INFLUENCE OF SCHOOLING ON LINGUSTIC-COGNITIVE SKILLS

Influência da escolaridade em habilidades linguístico-cognitivas

Maria Silvia Cárnio[1], Blenda Regina Zoccal Licas[2] , Aparecido José Couto Soares[1]

ABSTRACT

Purpose: to verify the influence of schooling on Phonemic Awareness and Rapid Automatized Naming, and also the possible correlation between such skills, in students from the 3rd and 4th year of elementary school. **Methods:** as sample, this study counted on 29 students from the 3rd (Group 1) and 28 from the 4th (Group 2) year of elementary school. All the participants were selected through standardized tests to Brazilian Portuguese regarding Phonology (Oral Language) and further reading, writing and arithmetic (Written Language). To asses Phonological Awareness it was applied the second part of a Phonological Awareness Test – Consciência Fonológica – Instrumento de Avaliação Sequencial (CONFIAS); the assessment of Rapid Automatized Naming was performed by the Comprehensive Test of Phonological Processing in its Brazilian Portuguese version. **Results:** students from Group 1 showed lower performance in Phonological Awareness than Group 2, however with no significant difference. In relation to Rapid Automatized Naming, the time spent to naming and also the errors pattern was similar in both groups. There was difference only in the time spent to naming and in the errors pattern of numbers. **Conclusion:** there is influence of schooling, even slightly, on Phonological Awareness and Rapid Automatized Naming once students from Group 2 showed best results than Group 1 in both tests. Nevertheless no significant difference was found.

KEYWORDS: Evaluation; Language; Reading; Learning; Education

INTRODUCTION

Several studies[1,2] have claimed that linguistic-cognitive skills such as phonemic awareness (PA) and rapid automatized naming (RAN) are essential to both acquisition and development of reading abilities.

PA is the capacity of manipulating the phonemes of the language[3,4] in tasks of blending, splitting and manipulation of speech sounds. Such skill is developed in parallel to reading and writing acquisition and also foster literacy development , that is, they are connected in a reciprocal way. Researches have shown that PA skills are more linked to the literacy process than syllabic tasks[5,6].

Meanwhile PA have been related to decoding skills and also letter-to-sound proficiency[7], further variables are associated to word recognition and, consequently to reading fluency such as RAN[8], one of the most important skills. A wide range of researches have stated that RAN may predict reading fluency [9-11].

When children master phonological awareness and know the name of the letters, it leads them to quickly access phonological information and drive their attention to the letter sequences, which may favor the orthographic processing. Furthermore, the fast processing in each level of reading leads to the quick word recognition[12]. Learning to read and write in an alphabetic orthography requires the ability of quickly process visual symbols[13].

(1) Departamento de Fisioterapia, Fonoaudiologia e Terapia Ocupacional da Faculdade de Medicina da Universidade de São Paulo (FMUSP), São Paulo, SP, Brasil.

(2) Curso de Fonoaudiologia da Faculdade de Medicina da USP (FMUSP), São Paulo, SP, Brasil.

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Various studies[8,9] have suggested that PA is more deeply related to the development of decoding skills, that is, the ability to establish letter-to-sound associations. In the other hand, orthographic memory is associated to quickly process visual symbols and favor children to read and interpret texts efficiently[9-11]. Hence, is undeniable the importance of such skills to the literacy in alphabetic languages such as the Brazilian Portuguese.

Several researches[8-10,13] have investigated the relation between PA, RAN and written language, showing the importance of then in the schooling process. Nevertheless, studies which investigated the opposite relation, that is, whether the schooling process has influence on linguistic-cognitive skills and also if there is reciprocity between them, are scarce. Relying on this basis, investigate the influence of schooling on PA and RAN may provide parameters to best understand the relation between them.

Thus, this study aimed to verify the influence of schooling on PA and RAN and also the possible correlation between them in students from the 3rd and 4th year of elementary school.

METHODS

This study, prospective and transversal, was approved by the Ethics Committee of the Institution under nº 214/11. All parents/caretakers signed the Free Informed Consent Term to allow their children to participate in this research.

The study included 29 elementary school children from 3rd grade (G1) and 28 from 4th grade (G2), for a total of 57 children. The mean age of the children in G1 was 8:5 years, and the group included 16 male and 13 female children; G2 consisted of 12 female and 16 male children with a mean age of 9:3 years.

To compose the sample, the following inclusion criteria were considered: lack of hearing, cognitive or visual impairment; absence of previous communication disorders in either oral or written language; lack of concerns regarding the child's learning process or current academic performance.

Procedures for selecting subjects

All parents/caretakers signed the Free Informed Consent Term to allow their children to participate in this research.

In order to guarantee the inclusion criteria an oral phonological assessment standardized to Brazilian Portuguese[14] was performed to verify the existence of phonological disorders. Regarding written language it was used the School Performance Test[15] which assesses writing, reading and arithmetic skills. All tests were performed in scheduled days according to the availability of the school. All analysis of both tests followed the guidelines presented in each test. Students who showed any type of disorders were referred to specific health services.

Experimental Proofs

All children underwent the second part of CONFIAS *(Consciência Fonológica: Instrumento de Avaliação Sequencial)*[16] . According to its instructions the children were supposed to perform tasks presented in a increasing level of challenge, including producing a word that starts with a defined phoneme, identifying a word's initial phoneme, phoneme exclusion, and split and mixed phonemes. All children were previously trained with two examples for each task. The test comprises 30 items in which each correct answer is equivalent to one point. Consequently 30 points is the maximum score of the test.

After PA assessment, RAN was investigated through the Comprehensive Test of Phonological Processing (CTOPP)[13], according to the instructions of the Brazilian Portuguese version[17,18]. All subjects were trained in order to guarantee their knowledge of the items to be named. Sequentially, they were instructed to name the stimuli presented as fast as possible, speaking intelligibly and audibly in each item. All the stimuli were distributed and randomly repeated in four lines and nine columns divided into two parts (A and B). Analysis of the performance considered the time taken for naming in each category of the test as well as the amount of errors in all subtests.

All data was tabulated and statistically analyzed in SPPS 18. Initially, a descriptive analysis of all parameters was performed and also the distribution of data was investigated. Mann-Whitney and Spearman correlation coefficient were used to analyze the relation between the performances of the children in both tests. A significance level of 5% was adopted for hypotheses tests.

RESULTS

Students from G1 showed lower means than G2 with no significant difference. However, the value of p was very close to 0,005 (Table 1).

Descriptive analysis of time spent to each task indicated that students from both groups showed greater means naming objects and letters (Tables 2 and 3).

In relation to the amount of errors in RAN, descriptive analysis indicated that students from G1 and G2 presented errors mostly in naming colors (Tables 2 and 3).

Table1 – Performance of Groups 1 and 2 in phonemic awareness

	Minimum	Maximum	Median	Mean	Standard Deviation	U	Z	Value of p
G1	13,0	28,0	21,0	21,52	4,16	286,0	-1,923	0,054
G2	14,0	30,0	26,0	23,57	4,55			

Legend: U = Mann-Whitney statistics tests ; Z= score Z

* Significant results (p <0,05) – Mann-Whitney non parametric tests

Table 2 – Performance of Group 1 in Rapid Automatized Naming

	Minimum	Maximum	Median	Mean	Standard Deviation
TimeRAN_objects	61,0	138,0	82,0	88,03	18,24
TimeRAN _letters	35,0	84,0	47,0	51,14	12,38
TimeRAN _numbers	36,0	78,0	44,0	48,03	10,33
TimeRAN _colors	62,0	174,0	92,0	95,66	23,25
ErrorsRAN_objects	0,0	4,0	1,0	1,45	1,33
ErrorsRAN_letters	0,0	5,0	0,0	0,97	1,48
ErrorsRAN_numbers	0,0	4,0	1,0	1,07	1,10
ErrorsRAN_colors	0,0	8,0	4,0	3,72	2,00

Legend: RAN Rapid Automatized Naming

Table 3 – Performance of Group 2 in Rapid Automatized Naming

	Minimum	Maximum	Median	Mean	Standard Deviation
TimeRAN_objects	56,0	137,0	77,0	84,43	22,75
TimeRAN _letters	30,0	74,0	45,5	45,82	11,60
TimeRAN _numbers	28,0	73,0	41,0	41,54	9,40
TimeRAN _colors	42,0	169,0	89,5	92,21	24,80
ErrorsRAN_objects	0,0	13,0	1,0	2,11	3,26
ErrorsRAN_letters	0,0	5,0	0,0	0,71	1,24
ErrorsRAN_numbers	0,0	3,0	0,0	0,32	0,67
ErrorsRAN_colors	0,0	12,0	2,0	3,36	3,42

Legend: RAN Rapid Automatized Naming

The comparison of the performance of students from G1 and G2 demonstrated that their errors patterns were similar. There was found difference between the groups only in RAN of numbers both in the time spent to name and in the amount of errors (Table 4).

To verify whether the performance in PA is correlated to RAN tasks, the Spearman correlation coefficient was used. Such investigation was restricted to the time spent to name since the number of errors was low in all tasks. It was noticed that no correlation between PA and RAN was found in G1. Concerning G2, negative correlation between PA and time spent to name letters and numbers was found, suggesting that the better the performance in PA, the lower is the time spent to name those items (Table 5).

Table 4 – Comparison between the performance of groups in Rapid Automatized Naming

	Group	U	Z	Value of p
TimeRAN_objects	G1 G2	336,0	-1,118	0,264
TimeRAN _letters	G1 G2	318,5	-1,398	0,162
TimeRAN _ numbers	G1 G2	245,0	-2,573	0,010*
TimeRAN _colors	G1 G2	373,5	-0,519	0,604
ErrorsRAN_objects	G1 G2	384,5	-0,356	0,722
ErrorsRAN _letters	G1 G2	368,0	-0,688	0,492
ErrorsRAN _ numbers	G1 G2	235,5	-3,036	0,002*
ErrorsRAN _colors	G1 G2	320,0	-1,387	0,165

Legend: RAN: Rapid Automatized Naming; U = Mann-Whitney statistical tests; Z= score Z
* Significant results (p <0,05) – Mann-Whitney non parametric test

Table 5 – Spearman correlation coefficient of Phonemic Awareness and time of Rapid Automatized Naming in Groups 1 and 2

			TimeRAN_ objects	TimeRAN_ letters	TimeRAN_ numbers	TimeRAN_ colors
3rd year	Phonemic Awareness	r	-0,212	-0,088	-0,088	0,082
		p	0,27	0,652	0,651	0,672
4th year	Phonemic Awareness	r	-0,292	-0,389	-0,393	-0,248
		p	0,132	0,041*	0,039*	0,203

Legend: RAN Rapid Automatized Naming; r = Spearman correlation coefficient; p = value of p
* Significant Results (p <0,05) – Mann-Whitney non parametric test

DISCUSSION

The results of PA showed similar means and standard deviations for both groups, assuring a steady pattern of scores for the children. Because the children in G1 and G2 were at different schooling levels, we expected to find significant differences in their scores, as several authors have previously claimed[19,20]. However, the statistical analysis shows a tendency toward significance that might have occurred whether the sample had been larger. Data indicated, even slightly, a best performance of G1 in PA suggesting the influence of schooling in such skill.

A study[21] in which children from 3rd and 4th year were subjects found results to those from the present study. The authors indicated that the knowledge of the children regarding orthography might have led them to rely on the written form of the words, even though they were instructed to not consider it. Thus, it is possible to affirm that the same process may have occurred to the children from this research.

Furthermore, it is important to note that in most countries where studies concerning PA are conducted, the literacy process is based on letter-sound tasks, which are essential to the proper evolution of literacy; however, such skills are not commonly taught in Brazilian schools. Hence, this may be an explanation of why children from different levels of schooling achieved similar performance in PA.

Specifically in the school where this study was performed, teachers emphasize syllable activities that do not improve phonemic knowledge, an essential issue to languages that rely on the alphabetic principle, such as Brazilian Portuguese[22]. On this basis, it is possible to speculate that schooling

was not a decisive factor to the statistical difference in PA due to the way that Portuguese is taught in Brazilian schools.

Data regarding RAN showed that children in G2 required less time to name the stimuli and made fewer errors; however, no statistically significant difference was found. Both groups required more time to name colors and objects than letters and numbers. Such stimuli demand the use of attentional, perceptive and visual process to retrieve the larger lexicon structure, which requires more time for naming them rapid and sequentially [5,23,24].

Regarding the similarity in the performance in RAN of children from the present study, it might have occurred due to the nearness of grade school between the groups and also because they have started to learn the orthographic patterns of Brazilian Portuguese. A research[25] investigated RAN in students from the cycle I of elementary school and found similar means between 3rd and 4th year children, the same level of schooling of students from the present study. Another Brazilian study[26], which verified the performance of students with and without cognitive impairment, also reported similar performance between the groups.

It is important to mention that several authors affirmed that in the early literacy, items such as letters and numbers are more quickly named than colors and objects due to the multiplicity of semantic structure that the formers require[27,28]. Since objects and colors involve lexical access, they might involve more than one retrieval feature, for example, the color blue may have various gradation of tones[27].

An international study[29] stated that although the performance in colors and objects may predict reading proficiency in preschool children, number and letters have more correlation with the reading of children in early literacy. Therefore, we may speculate that children from the different groups, even though in different levels of schooling, are both in early literacy. However, it is important to highlight that the statistical difference found in the time spent to name numbers and in the amount of errors in it, indicate a best performance of G2 and suggest that they may be more advanced than G1 in decoding skills.

Regarding the negative correlation between PA and RAN of letters and numbers for children from G2, results from others researches were confirmed[27,28]; those studies pointed that the better the performance in PA, the fewer is the time spent in RAN, and they both increase as the schooling advancement. Such correlation did not occur in RAN of colors and objects. A possible explanation for that relies on the fact that both skills are related to decoding tasks, suggesting that G2 may be more advanced in such skill.

A recent study[30] noticed that PA is related no only to early literacy but also to reading proficiency and may provide more accuracy in text reading activities. Thus, is possible to speculate that G2 children may present, even slightly, better performance in decoding tasks, variable which were not verified in the present research.

Hence, the present study provides relevant contributions showing that schooling has an important role on the development of linguistic-cognitive skills. Such data have been already known concerning PA[2,4,6-8,16], however they are scarce in relation to RAN. Thus, data from the present study indicate reciprocity between literacy and consolidation of PA and RAN.

It is important to emphasize that data from the present research highlight an important area of investigation in reading and writing field, pointing out the need of a better understanding regarding the reciprocity between the skills investigated in this research. Thus, a larger sample and tests involving reading skills may provide advancement in the knowledge of the relation between the variables investigated in this study.

CONCLUSION

There is, even slightly, influence of schooling on PA and RAN once G2 children showed better results than G1 in both tests, even though with no statistical difference.

Also, negative correlation between PA and RAN of letters and number is noticed only for students with higher level of schooling, indicating that the better performance in PA, the fewer time spent in RAN.

The present study raises important contributions concerning the development of linguistic-cognitive skills and its relation with schooling advancement, indicating reciprocity between them, and also the need of investigating a larger sample and different levels of schooling.

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RESUMO

Objetivo: verificar a influência da escolaridade na Consciência Fonêmica e Nomeação Automática Rápida, além da possível correlação entre tais habilidades em escolares do 3º e 4º ano do Ensino Fundamental. **Métodos:** participaram deste estudo 29 escolares do 3º ano (Grupo 1) e 28 escolares do 4º ano (Grupo 2) do Ensino Fundamental. Os sujeitos foram selecionados por meio de testes padronizados: um de fonologia (Linguagem Oral) e um de leitura, escrita e aritmética (Linguagem Escrita). Para a avaliação da Consciência Fonêmica foi aplicada a segunda parte da prova de Consciência Fonológica – Instrumento de Avaliação Sequencial. A avaliação da Nomeação Automática Rápida foi realizada por meio dos testes de Nomeação Rápida de números, cores, objetos e letras do "Comprehensive Test of Phonological Processing" adaptado para o Português Brasileiro. **Resultados:** os escolares do Grupo 1 apresentaram desempenho inferior em Consciência Fonêmica quando comparados ao Grupo 2, porém esta diferença não foi significante. A observação do desempenho entre os escolares do Grupo 1 e Grupo 2 em Nomeação Automática Rápida demonstrou que o padrão de tempo e de erros foi semelhante entre os grupos. Houve diferença apenas no tempo de nomeação e na ocorrência de erros na tarefa relacionada aos números. **Conclusão:** há influência da escolaridade, ainda que modestamente, em Consciência Fonêmica e Nomeação Automática Rápida, uma vez que escolares do Grupo 2 apresentaram melhores resultados do que Grupo 1, em ambos os testes, contudo sem diferença significante entre os grupos.

DESCRITORES: Avaliação; Linguagem; Leitura; Aprendizagem; Educação

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Mailing address:
Maria Silvia Cárnio.
R. Cipotânea, 51, Cidade Universitária
São Paulo – SP – Brasil
CEP: 05360-160
E-mail: mscarnio@usp.br