Reading errors of Portuguese-English bilingual children learning to read in english via a phonics based approach: a comparison with errors from Monolingual English children *

LUZ CARY
ARLETTE VERHAEGHE
HELENA MARCHAND
Faculty of Psychology and Education - University of Lisbon

The nature of written word recognition procedures in two orthographies with differing levels of transparency is examined. Study 1 reports the nature of word recognition in English and Portuguese by Portuguese-English Bilingual school-graders, whose home language is Portuguese. Study 2 carries out a comparison of English written word recognition procedures by Bilingual and Monolingual English children.

STUDY 1

The school attended by the children is an English school near Lisbon where only English is spoken. The kindergarten program includes some phonological training and instruction on sound-letter correspondences. In primary school the children receive formal reading instruction in English *via* a phonics based approach. Portuguese language classes only begin in 3rd grade, but skip over the teaching of reading in Portuguese as such since the children are already able to read in Portuguese. And in fact, during a short interview that took place before the experiment the majority of the children reported that they usually read Portuguese story books at home.

SUBJECTS, MATERIALS AND PROCEDURE

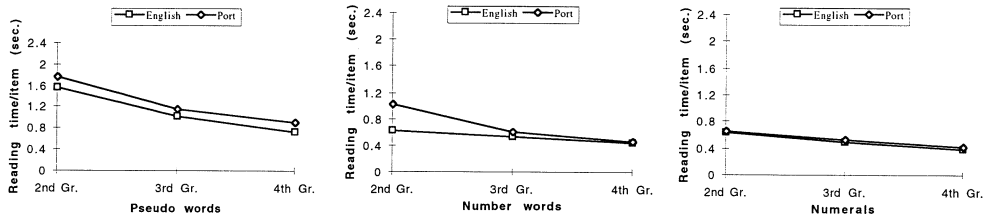
Thirty two Portuguese-English Bilingual children (22 girls and 10 boys) from grades 2, 3 and 4 took part in the study. Second graders: n=10, mean age 7.7 (range 7.3 - 8.3). Third graders: n=15, mean age 8.8 (range 8.5 - 9.5). Fourth graders: n=7, mean age 10.2 (range 9.10 - 10.6). All children came from Portuguese families in which Portuguese was the language spoken at home. The children were given a Portuguese and an English version of the three continuous reading tasks devised by Wimmer and Goswami (1994), numeral reading, number word reading and pseudo word reading. Pseudo words were created by interchanging the onset and the rime of the number words (for example, the Portuguese number word *dois* would become the pseudo-word *nois*). In each orthography the nine items of each material type (numerals, number words and pseudo words) were aleatorily combined in lists of 18 items. The testing took place at the end of the school year, in a single experimental session. The child was requested to read as fast and as accurately as possible.

* We would like to thank the children, principal and teachers of St Dominic's School, São Domingos de Rana, Lisbon. We also would like to thank Luís Querido and Sandra Fernandes for help in collecting the data of Study 1, and Diana Almeida, Kalpna Kirtikumar and Susana Pacheco for help in collecting the data of Study 2. This research was partially supported by funds from JNICT.

Total reading time of each list was measured and reading was recorded. Three training lists per orthography (6 item each) were previously presented and in the same order in which the child would receive the experimental conditions.

RESULTS AND DISCUSSION

Figure 1 presents the mean reading time per item in each grade and condition (pseudo words, number words and numerals).



Analysis of variance on mean reading time per item, taking Orthography (English *vs.* Portuguese), Grade (2, 3 and 4) and Condition (numerals, number words and pseudo words), showed that the three main factors were significant: (1) Orthography ($F(1, 58) = 12.35$, $p < .0025$; (2) Grade ($F(2, 58) = 5.98$, $p < .01$); and (3) Condition ($F(2, 58) = 37.91$, $p = .0001$); (4) no double interaction, Orthography x Condition, Orthography x Grade and Grade x Condition reached the significance level of $p < .05$ ($F(2, 58) = 2.55$, $F(2, 58) = 1.50$ $F(4, 58) = 2.43$, respectively). The triple interaction Condition x Orthography x Grade was also non significant ($F(4, 58) = 1.73$). The significant effect of Orthography is obviously related to the fact that English materials are read faster than Portuguese materials, consistently with the fact that Portuguese tuition only starts in grade 3. As expected, improvement in reading time was observed between grade 2 to 4. In all grades, pseudo words were read slower than number words and numerals.

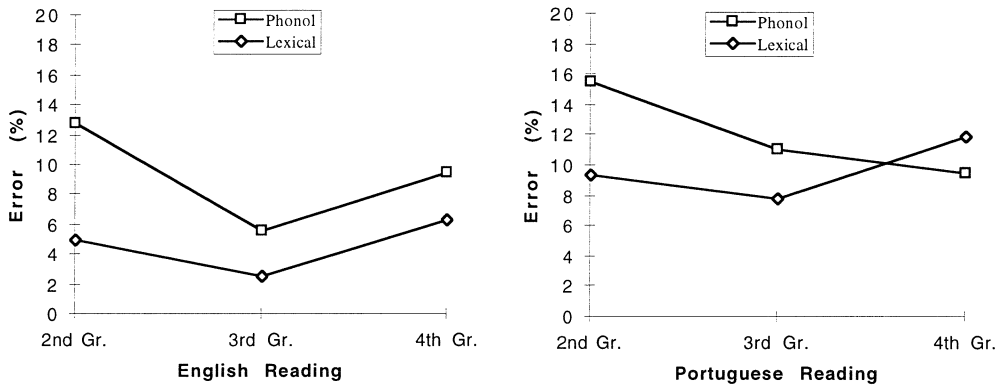
ERRORS IN NUMERAL AND NUMBER WORD READING

In both orthographies, no errors were made in numeral recognition. No errors or refusals occurred in English number word reading and a very few errors were made in the corresponding Portuguese condition.

ERRORS IN PSEUDO WORD READING

Omissions in pseudo-word reading were quite exceptional in both orthographies and apparently linked to the need to follow the instruction of reading fast, rather than to a real incapacity to process the stimuli. To check the possibility that in each orthography word recognition could be carried out according to differing strategies, an indirect phonological strategy *vs.* a direct lexical one, errors in pseudo word reading were classified as (1) phonological, if involving deletion, substitution or order inversion of consonants and/or vowels, and leading to the production of another pseudo word and as (2) lexical, if involving lexicalisations of the stimuli.

Figure 2 presents the mean percentage of error-type (Phonological *vs.* Lexical) per grade and orthography (English *vs.* Portuguese).



Analysis of variance on the percentage of errors made in pseudo word reading, including Error Type (Phonological *vs.* Lexical), Grade and Orthography showed: (1) a significant effect of Error Type ($F(1, 29) = 6.64$, $p < .025$), indicating that phonological errors outnumbered lexical errors; (2) no effect of Grade ($F(2, 29) = 1.39$); (3) a significant effect of Orthography ($F(1, 29) = 10.56$, $p < .005$), reflecting the fact that the children made less errors in English than in Portuguese; and (4) no significant interactions.

Independently of orthography, Bilingual Portuguese-English children seem to move into reading by assembling pronunciations. This could be an effect of teaching method. Empirical research not only has shown that the combination of training in phonological skills and in reading skills is quite effective in developing reading ability (for example, Bradley and Bryant, 1985; Hatcher, Hulme and Ellis, 1994), but it has also indicated that in general children who are taught to read by phonics outperform the children who are taught to read by whole-word methods (for example, Sowden and Stevenson, 1994). Moreover, studies having carried out analysis of reading errors (for example, Seymour and Evans, 1994) reveal differing effects of teaching methods on early reading procedures: the methods emphasising correspondences between phonemes and graphemes allow the observation of signs of early decoding competence on children's reading and spelling, while whole-word based methods originate reading errors consisting in the production of words that are often visually similar to words overtrained by the children, indicating that whole-word instructed children recognise words without engaging in decoding.

But another possibility must be considered: the existence of a combined effect of teaching method in a deep orthography (English) and concomitant exposure to a relatively transparent one (Portuguese). Although the Portuguese orthography is not completely transparent, as it contains some irregularities where morphophonological influence prevails (Girolami-Boulinier and Pinto, 1994), and quite a lot of contextual regularities, Portuguese is nevertheless a phonological orthography, with a highly predictable grapheme-phoneme relationship, in which the use of phonological rules affords more than 90% correct conversions (Viana, Andrade, Oliveira and Trancoso, 1991). The acquisition of grapheme-phoneme conversion rules in English might facilitate the application of that knowledge on the decoding of the Portuguese materials that the children reported to read at home. These repeated encounters with a more transparent

orthography might develop the children's phonological awareness, reinforcing the effect of teaching method and hastening the processing of the English orthography on the bases of assembled phonology. Compatible results have been obtained that lead to the admission of this possibility: Holn and Dodd (1996) have shown that students with non-alphabetic first language literacy had poor phonological awareness, relatively to students with alphabetic first language literacy and that consequentely, they had difficulties in reading pseudo words; Campbell and Sais (1995) demonstrated that exposure to Italian, which has a much more regular phonological structure than English, favoured kindergartener's phoneme awareness in the English language.

STUDY 2

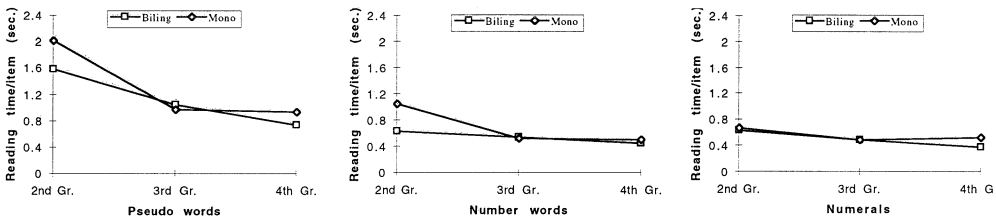
The aim of Study 2 was to disentangle these two alternatives (the mere effect of method *vs.* the effect of method combined to concomitant exposure to the more transparent Portuguese orthography). We examined Monolingual English children from the same school and grades, having followed the same school *curricula* but having not received Portuguese tuition. Study 2 presents these results.

MONOLINGUAL SUBJECTS, MATERIALS AND PROCEDURE

Twenty eight Monolingual English children (13 girls and 15 boys) were examined. Second graders: n=8, mean age 7.9 (range 7.2 - 8.5). Third graders: n=9, mean age 8.10 (range 8.1 - 9.6). Fourth graders: n=11, mean age 10.0 (range 9.7 M - 10.5). The children were tested only in English at the same moment of the school year. The instruction was given in English by a Bilingual English-Portuguese student. Total reading time per list was measured and reading was recorded.

COMPARISON BETWEEN BILINGUALS AND MONOLINGUALS

Figure 3 presents Bilinguals' and Monolinguals' mean reading time per item in each grade and condition (pseudo words, number words and numerals) in the English orthography.



The three-way analysis of variance on the mean reading time per item taking Group (Monolingual *vs.* Bilingual), Grade (2d, 3rd and 4th) and Condition (numerals, number words and pseudo words) showed: (1) no effect of Group (Monolingual *vs.* Bilingual), ($F(1, 108) = 1.31$); (2) a significant effect of Grade ($F(2, 108) = 6.85$, $p = .0025$ and (3) a significant effect of Condition $F(2, 108) = 48.20$, $p < .0001$. Only the double interaction Condition x Group was significant ($F(4, 108) = 5.19$, $p < .001$), owing to the fact that in both groups of Monolinguals and Bilinguals, 2d graders were much slower in reading the pseudo words than 3rd and 4th

graders. The interaction Condition x Group (Bilinguals *vs.* Monolinguals) and the triple interaction Condition x Group (Bilinguals *vs.* Monolinguals) x Grade were non significant ($F < 1$ in both cases).

ERRORS IN NUMERAL AND NUMBER WORD READING

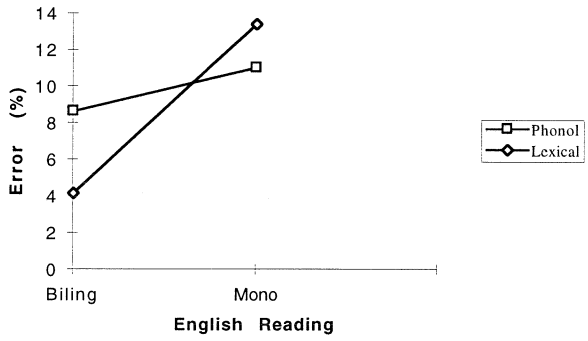
As the Bilingual, the Monolingual children did not make errors in numeral recognition. Contrarily to the Bilinguals who did not make errors in number word reading, 37.5% of the Monolingual 2nd graders and 22% of the Monolingual 3rd graders made errors (range 1 – 12 and 1 – 4, respectively).

ERRORS IN PSEUDO WORD READING

Table 1 presents the percentage of Monolingual and Bilingual children who made 0%, between 1% and 20%, 21% and 40% and more than 40% of errors in English pseudo word reading.

	%of errors in pseudo-word reading			
	0%	1%-20%	21%-40%	more than 40%
Monolinguals	11%	43%	21%	25%
Bilinguals	28%	44%	25%	3%

Figure 4 presents the mean percentage of Error Type (Phonological *vs.* Lexical) in English pseudo word reading made by Monolinguals and Bilinguals.



Analysis of variance including Error Type (Phonological *vs.* Lexical), Group (Bilinguals *vs.* Monolinguals) and Grade showed: (1) no effect of Error Type ($F < 1$); (2) a significant effect of the two other factors: Group (Bilinguals *vs.* Monolinguals) ($F(1, 54) = 6.94$, $p < .025$) and Grade ($F(2, 54) = 3.97$, $p < .025$). The non-significant interaction between these two factors ($F(2, 54) = 1.58$) indicates that in all grades, Monolingual children made more errors than Bilingual children. The same analysis showed a significant interaction between Error Type and Group (Bilinguals *vs.* Monolinguals) ($F(1, 54) = 6.27$, $p < .025$), clearly evident in Figure 4.

Contrarily to the Bilingual children, the Monolingual children made more lexical errors than phonological, although the difference does not reach significance. These findings give support to the interpretation of the results from Study 1 in terms of a combined effect of teaching method in a deep orthography (English) and concomitant exposure to a relatively transparent one (Portuguese). A Portuguese background improves the ability to manipulate English sublexical units and thus favours reading by assembling phonology.

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