Tipologia de erros de leitura de escolares brasileiros considerados bons leitores*****

Reading errors typology of Brazilian students considered good readers

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Abstract

Background: assessment of oral reading. Aim: to characterize, according to the variables of public or private school and literacy, the types of errors in word reading presented by typical elementary/middle school students considered competent readers by their teachers. Method: participants of this study were 151 students with ages ranging between 8 and 12 years, from the 4th to the 7th grade of public and private schools. The students read a list of 38 words. The oral readings were transcribed and the errors analyzed according to their frequency. The frequency of errors was calculated based on the possibilities of errors presented by the used word list. Results: the obtained results gave evidence to the errors presented by typical students of both public and private schools from all of the tested grades. There was a statistically significant progressive reduction in errors of orthographic decoding according to literacy (p<0.0001). Considering the groups, students from private schools presented fewer errors of global orthographic decoding when compared to students from public schools (p < 0.0001). Conclusion: the results suggest that reading errors are part of the learning process of orthographic decoding rules. These errors are progressively overcome with literacy. The domain of orthographic decoding independent of the context occurred more prematurely than that which is dependent of the grapheme context.

Key Words: Reading; Assessment; Speech-Language and Hearing Sciencies.

Resumo

Tema: avaliação da leitura oral. Objetivo: caracterizar, segundo as variáveis rede de ensino e escolaridade, os tipos de erro na leitura de palavras isoladas, apresentados por escolares típicos do ensino fundamental, considerados competentes por seus professores. Método: participaram da pesquisa 151 escolares com idade entre oito e doze anos, matriculados do quarto ao sétimo ano do ensino fundamental das redes pública e particular. Os escolares leram uma lista com 38 palavras. As leituras orais foram transcritas e os erros analisados, segundo a freqüência de erros cometidos calculada com base na possibilidade de erros oferecida pela lista apresentada. Resultados: os resultados encontrados evidenciaram a presença de erros quando analisadas as leituras dos escolares típicos de ambas as redes de ensino e de todas as séries estudadas. Houve redução progressiva e estatisticamente significante dos erros de decodificação ortográfica em função da progressão da escolaridade (p < 0,0001). Considerando a rede de ensino, os escolares da rede particular apresentaram menor número de erros que os de escola pública quando comparado o desempenho na decodificação ortográfica global na prova de leitura de palavras (p < 0,0001). Conclusão: os resultados demonstraram que os erros de leitura fazem parte do aprendizado das regras de decodificação ortográfica e são superados, progressivamente, com o aumento da escolaridade. O domínio da decodificação da ortografia independente do contexto ocorreu mais precocemente que o da dependente do contexto grafêmico.

Palavras-Chave: Leitura; Avaliação; Fonoaudiologia.

Introduction

Adequate procedures may identify the reading level or the presence of decoding or comprehension difficulties when the reader is not competent. Literature indicates the administration of, at least, two tasks for this assessment: one that involves the recognition of isolated words and non words, and another one that demands the reading of texts 1-2. These are necessary tasks for the investigation of reading ability and for the clinical diagnosis of difficulties.

Recently, quantitative benchmarks for fluency (number of words read per minute) and accuracy are the most frequently used for diagnosing reading disabilities and characterizing a reader's fluency 3-10, those being a robust indicator of decoding competence 11. Although the benchmarks are of fundamental importance in the diagnosis and in determining a reading level, these are quantitative and do not explain how the reader processes information when recognizing words and how he progressively masters orthographic decoding. Thus, characterizing word reading errors may clarify strategies used or difficulties presented 12-16 and contribute to the comprehension of the typical learning to read process and its disabilities.

Research and international assessment tools present different ways for categorizing reading errors, those being part destined to the analysis of isolated item reading 13-15 and part to texts 17-18.

Few studies analyzed types of reading errors in Brazilian Portuguese (BP). In 2001, Pinheiro e Rothe-Neves 19 reaffirmed the existence of different effects of psycholinguistic characteristics of words on reading. In 2004, Capovilla, Capovilla and Suiter 20 assessed children with and without learning difficulties, and based on the rejection or not of homophones and non word pair items identified reading strategies utilized. These two researches, performed with isolated item reading in typical and learning disabled children, alerted to the possibility of knowing, through error typology analysis, subjacent processes, when the error is considered an attempt to read correctly. This, observed frequently in the early stages of learning should be overcome or the pattern modified with the progression of schooling.

Brazilian research found discrepancies in reading amongst private and public school students, strengthened by the hypothesis of socio-cultural interference on learning 21-22. These should be analyzed in order to verify if there is interference in reading competence in these two socio-cultural contexts.

The objective of the present study is to characterize, according to the variables type of school and schooling, types of isolated word reading errors, made by typical elementary students, considered competent by their teachers.

Method

Research approved by the ethics in research committee Unifesp (number 1045/05).

Sample Selection:

At the beginning of the first semester of the school year, 197 students were assessed, boys and girls (08 to 12 years old), enrolled in regular 4th to 7th grade elementary and middle school classes, referred by teachers 22-23, who were asked to select the best readers in each grade, considering the following exclusion criteria: presence of or indication of difficulties in learning to read; indication of or signs of cognitive impairment, psycho-emotional disorders or global developmental disorders; non signing of the clarification agreement sheet.

Of the total number of students, 75 were from private schools (PRS) and 122 from public schools (PUS) of the city of São Paulo. In order to confirm the teacher's indications, an analysis of word reading fluency of each student was made, which evidenced the possibility of participation of 151 students, whose mean reading speed was compared to results found by Ávila et al. 24 for isolated items. Thus, in PRS the mean values observed ranged from 55,3 to 61,5 wpm, and in PUS, from 38,2 to 60,1 wpm, in 4th to 7th grade.

The final sample constituted of 80 typical students of PUS (65% girls) and 71 of PRS (52% girls), with the following distribution: 4th grade: 18 and 20; 5th grade: 19 and 20; 6th grade: 19 and 20; 7th grade: 15 and 20 participants of public and private schools, respectively.

Material and Procedure

The assessment was made up of the oral reading of a list of 38 words in Brazilian Portuguese: bota, laço, povo, bife, apito, fava, ganso, valsa, salame, mesada, deusa, carro, crescer, cenoura, cravo, ciclo, esgoto, assistir, depôs, fiz, texto, exagero, deixa, gente, gilete, alguém, sagu, joelho, guerra, hífen, lâmpada, ênfase, calma, sagüi, xale,

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próximo, oxítona, absoluto. This list is the result of the adaptation of linguistic material proposed by Ramos 22. These modifications enabled the usage of all of the decoding rules of the Brazilian orthographic system. The list, balanced as to extension and frequency, was printed in black ink, all capital letters, font Arial 12 and double spaced, on a white background. The words from the list were displayed vertically.

The analysis, categorization and quantification of errors were based on Goulandris 13, Goikoetxea 14 e Ramos 22 considering the adaptation for the Brazilian Portuguese of the rules of orthographic decoding 25. Thus, the following types of errors were considered possible:

. T1- Substitution for visually similar word 13: when there was reading of the presented word as another orthographically similar word. The classification resulted in two different subcategories: one derived from errors in reading the final syllables of words (Example: exagero read as exagerado), and another derived from errors in reading the initial syllables of words (first syllable in dissyllabic words; first and second syllables for di, tri, and polysyllabic words. Example: oxítona read as azeitona).

. T2 - Regularizations 22: when irregular words, with "x" letter values, were read as regular words (with sound value of the -sh digraph). Example: exagero read as eshagero.

. T3 - Disrespect to the grapheme - phoneme correspondence rule independently of context 13,22: when the substitution of consonants, which have sole relationship to a phoneme, was observed, or the substitution of vowels during word reading, caused incorrect reading. Example: ganso read as canso.

. T4 - Omissions and additions 14: when vowels or consonants were omitted or added.

. T5 - Errors in orthographic rule application 22: when the error occurred by the misuse of rules in the correspondence dependent on grapheme context. Examples: mesada read as messada; gemada read as guemada.

. T6 - Sequencing inversions 14: when some letters present in the target stimuli were read in inverted sequence. Example: esgoto read as egosto.

. T7 - Error in word stress usage 14: when there was correct assignment of the sound values of graphemes, but error in the identification of the stressed syllable. Example: xale read as chalé.

. T8 - Error by disrespecting stress marks 14: when there was correct assignment of the sound values of graphemes in the word, but errors in the correct usage of word stress determined by stress marks. Example: lâmpada read as lampada.

. T9 - Complex errors 14: when there was more than an error in the same word.

. T10 - Refusals: when the child refused to read the presented word.

The readings were held individually and recorded (Onda brand mp4) for posterior analysis. No time limit was established or digital word following restricted during reading.

The recordings, heard and transcribed by one only speech therapist allowed for the identification, classification and computation of the total errors presented by category and in the reading test as a whole.

Later, the error possibilities were identified for all of the words according to each proposed category and for the totality of the test: substitution for visually similar word: 38; regularizations: 06; disrespect to the grapheme - phoneme correspondence rule independently of context: 38; omissions and additions: 38; errors in orthographic rule application: 30; sequencing inversions: 39; error in word stress usage: 38; error by disrespecting stress marks: 08; complex errors: 38; refusals: 38.

Next, the error frequency was calculated in total and by category. Following these calculations, the statistical analysis was started.

$$\text{Error frequency} = \frac{\text{number of errors made (by category or in total) x 100}}{\text{number of possible errors (by category or in total)}}$$

Results

The Statistical Analysis System, version 13.0 was used. The Measurement Analysis of Central Tendency (average and sd) and Variance - ANOVA were applied. The significance level adopted for this study was 0.05. The statistically significant answers are in bold and marked with an asterisk.

The results evidenced the presence of errors in the readings of all typical students of both school systems and of all of the grades assessed.

The general performance analysis in the word reading test showed a progressive and statistically significant reduction of errors T1, T3, T5, T6, T8 of orthographic decoding, in function of schooling progress (p<0.0001*), according to Table 1. Likewise, a reduction in frequency for all types of errors was observed when the performances of 4th and 7th grade were compared, except for error T10, absent in the reading of students in all of the grades.

When school system was considered, the students from PRS had fewer errors than the ones from PUS when the total word reading performance was compared (p<0.0001*), according to Table 2. As error types were considered, a smaller frequency was observed for the T1, T4 T7 and T8 categories in word reading done by PRS.

TABLE 1. Distribution of error frequency averages and standard deviations in word reading according to schooling.

Reading error types	4th grade		5th grade		6th grade		7th grade		Schooling effect
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	p-value
T1	1,79	2,04	1,54	1,98	1,14	1,79	0,45	1,18	**0,0069 ***
T 2	3,51	7,90	2,57	6,10	2,14	6,82	0,48	2,82	0,2275
T 3	1,24	2,42	0,20	0,70	0,67	1,57	0,15	0,61	**0,0077 ***
T 4	0,62	1,28	0,33	1,08	0,40	0,95	0,00	0,00	0,0700
T 5	1,04	1,74	1,36	2,26	0,59	1,50	0,28	0,94	**0,0365 ***
T 6	0,48	1,19	0,07	0,42	0,00	0,00	0,00	0,00	**0,0030 ***
T 7	1,94	2,58	1,55	1,89	1,55	1,88	1,04	1,45	0,2620
T 8	12,83	10,27	11,22	11,03	10,24	11,77	5,36	9,24	**0,0110 ***
T 9	1,10	1,43	0,64	1,68	0,40	0,95	0,52	1,06	0,0731
T 10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	a
TT	1,53	1,03	1,02	0,70	0,88	0,73	0,48	0,54	**<0,0001 ***

Key: arithmetic average; sd: standard deviation; TT - total of errors; a - could not be computed because the variable, at least, is constant.

TABLE 2. Error frequency average and standard deviation distribution in word reading according to school system.

Reading error types	4th grade				5th grade				6th grade				7th grade				School system effect
	PUS		PRS		PUS		PRS		PUS		PRS		PUS		PRS		
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	Sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	p-value
T1	2,5	2,33	1,02	1,32	1,90	2,24	1,11	1,60	1,32	1,81	0,97	1,80	0,79	1,50	0,0	0,0	**0,0028***
T 2	5,0	9,52	1,85	5,39	4,17	7,40	0,88	3,82	2,50	8,16	1,75	5,26	0,83	3,73	0,0	0,0	0,0509
T 3	2,11	3,03	0,29	0,85	0,26	0,81	0,14	0,60	0,40	1,29	0,97	1,80	0,13	0,59	0,18	0,68	0,1719
T 4	1,05	1,57	0,15	0,62	0,40	0,96	0,28	1,21	0,53	1,08	0,28	0,83	0,0	0,0	0,0	0,0	**0,0446***
T 5	1,17	1,96	0,93	1,54	1,33	2,27	1,40	2,31	0,83	1,83	0,35	1,05	0,33	1,03	0,22	0,86	0,4967
T 6	0,53	1,38	0,44	1,01	0,13	0,59	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,6051
T 7	3,16	2,91	0,59	1,13	2,50	2,00	0,55	1,10	1,71	1,77	1,39	2,03	1,32	1,60	0,70	1,21	**<0,0001***
T 8	14,32	10,2	11,11	10,4	13,75	10,6	8,55	11,1	11,88	13,7	8,55	9,37	8,75	10,8	0,83	3,23	**0,0046***
T 9	1,45	1,57	0,73	1,21	0,0	0,0	1,52	2,20	0,40	0,96	0,42	0,99	0,92	1,29	0,0	0,0	0,0975
T 10	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	a
TT	2,19	0,95	0,81	0,51	1,21	0,68	0,82	0,65	0,97	0,74	0,80	0,72	0,66	0,58	0,24	0,38	**<0,0001***

Key: PUS: Public Schools; PRS: Private schools; arithmetic average; sd: standard deviation; TT - total of errors; a - could not be computed because the variable, at least, is constant.

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Discussion

The presence of word reading miscues made by typical students of both schools systems revealed that these errors are part of the process of learning to read. The results showed that there was a progressive reduction in errors with the increase in schooling, in the general performance, indicating that the orthographic decoding rule ownership of the Brazilian Portuguese occurs gradually in reading, as well as in writing codification. This data agrees with experimental studies and literature reviews that indicate a progressive increase in word reading accuracy levels with schooling progression throughout elementary school, as a possible effect of reading experience in the automaticity of the capacities of decoding and recognizing [6,8].

The analysis of the categories of errors made revealed that the miscues in reading orthographically transparent words were more frequent in 4th grade. The sequencing inversions, omissions and additions, that reveal disrespect to the syllabic structure, were infrequent and surpassed in 6th and 7th grades, respectively. Errors in respecting phoneme - grapheme correspondence rules, likewise related to orthographically transparent decoding, reduced significantly with schooling.

The students from 4th to 6th grade made more errors of substitution for visually similar word than the ones from 7th grade, which shows that reading through the lexical route improves with schooling. Likewise, the miscues in reading words of orthography dependent on the grapheme context, which can be read correctly through the lexical route, decreased significantly with schooling progress.

When studying the decoding ownership in Spanish, researchers [14-15,26] observed, in the beginning stage of learning to read, the presence of errors in orthographic decoding independently on the context. However, these were less frequent than the ones dependent on grapheme context.

Studies 27-29 referred that after the grapheme-phoneme correspondence rules have been learned, children are faced with errors in reading words of orthography independently on the grapheme context, which lead them to realize the existence of determining rules of phonological correspondence of a grapheme in a given graphemic context, conducting them, gradually, to orthographic ownership.

Errors in disrespecting stress marks were the ones that most differentiated the performance regarding type of school. Together with the complex errors, these were present in all grades and showed that student's performance was similar even with schooling progression. The most frequent errors in all school years, related to stress marks, did not decrease with schooling progression. Likewise, irregular word reading did not differentiate the grades studied.

No student refused to read. In cases of difficulties in recognition through the lexical route, the phonological route allows for the identification of words seen for the first time or words that do not have a representation in the orthographic lexicon [8].

Conclusion

Regarding type of school, the students in PRS made fewer errors. In regards to grade, with the exception of the ones related to stress marks and to orthographic irregularity, the reading errors are overcome, progressively, with schooling and are characteristic to the learning of the rules of orthographic decoding, independently of school type. Errors related to orthographic transparency in 4th grade and substitutions for visually similar words in 4th to 6th grades were the errors observed more frequently.

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