several variables, including the interaction between the phonetic systems of both languages[7].

Studies[9] conducted with English–Greek and Greek–English bilingual children and two groups of monolingual children — English and Greek-speaking, respectively — demonstrated that PA may depend on the phonological complexity of the first or the second language. When the second language is phonologically simpler than the first, the latter may have an enabling effect on PA development; however, when the second language is phonologically more complex than the first, it does not facilitate PA development.

In the literature on this topic, several research studies are found on the PA development of monolinguals and bilinguals who speak a variety of languages, evidencing important conclusions[10-13]; however, few are the studies that highlight the variable gender in assessing PA and bilingualism. In the south of Brazil, scholars investigated the PA development of bilingual and monolingual children of both sexes[14]. The authors observed better performances among the girls in the majority of PA tasks.

In our study, we aimed at comparing the PA performances of bilingual and monolingual students of both sexes. For this purpose, we outlined the profile of the PA skills of both groups of students, and verified their performances and studied which PA skills are most frequent in bilingual children.

METHODS

This is an observational and descriptive cross-sectional study carried out with 17 third-year students ranging from seven years to eight years and 11 months of age, enrolled in two private schools, one with monolingual curriculum and the other bilingual, in the city of Salvador, with approximate socioeconomic characteristics. For our purposes, we established the following exclusion criteria: students with auditory impairments of any degree or learning difficulties reported by the school; bilingual students (in the bilingual school) enrolled in the institution for less than two years, as some studies defend the hypothesis that the individual's age at the time of bilingualism acquisition influences brain organization and laterality development, thus determining the role of both hemispheres in verbal information processing[8]. Considering this, we estimated that, after two years of enrollment in a bilingual school, these neurophysiological aspects would have been modified to the extent of differentiating the groups in question significantly. It is worth highlighting that the monolingual children were not bilingual at home, and that the bilingual individuals were regularly exposed to Portuguese and English linguistic systems at school.

This study was submitted to the Ethics Committee of Hospital Espanhol in Salvador and approved under report number 046/08. It is in accordance with Resolutions 196/96 and 251/97.

We sent the Informed Consent to be signed by the legal guardians via the students, as well as a letter requesting their permission to include their child(ren) in this study along with a questionnaire to gather information about the children's history of auditory, visual, neurological, and emotional impairments. We also asked about any congenital illnesses, language development delays, complaints about learning difficulties, and if the child was monolingual (Brazilian Portuguese — BP) or bilingual (English and BP). The purpose of this document was to aid in the selection of participants, according to the criteria mentioned above.

In total, we tested nine bilingual students (four boys and five girls) and eight monolingual students (four boys and four girls).

We applied the PA skills test[15] to the participants of this study. Each subtest is composed of three initial examples used by the evaluator to explain to the child what must be done. The test per se begins after each one of them has been exposed.

This test was used to verify the following variables:

- Syllabic analysis – initial, medial, and final – with the purpose of analyzing how the child perceives syllables at the beginning, middle, and end of words;
- Syllable and phoneme addition – to indicate how the child synthesizes syllables and phonemes to form words;
- Sentence and word segmentation – to verify how the child perceives the division of a word in syllables, and of a sentence in words;
- Syllable and phoneme subtraction – to identify the child's ability to subtract syllables and phonemes from a word and to perceive in what word this process results;

- Syllable and phoneme substitution – to verify how the child substitutes syllables and phonemes in the words and how he/she perceives the resulting word;
- Rhyme reception – to analyze the child's ability to perceive similar ending sounds between two different words;
- Sequential rhyme – to assess the child's auditory sequential memory;
- Syllabic reversal – to identify whether the child is capable of perceiving isolated sounds reversely and of using them to form the correct word; and
- Articulation image – to determine which articulation image the child has for each speech sound[15].

The collection occurred during two meetings in each school, with approximately 20 minutes of duration for each student. The selected children entered a room assigned for this activity while the others waited their turn in a different location. The protocol was applied individually and using simple language so that the child would not feel that he/she was being tested. With the purpose of avoiding any degree of anxiety, it was explained to each one of them that the activity was a "game" and that there was no problem if the answers were not all correct.

During the entire sample collection, a single evaluator investigated the children's performances, and each item was preceded by a practice period so as to avoid the interference of any questions with the test.

The collected data were transcribed onto the program EpiData Entry 3.1 (CDC, Atlanta, GA, USA) and quantitatively verified by the SPSS, version 7.5 (Chicago, USA). The analysis of the data was conducted in stages. Firstly, we added up the results for each variable and obtained the total for each child. The groups were then compared in three stages, without considering gender, and after this step the same analysis was conducted by specifying the individuals' gender.

In the descriptive analysis, we considered absolute and relative frequencies, as well as measures of central tendency (average) and of dispersion (standard deviation). In order to verify the relation between dependent and independent variables, we utilized Mann-Whitney's test with a significance level of 5%.

The Informed Consent, the questionnaires, and the tests conducted with each participant were stored and identified in a separate file.

RESULTS

There were statistically significant differences between the two groups. According to their age range, out of the 17 children who participated in this study, none had a performance below the expected, and the total individual test score was higher than 55 points[15]. Of this sample, 64.7% of the children were within the expectations, which ranged between 55.0 and 68.0 points[15], while 35.3% had performances that surpassed the expectations for their age and obtained more than 68.0 points[15]; 83.3% of these were bilingual. We observed that, out of the bilingual children who presented test performances that exceeded the expectations, 60% were female. In the monolingual group, the number was 100% for this gender.

The performance of the groups in each PA skill subtest is displayed in the form of tables. We observed that the bilingual children presented significantly better performances on sequential rhyming and on the total test score ($p<0.05$). In addition to these skills, the same group had better performances on articulation image skills, with values that bordered what was considered statistically significant ($p=0.05$) (Table 1).

Table 2 displays the performance of the male participants in both groups on each PA skill, and Table 3 presents the females' performances. We did not observe any significant differences in the individuals' performances among the girls. On the other hand, upon comparing the boys in both groups in question, we perceived that the bilinguals had better performances on the skill of phoneme addition than their monolingual counterparts ($p<0.05$).

It can be observed in Tables 1 to 3 that the standard deviation index is null for the bilingual children in 37.5% of the PA skills addressed on the test, while this number was only 12.5% for the monolinguals. When compared between the genders, this variable revealed that the standard deviation was null for 50.0% of the females in both groups — bilingual and monolingual. Concerning the male participants, the null value of standard deviation was found in 37.5% of the bilinguals and 18.7% of the monolinguals.

DISCUSSION

The data collected and analyzed in this study had the purpose of elucidating the PA performance of monolingual and bilingual students of both sexes. Based on these data, we aimed at comparing these skills among bilingual and monolingual boys and girls. Upon evaluating the scores of each group, we found similarities and differences, described hereafter.

The group of bilingual students obtained a higher average score (Table 1), in agreement with other studies that registered advanced skills in bilingual children in comparison to monolinguals[10-12], and in disagreement with another study[16] in which no global differences were found between the groups evaluated.

When comparing the performance average of both groups on each subtest, it is interesting to highlight that, although the results did not reveal statistically significant differences, we verified that monolingual children had better performances on two PA skill tests: word segmentation and syllabic reversal (Tables 1 to 3). This fact may be justified by the sound characteristics of BP, which are syllabic and, for this reason, enabled the children to recognize phonological units more easily[10]. Therefore, it is inferred that the monolingual children fared better on these tests because they were more attentive to the syllables and words.

On the other hand, the bilinguals obtained better results on the subtest of phonemic awareness, a skill considered to be more complex than syllabic awareness. The better scores on this skill may be justified by the environment of richer linguistic input experienced by these children, which results in a better development of skills that are relevant to phonemic discrimination[6]. This hypothesis is in agreement with studies that state that bilingual children usually pay more attention to phonetic rather than to semantic aspects[1].

Table 1. Performance of the bilingual and monolingual students of both sexes on the tasks of phonological awareness skills

Subtest	Participants/group	Mean	Standard deviation	p-value
Initial analysis	Eight monolinguals	7.75	0.707	0.289
	Nine bilinguals	8.00	0.000	
Final analysis	Eight monolinguals	3.88	0.354	0.931
	Nine bilinguals	3.89	0.333	
Median analysis	Eight monolinguals	3.88	0.354	0.289
	Nine bilinguals	4.00	0.000	
Syllable addition	Eight monolinguals	4.00	0.000	1.000
	Nine bilinguals	4.00	0.000	
Phoneme addition	Eight monolinguals	2.88	0.991	0.441
	Nine bilinguals	3.22	0.833	
Sentence segmentation	Eight monolinguals	2.50	1.195	0.617
	Nine bilinguals	2.78	0.972	
Word segmentation	Eight monolinguals	7.50	1.414	0.664
	Nine bilinguals	7.33	1.414	
Syllable subtraction	Eight monolinguals	3.88	0.354	0.931
	Nine bilinguals	3.89	0.333	
Phoneme subtraction	Eight monolinguals	3.50	0.535	2.460
	Nine bilinguals	3.78	0.441	
Syllable substitution	Eight monolinguals	2.00	0.000	1.000
	Nine bilinguals	2.00	0.000	
Phoneme substitution	Eight monolinguals	1.50	0.535	0.246
	Nine bilinguals	1.78	0.441	
Rhyme reception	Eight monolinguals	7.25	1.488	0.122
	Nine bilinguals	8.00	0.000	
Sequential rhyming	Eight monolinguals	4.13	1.356	0.041*
	Nine bilinguals	5.78	1.563	
Syllable reversal	Eight monolinguals	3.50	0.535	0.666
	Nine bilinguals	3.33	0.707	
Articulation image	Eight monolinguals	6.75	1.832	0.050
	Nine bilinguals	8.00	0.000	
Total	Eight monolinguals	64.88	4.257	0.027*
	Nine bilinguals	69.78	2.587	

*p<0.05 was considered statistically significant: Mann-Whitney's test

Both groups had the same performance on the subtests of addition and substitution of syllables. Some authors argue that, in the initial stages of phonological development, children perceive and produce longer phonological units, such as words and syllables, and only later they learn to differentiate smaller phonological units, such as phonemes[1-4,17]. Since these skills are related to syllabic awareness (substitution and addition) — and considering the previous affirmation — the performance of both groups had the potential of being satisfactory and equally compared regardless of exposure to a second language.

The bilingual children had better performances on the total test score because they obtained more positive results in the majority of PA tasks.

The bilingual children showed better performances on the skill of sequential rhyming, related to auditory sequential memory[8], which implies that the exposure to more than one language can benefit the development of this skill. Keeping in mind that phonological processing includes how quickly an individual is able to access phonological information (access to the lexicon stored mentally), the phonological component of work memory, and PA[5], it is believed that this difference lies in the fact that a bilingual child needs to identify and differentiate four possible forms of phonemes, two in each language, in order to form four words of different semantics, while a monolingual child has to differentiate only two corresponding phonemes, the so-called minimal pairs, in his/her mother tongue. In other words, bilingual children access the lexicon stored mentally in order to differentiate phonological components many times, which makes them more experienced and skillful in comparison to monolingual children.

Another skill in which the bilingual students presented very relevant results was articulation image. When calculated, this skill was quite close to what is considered statistically significant. This skill refers to the images a child has for each speech sound[8], making clear, once again, that when the linguistic environment is richer in auditory stimuli, there is better development of skills that are relevant to phonemic discrimination[7]. This, in turn, enables the comprehension that the articulation of the phonemes of a given language is a determining factor to differentiate all of its phonemes. Thus, the attention paid to the accurate production of phoneme sounds by bilingual children is more marked in comparison to that of monolingual children, who experience the phonemic stimulation provided by a single language.

Table 2. Performance of the bilingual and monolingual male students on the tasks of phonological awareness skills

Subtest	Participants/group	Mean	Standard deviation	p-value
Initial analysis	Four monolinguals	7.50	1.00	0.686
	Four bilinguals	8.00	0.00	
Final analysis	Four monolinguals	3.75	0.50	1.000
	Four bilinguals	3.75	0.50	
Median analysis	Four monolinguals	3.75	0.50	0.686
	Four bilinguals	4.00	0.00	
Syllable addition	Four monolinguals	4.00	0.00	1.000
	Four bilinguals	4.00	0.00	
Phoneme addition	Four monolinguals	2.25	0.50	0.029*
	Four bilinguals	3.75	0.50	
Sentence segmentation	Four monolinguals	3.00	1.41	0.111
	Four bilinguals	2.50	1.29	
Word segmentation	Four monolinguals	7.00	2.00	0.730
	Four bilinguals	7.00	2.00	
Syllable subtraction	Four monolinguals	3.75	0.50	0.556
	Four bilinguals	3.75	0.50	
Phoneme subtraction	Four monolinguals	3.50	0.58	1.000
	Four bilinguals	3.75	0.50	
Syllable substitution	Four monolinguals	2.00	0.00	1.000
	Four bilinguals	2.00	0.00	
Phoneme substitution	Four monolinguals	1.00	0.00	0.730
	Four bilinguals	1.75	0.50	
Rhyme reception	Four monolinguals	7.50	1.00	0.686
	Four bilinguals	8.00	0.00	
Sequential rhyming	Four monolinguals	4.50	1.00	0.200
	Four bilinguals	6.00	1.63	
Syllable reversal	Four monolinguals	3.50	0.58	1.000
	Four bilinguals	3.50	0.58	
Articulation image	Four monolinguals	7.50	1.00	0.686
	Four bilinguals	8.00	0.00	
Total	Four monolinguals	64.50	4.04	0.413
	Four bilinguals	69.75	2.75	

*p<0.05 was considered statistically significant: Mann-Whitney's test

Another relevant aspect found in the statistical analysis was the null standard deviation presented by the bilingual children on some skill subtests, a fact that was not registered in the group of monolinguals. Regarding gender, the null standard deviation was the same for the female bilingual and monolingual participants, but it was different for the males, and it did not reveal any variability in the answers of the group of bilingual boys.

Some scholars affirm that the earlier the children are exposed to two different languages, the better will be their linguistic competence skills and fewer the difficulties to stabilize their phonological system[18,19]. This affirmation infers an explanation for the more marked homogeneity (null standard deviation) present in the answers of the bilingual group of boys, a difference that was not relevant in the case of the girls, regardless of being bilingual or not.

We believe that the explanation for this fact lies in the contribution of studies that showed, through functional neuroimaging exams, that language is processed differently by both sexes, and that there is indication that, when dealing with phonological material, verbal language processing occurs in both brain hemispheres in females, while this process unfolds in specific areas of the dominant hemisphere in males[18,19]. This explanation shows that the exposure to a second language enabled the bilingual boys to present better performances than the monolinguals. The same did not occur with the girls, as language processing already occurs in both hemispheres in their case, and it possibly did not improve once they were exposed to a second language.

The data obtained were compared among the boys and girls in both groups, and they revealed that the bilingual boys had better performances on the skill of phoneme addition, with statistically significant results. Phonemic awareness tasks are more complex[16], and the exposure to a second language may compose a richer environment for auditory stimuli, which justifies the better performances of the bilingual boys. This difference was not observed in the group of girls, a fact that is in agreement with authors who argue that language is processed differently by each sex[18,19].

It is worth highlighting that, in this study, bilingualism was a factor that favored statistically significant results concerning the tasks of sequential rhyming, phoneme addition, and total score (Tables 1 and 2), which leads us to infer that PA development can be influenced by bilingualism[20].

Table 3. Performance of the bilingual and monolingual female students on the tasks of phonological awareness skills

Subtest	Participants/group	Mean	Standard deviation	p-value
Initial analysis	Four monolinguals	8.00	0.00	1.000
	Five bilinguals	8.00	0.00	
Final analysis	Four monolinguals	4.00	0.00	1.000
	Five bilinguals	4.00	0.00	
Median analysis	Four monolinguals	4.00	0.00	1.000
	Five bilinguals	4.00	0.00	
Syllable addition	Four monolinguals	4.00	0.00	1.000
	Five bilinguals	4.00	0.00	
Phoneme addition	Four monolinguals	3.50	1.00	0.286
	Five bilinguals	2.80	0.84	
Sentence segmentation	Four monolinguals	2.00	0.82	0.111
	Five bilinguals	3.00	0.71	
Word segmentation	Four monolinguals	8.00	0.00	0.730
	Five bilinguals	7.60	0.89	
Syllable subtraction	Four monolinguals	4.00	0.00	1.000
	Five bilinguals	4.00	0.00	
Phoneme subtraction	Four monolinguals	3.50	0.58	0.556
	Five bilinguals	3.80	0.45	
Syllable substitution	Four monolinguals	2.00	0.00	1.000
	Five bilinguals	2.00	0.00	
Phoneme substitution	Four monolinguals	2.00	0.00	0.730
	Five bilinguals	1.80	0.45	
Rhyme reception	Four monolinguals	7.00	2.00	0.556
	Five bilinguals	8.00	0.00	
Sequential rhyming	Four monolinguals	3.75	1.71	0.190
	Five bilinguals	5.60	1.67	
Syllable reversal	Four monolinguals	3.50	0.58	0.730
	Five bilinguals	3.20	0.84	
Articulation image	Four monolinguals	6.00	2.31	0.286
	Five bilinguals	8.00	0.00	
Total	Four monolinguals	65.25	5.06	0.286
	Five bilinguals	69.80	2.77	

*p<0.05 was considered statistically significant: Mann-Whitney's test

The results of this study do not corroborate those of other authors who reported that they did not observe significant differences concerning PA skills between the sexes[21,22]. On the other hand, it is in agreement with authors who affirm the existence of neurophysiological differences in phonological processing[18].

With this study, we sought to add to the literature on this topic and to provide preliminary results that reveal that PA development can be influenced by learning another language. However, we highlight that the data used here are limited, given that the sample was small. We therefore suggest the conduction of other studies on this topic with a larger number of participants.

CONCLUSION

We conclude that the performances of the groups were different on the PA skills tested. Nevertheless, the performances of both groups were satisfactory according to the test applied.

We observed that the skill of phonemic awareness, the most complex part of PA, was better dominated by the bilingual children. The exposure to a second language enabled them to achieve performances beyond the expectations for their age range and also higher total test scores.

The bilingual boys demonstrated better performances than their monolingual counterparts, while the bilingual girls did not reveal important differences.

Therefore, we verified in this study that the exposure to two languages, contrary to what some scholars believe, does not impact PA skills negatively but, instead, make children more susceptible to language sounds.

**AGCL was responsible for data collection and tabulation; LBRS collaborated with data collection and tabulation, and supervised collection; LBRS was also responsible for the study project and outline, as well as overall supervision of the stages of manuscript writing and elaboration.*

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