Young Bilingual Children's Spelling Strategies: A Comparative Study of 6- to 7-Year-Old Bilinguals and Monolinguals

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Abstract

Developing literacy in two languages can be challenging for young bilingual children. This longitudinal study investigates the effects of bilingualism in the spelling strategies of English-Portuguese speaking children. A total of 88 six-to-seven-year-old bilinguals and monolinguals were followed during one academic year and data gathered on a range of verbal and written language skills and non-verbal measures while controlling for SES. For both bilinguals and monolinguals letter knowledge, phonological awareness and word concept were significant predictors of spelling. However, non-verbal reasoning played an increasing role in explaining spelling variance for bilinguals, suggesting that learning to spell in two alphabetic languages places more demands on non-verbal processing skills. Spelling error analyses further revealed that bilinguals when compared to monolinguals showed more reliance on phonological strategies, less compliance with the L1 orthographic system and at times transference from L2. The results suggest important implications for our understanding of spelling acquisition and the development of effective intervention practices for bilingual children.

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Estrategias de Ortografía en Niños Bilingües: Un Estudio Comparativo de Niños Bilingües y Monolingües de 6 y 7 Años

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Resumen

Desarrollar la alfabetización en dos idiomas puede ser un desafío para los niños bilingües. Este estudio longitudinal investiga los efectos del bilingüismo en las estrategias de ortografía de los niños que hablan inglés y portugués. Un total de 88 niños bilingües y monolingües entre los seis y siete años participaron en este estudio durante un año académico, en el cual se recogieron datos sobre una variedad de habilidades de lenguaje verbal y escrito y medidas no verbales teniendo en cuenta el nivel socioeconómico. Tanto para los niños bilingües como para los niños monolingües el conocimiento de letras, la saber fonológico y el concepto de palabra fueron principales predictores de la ortografía. Sin embargo, el razonamiento no verbal jugó un papel cada vez mayor en la variación de la ortografía de los niños bilingües, lo que sugiere que aprender a escribir en dos idiomas alfabéticos impone más demandas en las habilidades de procesamiento no verbal. El análisis de los errores de escritura revela que los niños bilingües en comparación con los monolingües mostraron una mayor dependencia de estrategias fonológicas, un menor cumplimiento de las reglas del sistema ortográfico inglés y, en ocasiones, transferencia del portugués para escribir fonemas en inglés. Los resultados muestran implicaciones importantes para la comprensión de la adquisición de la ortografía en niños bilingües y sugieren el desarrollo de prácticas de intervención efectivas para niños bilingües.

Palabras clave: Bilingüismo, aprendizaje de la ortografía, análisis de errores de ortografía

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Early spelling is an important component of literacy acquisition and a unique predictor of later reading (Treiman et al., 2018). However, spelling raises particular challenges for young children as the process of deciphering spoken words to represent them graphically requires phonological awareness (PA), phoneme-grapheme and lexical knowledge as well as cognitive skills (Czapka, Klasset & Festman, 2019; Norton, Kovelman, & Petitto, 2007; Stage & Wagner, 1992). Developing literacy in two alphabetic languages can be particularly challenging for young bilingual children. Previous research studies have uncovered associations between L1 and L2 in language processing tasks requiring phonological awareness and word decoding. However, the nature of the relationship between bilinguals' two languages is still unclear with both positive, negative or no associations found for different groups and linguistic domains (Kang, 2012; Raynolds & Uhry, 2010; Sparks, Patton, Ganschow & Humbach., 2008; Zammit, Agius & Camilleri, 2018). For example, Sun-Aperin and Wang (2011) whilst finding positive cross-language transference for reading noted that orthographic skills in L1 and L2 were independent of each other in spelling. Therefore, the influence that both languages have on bilinguals' spelling development and how cross-language information influences bilinguals spelling strategies remain open questions.

The present longitudinal study investigates the influence bilingualism may have on the spelling strategies in young bilingual children within two challenging orthographic systems: English and Portuguese. A combination of quantitative data and spelling error analysis was used to uncover bilinguals' spelling strategies. It also extends present research by comparing bilinguals and monolinguals not only on a range of verbal and written language skills, but also on non-verbal measures while controlling for socioeconomic status (SES). These two latter factors are seldom included in studies exploring literacy acquisition in bilinguals but have both been shown to significantly influence linguistic skills (Calvo and Bialystok, 2014; Melby-Lervag & Lervag, 2011; Woumans, 2015). For example, whilst significant variations in literacy skills, such as PA, have been attributed to differences in SES (Chung et al., 2017), past research has often not matched monolingual and bilingual

groups in terms of socioeconomic backgrounds (Czapka, Klasset & Festman, 2019; Gathercole, Kennedy & Thomas, 2016).

Although it is estimated that more than half of the world population is bilingual (Bialystok, 2017), bilinguals are complex to study as they are a very diverse population, with different proficiencies and linguistic backgrounds. Bilingualism is also not static, being constantly subject to changes as children move from one context (social and linguistic) to another and develop skills as needed for their particular circumstances. In the present study and for sampling purposes bilingualism is defined as the regular use of two languages, and bilinguals are those who actively use two languages on an everyday basis at home, in the community and at school from an early age (Grosjean, 2010; Kroll, Dussias, Bice, & Perrotti, 2015; Mayer, Crowley, & Kaminska, 2007).

Spelling in Bilinguals

While spelling strategies may vary across languages (Mayer et al., 2007, Rønneberg & Torrance, 2019), spelling single words requires the coordination of distinct processes (Czapka, et al., 2019). For young spellers in an alphabetic system, spelling involves segmenting spoken words into phonemes, and knowing letter names/sounds while also understanding the alphabetic principle of mapping a sequence of sounds to represent them graphically onto a sequence of letters (Treiman & Bourassa, 2000, Raynolds & Uhry 2010). However, symbol-sound correspondence is just an initial step in spelling (Kahn-Horwitz, Schwartz & Share., 2011) as with more complex writing systems such as English and Portuguese, phoneme-to-grapheme correspondence is insufficient to become a successful speller. In spelling children learn to connect knowledge about the alphabet, phonology, orthography and morphology of their language (Treiman & Bourassa, 2000).

Language transference is one of the key outcomes from research on the literacy acquisition of bilinguals, suggesting that both languages impact on the representation of each other (Dixon, Zhao & Joshi, 2010). Studies specifically focusing on spelling in bilinguals have, however, revealed distinct outcomes, with some research suggesting *positive* cross language facilitation whilst others identifying *negative* (interference) literacy skills transference across languages (Bialystok, 2017; Raynolds & Uhry, 2010). The nature of the scripts in the two languages may explain some of the differences noted

across studies (Deacon et al., 2013). That is, bilinguals' language transference may be different with two languages that share characteristics in the writing systems (e.g., two alphabetic systems) from those with two very different orthographies (e.g., an alphabetic and a logographic system) (Deacon et al., 2013; McBride-Chang & Ho, 2005). Transference may also depend on the speaker's levels of fluency and the complexity of both writing systems (Mishra & Singh, 2014; Sun-Aperin & Wang, 2011; Yeong, Fletcher & Bayliss, 2014).

Transference across two languages with a similar alphabet may result from bilinguals developing a single orthographic representation for words (Van Heuven, Schieefers, Dijkstra, & Hagoort , 2008) or, by an automatic activation of the non-target lexicon via translation equivalents (Mishra & Singh, 2014). Both explanations imply that a simultaneous activation of two languages will also require a selection system to detect similarities and conflict across languages, and inhibit automatic transference (see Bialystok, 2017). This in turn will require bilinguals to develop specific strategies to cope with competitive information from both languages.

Writing Systems: English and Portuguese
The complexity of the relationship between phonemes and graphemes in a language influences children's initial spelling strategies but also levels of cross language transference (Arab-Moghaddam & Senechal, 2001; Yeong et al., 2014). Both English and Portuguese are alphabetic languages and share some phonological and orthographical properties. However, these two orthographies also present differing complexity. English is often described as a *deep* orthography as it is characterised by complex and inconsistent correspondences between phonemes and their grapheme representations (Arab-Moghaddam & Senechal 2001; Mayer et al, 2007). The spelling of vowels is particularly inconsistent in English and although sometimes the choice of vowels is based on positional factors, other times it is not (e.g., made and maid).

Portuguese on the other hand is regarded of intermediate consistency; it has a simpler syllabic structure than English, however the relationship between phonemes and graphemes is also not simple and direct (Defior,

Martos & Cary,   2002; Vale, 2011). As in English, the Portuguese
orthographic system depends on different factors: phonological, syntactic and
lexical. Although vowels in Portuguese are clearly less problematic than in
English, the spelling of some vowel sounds also present inconsistencies (e.g.,
O and U). Particular consonant sounds such as /s/ can also be complex for
children to spell because different graphemes can be used to represent it.

Purpose of the Study

In order to understand factors influencing the spelling strategies used by
English-Portuguese young bilingual spellers, bilingual and monolingual
children's literacy and non-verbal skills were studied and the following
research questions were explored:

1. Are there significant differences between English speaking
   monolinguals and English-Portuguese bilinguals in terms of spelling
   and literacy related skills?
2. Do young English-Portuguese bilinguals and English monolinguals
   use similar sources of information/ strategies to spell in English?

Method

Samples and Sampling Procedure

Two groups of children took part in this study: one group of English
monolingual children and one group of English-Portuguese bilinguals. The
monolingual group comprised 44 children, 18 girls and 26 boys. At the first
assessment this group was on average 6.6 years old (ranging from 6.1 to 7.2
years of age). The second group comprised 44 English-Portuguese bilingual
children, with a mean age of 6.9 (ranging between 6.2 to 7.3 years). There
were 23 girls and 21 boys in this group.

Both the monolingual and bilingual children attended private schools
following the English National Curriculum: the former in two schools in two
cities in England, and the bilinguals in two cities in Portugal. All schools
provided the same curriculum subjects, except for Portuguese which was
taught in the bilingual schools as L2. In all schools literacy in English was
introduced to the children in Foundation (3-4 years); in the bilingual schools

literacy instruction in Portuguese started at the age of 6. Bilinguals were selected according to the following criteria: (1) being fluent in English and Portuguese (based on school records), (2) having no experience of other languages, (3) having attended a British English-speaking school from the age of three.

No child included in the samples had any cognitive, linguistic, sensory or emotional impairment, indicated by the school records. Data were collected in different schools to obviate the possibility that group differences were the result of variables such as teaching strategies or school climate.

Independent schools were chosen because they served children from similar SES. The criterion used in this study to group children in terms of SES was parental occupation derived from the Standard Occupational Classification (Office of National Statistics, 2000). Parental occupation data confirmed that there was no significant difference between the monolingual and bilingual groups in terms of the social group assigned to. However, it is important to emphasise the limitations of using parental occupation as the sole measure of SES (Savage, Devine, Cunningham et al., 2013).

Procedure

Permission to carry out the study was sought from the schools, parents and verbally from the children. All the children were seen individually in their schools. At the beginning of each session the structure of the tasks was explained again to the children and they were reminded that they could stop any time they wished to.

Data were collected at three separate times in the academic year. The first session took place between September and October. The second session took place between the end of March and April. Three months later, in a third session, the children were given a group spelling test in their classrooms. Bilinguals' second language vocabulary was assessed once in a separate session. Data collection times and measures used are summarised in table 1.

Table 1. *Measures given to both monolinguals and bilinguals at three data collection times*

Time 1	Time 2	Time 3
Alphabet knowledge	Alphabet knowledge	
Word concept	Word concept	
PA	PA	
Spelling (words and nonwords)	Spelling (words and nonwords)	Spelling (words: Group Spelling Test)
Vocabulary	Vocabulary	
Non-verbal reasoning	Non-verbal reasoning	
	L2 Vocabulary (bilinguals)	

Measures Developed for the Study

Letter identification

The assessment procedure began with a test of letter name-and-sound knowledge using a set of plastic letters presented to the children in the same non-alphabetic order. Children were asked to identify both lowercase and uppercase letters.

Word concept

This task was designed to assess children's ability to separate words from graphic representations that were not words within a set of different letter strings and numbers.

PA

Two tasks were developed to assess children's ability to isolate phonemes in words: in the first task children were asked to say just the last sound of a word and in the second to say the remainder of a word after the first sound was omitted.

For the letter identification, word concept and the PA tasks the score was the number of items answered correctly.

Spelling of words

In this task children were asked to spell a list of words by writing them down. They were encouraged to try to write the word, and to have a guess when they

were not sure. Children were shown a picture for each word, with the same word heard twice on a sound recorder.

Spelling of nonwords

A similar procedure was used regarding spelling of nonwords, except here children were told: "this time we are going to hear some made-up words".

Spelling scoring system - A point was given for each letter correctly spelled. The letters in the words were considered correctly spelled if they were written in the exact order (even if some letters in between were missing). For example, *BL* for *ball* was scored 2 points. If two letters were written in a reversed order only one point was given. Digraphs were scored 1 point but half a point was given when only one of the letters of the digraph was represented. If a word was correctly spelled except for one extra letter half a point was deducted from the total.

The measures developed specifically for this study were previously piloted and reliability scores tested on separate samples.

Other Assessment Measures Used

The British Picture Vocabulary Scale (BPVS) was used to assess children's receptive vocabulary in English (Dunn et al., 1982). A Portuguese translation of the Peabody Picture Vocabulary Test -Revised (PPVT-R). PPVT-R was administered to bilinguals to assess vocabulary in Portuguese.

In terms of non-verbal reasoning two measures were used: children were asked to solve the British Ability Scales Matrices (BAS) (Elliot, Murray and Pearson, 1982) and after all the individual data was carried out the children were given the Draw-a-Man Test (Goodenough, 1926) in their classroom.

The children were given test A from the Parallel Spelling Test (Young, 1983) in their classroom at the end of the school year, in this study referred to Group Spelling Test.

Results

To ascertain if group mean scores for bilinguals and monolinguals were significantly different,   independent *t*-tests were calculated for all variables. The results indicate that monolinguals, when compared to bilinguals, obtained

significantly higher results on all spelling measures at all testing times (see table 2). Monolinguals could on average name more letters of the alphabet than bilinguals, however, no group differences were found in terms of identifying letter sounds. Monolinguals also showed significantly higher average scores on the word concept task, but no significant group differences were observed for PA. There were also no significant differences between monolinguals and bilinguals on non-verbal ability measures (BAS Matrices and Draw-a-man Test). In terms of receptive vocabulary in English, monolinguals performed significantly better than bilinguals.

Table 2. Comparative data for monolinguals and bilinguals on all measures at all testing times

Time	Test	Monolinguals		Bilinguals		t-value
		Mean	SD	Mean	SD	
Sep./Oct.	Spell words	43.86	5.36	38.64	7.92	3.58 **(df.74)
	Spell nonwords	40.46	4.22	35.70	6.82	3.89 ***(df.84)
	Name letters	46.28	8.63	28.09	17.89	6.00*** (df.84)
	Sound letters	48.40	2.66	47.79	4.62	.74 (df.84)
	Word concept	8.60	1.50	7.70	1.52	2.79(df.84)**
	Phoneme isolation	7.53	2.27	8.07	2.33	-1.08 (df.84)
	Phoneme deletion	7.23	2.08	6.19	3.10	1.84 (df.74)
	BAS Matrices	55.65	8.88	57.58	6.86	-1.13 (df.84)
	Draw-a-Man	108.26	41.66	117.41	32.52	-1.12 (df.82)
	Vocabulary-BPVS	113.47	9.92	86.74	17.67	8.65 (df.84)***

Table 2. Continued

Time	Task	Monolinguals		Bilinguals		
		Mean	SD	Mean	SD	*t*-value
March/	Spell Words	63.07	6.71	56.17	9.01	4.07 *** (df.86)
April	Spell nonwords	60.53	5.03	51.20	6.46	7.56 ***(df.86)
	Name letters	50.11	5.04	46.89	7.53	2.36*(df.86)
	Sound letters	50.48	1.89	50.39	2.26	.21 (df.83)
	Phoneme isolation	11.64	1.48	11.89	1.32	-.84 (df.86)
	Phoneme deletion	9.34	2.30	9.23	2.53	.22 (df.86)
	Word concept	9.89	.90	9.20	1.29	2.89 (df.77)***
	BAS Matrices	56.41	7.99	58.23	7.90	-1.07 (df.86)
	Draw-a-Man	101.61	39.74	110.00	37.20	-1.00 (df.83)
	Vocabulary - BPVS	112.09	8.82	91. 95	16.55	7.12 (df.86) ***
July	PST (Words)	23.32	5.33	17.05	5.89	5.19 ***(df.84)

Key: PST Parallel Spelling Test, BAS British Ability Scales
* p< .05   ** p= .001   *** p< .001

Vocabulary in L2
The results on the vocabulary test given to bilinguals at the second testing time showed that the bilingual group varied significantly in terms of their proficiency in Portuguese (Mean 73.30, SD 19.79).

To help uncover possible reasons for the bilingual group's lower spelling scores regression analyses were performed where spelling was entered as the independent variable and alphabet knowledge, word concept, PA, vocabulary, non-verbal ability, gender and age were entered as dependent variables. The multiple regression analyses results are summarised in tables 3 and 4 for monolinguals and tables 5 and 6 for bilinguals. The procedure used for

computing the regressions was the forward selection. The criterion for variable selection used was an F test probability level of .05.

Table 3. *Multiple regression analyses predicting spelling at the three testing times with the independent variables from testing time 1 – Monolinguals*

Testing time dependent variables	Testing time independent variables	B	SE B	*B*	*t*	*p*
T1 Sept./Oct Spelling words	T1 Sept./October					
	Phoneme deletion	1.181	.340	.458	3.47	.001
	Draw-a-man test	.353	.157	.298	2.25	.03
Spelling nonwords	Phoneme deletion	.965	.279	.475	3.46	.001
T2 March/April Spelling words	T1 Sept./October					
	Phoneme deletion	1.532	.420	.474	3.65	.001
	Draw-a-man test	.463	.193	.311	2.39	.021
Spelling nonwords	Phoneme deletion	.882	.328	.370	2.69	.010
	Phoneme isolation	.731	.300	.335	2.43	.020
T3 July Spelling words	T1 Sept./October					
	Phoneme deletion	.872	.358	.343	2.44	.019
	BAS Matrices	.532	.262	.286	2.03	.049

Table 4. *Multiple regression analyses predicting spelling at testing times 2 and 3 with the independent variables from testing time 2 – Monolinguals*

Testing time dependent variables	Testing time independent variables	B	SE B	*B*	*t*	*p*
T2 March/April	T2 March/April					
Spelling words	Word concept	3.173	.909	.402	3.49	.001
	Phoneme deletion	1.227	.329	.418	3.73	.001
	Sound letters	.027	.008	.263	2.34	.024
Spelling Nonwords	Word concept	2.110	.705	.358	2.99	.005
	Phoneme deletion	.870	.255	.396	3.41	.002
	Sound letters	.017	.006	.308	2.65	.012
T3 July	T2 March/April					
Spelling words	Phoneme deletion	1.004	.272	.451	3.70	.001
	Sound letters	.025	.007	.441	3.62	.001

Table 5. *Multiple regression analyses predicting spelling at the three testing times with the independent variables from testing time 1 – Bilinguals*

Testing time dependent variables	Testing time independent variables	B	SE B	*B*	*t*	*p*
T1 Sept./Oct	T1 Sept./October					
Spelling words	Phoneme deletion	.690	.329	.272	2.10	.043
	Word concept	1.457	.558	.293	2.61	.013
	Name letters	.108	.045	.252	2.42	.021
	Sound letters	.509	.226	.281	2.25	.031
Spelling nonwords	Sound letters	.868	.175	.557	4.97	.000
	Word concept	1.539	.480	.360	3.21	.003

Testing time dependent variables	Testing time independent variables	B	SE B	*B*	*t*	*p*
T2 March/April	T1 Sept./October					
Spelling words	Phoneme deletion	1.258	.349	.424	3.61	.001
	Word concept	1.908	.698	.328	2.74	.010
	Name letters	.131	.055	.262	2.38	.023
Spelling nonwords	Sound letters	.801	.143	.539	5.59	.000
	Word concept	1.419	.402	.347	3.53	.001
	Draw-a-man test	.305	.114	.248	2.69	.011
T3 July	T1 Sept./October					
Spelling words	Word concept	1.912	.530	.477	3.61	.001
	Draw-a-man test	.368	.151	.323	2.44	.020

Table 6. *Multiple regression analyses predicting spelling at testing times 2 an 3 with the independent variables from testing time 2 – Bilinguals*

Testing time dependent variables	Testing time independent variables	B	SE B	*B*	*t*	*p*
T2 March/April	T2 March/April					
Spelling words	BAS Matrices	.849	.245	.446	3.46	.001
	Phoneme isolation	2.278	.871	.337	2.62	.012
Spelling nonwords	BAS Matrices	.243	.187	.177	1.30	.230
	Phoneme deletion	1.007	.318	.400	3.17	.003
	Vocabulary	.145	.049	.339	2.96	.005
	Word concept	1.544	.530	.312	2.93	.006

Table 6. Continued

Testing time dependent variables	Testing time independent variables	B	SE B	*B*	*t*	*p*
T3 July Spelling words	T2 March/April Word concept BAS Matrices	1.981 .429	.587 .160	.442 .351	3.38 2.68	.002 .011

The regression analyses show that, for bilinguals word concept, PA, alphabet knowledge (naming and sounding letters) were strong predictors of spelling performance from the start of the academic year. For monolinguals, PA was a systematic predictor of spelling with word concept becoming an important predictor at the second testing time. For bilinguals the BAS matrices become an important predictor of spelling performance through testing times 2 and 3. Vocabulary in English had only a minor contribution in relation to spelling of non-words during testing time 2 for bilinguals.

Qualitative Spelling Error Analysis
The next step in the data analysis required understanding if language transference was also explaining bilinguals lower spelling scores. Qualitative spelling error analysis was conducted to ascertain if bilinguals spelling errors were: (a) the result of reliance on the Portuguese orthographic system to spell in English (*L2 transference*) or (b) the result of an overreliance on phonetic strategies to spell (*intra-language* error, not directly linked to L2).

The analysis concentrated solely on children's misspellings as these offer clearer information about the types of strategies that were used by each group (Treiman et al, 2013). The analysis focused on phonemes that could offer indication of L2 transference so most phonemes that are spelled the same in English and in Portuguese were not included in the analysis (e.g., /β/). Shared cross language phonemes offer little information about the possible reliance by bilinguals on Portuguese orthography to spell words in English. The phonemes not included in the analysis are indicated with a double dash (--).

However, the analysis included some phonemes such as consonant clusters and nasals, as these can be particularly challenging for young spellers

(Treiman, 1993; Read, 1986). These more challenging phonemes were analysed to see if, despite being common to both languages, they would be misspelled by bilinguals more times than monolinguals. This would, in turn, suggest that bilinguals' lower spelling performance was not entirely due to their reliance on the orthographic system of L2 to spell in English.

A spelling error produced by bilinguals was classified as being the result of L2 transference if the following criteria were all met: (1) it was a common representation of the phoneme in Portuguese but not in English, (2) it was not observed amongst monolinguals' misspellings in the present study and, (3) not found by other researchers as a common error in English-speaking young monolinguals.

Qualitative error analysis was performed on all the items spelled by children in both testing time 1 and 2, because of word count limitations, only illustrative examples are offered of 2 words (*Trousers* and *Shoe*) and 2 nonwords (*Dake* and *Rejune*). The qualitative spelling error analysis data is presented by identifying the spelling errors produced by both monolinguals and bilinguals for the phonemes selected.

Illustrative Examples

Trousers /traʊzəz/

Table 7. *Children's misspellings for the phoneme /tr/ in trousers*

Letter (s) used	Monolinguals N	Bilinguals N
T	5	11
CH		6
X		1

Treiman (1993) also found *T* to be the most common misspelling of /tr/. Young children treat consonant cluster as a unit with large number of consonant cluster errors involving the omission of the interior consonant (Steffler et al, 1998). Treiman (1993) also found a number of children spelling /tr/ as *CH*, which in the present study was observed six times in bilinguals. This seems to be a spelling error due to children perceiving similarities in

sounds (Cassar and Treiman, 1997). Young children find the sound /tr/ similar to /tʃ/ (Read, 1986). L2 was only apparent in the use of *X* for /tr/ by one bilingual. This seems to be due to the similarity between /tr/ and /tʃ/ and in Portuguese /ʃ/ is in sometimes spelled *X*.

Table 8. *Misspellings for the phoneme /aʊ/ in trousers*

Letter (s) used	Monolinguals N	Bilinguals N
O	14	10
AW	12	11
A	10	24
OW	8	1
AU	3	7
E	3	1
I	2	3
U	2	6
AO		7

All letters used by bilinguals and monolinguals to spell /aʊ/ were found to be used by an important percentage of children studied by Read (1975). The only exception was the use of *AU*. Because /aʊ/ in Portuguese would be spelled *AU* or *AO*, this error could at first be judged as resulting from L2. However, this does not seem to be the case as the same misspelling was observed amongst monolinguals. The use of *AO* was however considered as possible L2 transference because it was not observed amongst monolinguals' spellings for this phoneme and it was one of the two possible spellings of / aʊ / in Portuguese.

Table 9. *Misspellings for the phoneme /z/ in trousers*

Letter (s) Used	Monolinguals N	Bilinguals N
Z	4	10
SS	2	3

The analysis of the phoneme /z/ here refers to both the first and second *S* in the word *trousers*. The decision to analyse the occurrence of /z/ twice together in the word *trousers* was based on the fact that, with some spellings, it was not possible to determine if either the first or the second had been represented (e.g., spelling trousers as *TRAWS)*.

Most children in the present study represented /z/ with *S*. This was followed by the use of *Z* and *SS*. This was also the pattern observed in previous studies (Treiman, 1993; Read, 1975). Because of the great similarity between monolinguals' and bilinguals' spelling errors for this phoneme, no L2 transference errors could be inferred.

Table 10. *Misspellings for the phoneme /ə/ in trousers*

Letter (s) Used	Monolinguals N	Bilinguals N
U	9	6
I	2	15
A		13

The results for the phoneme /ə/ showed a different pattern of misspellings for monolinguals and bilinguals. While monolinguals' most common misspelling was the use of *U*, bilinguals' most frequent error was the use of *I*, followed by the use of *A*. Bilinguals' high choice of *I* for /ə/ does not seem to be a reliance on L2, as in Portuguese /ə/ is never spelled with an *I*. The use of *A* could, however, be a case of a L2 transference error. The sound /ə/ is not part of the Portuguese phonetic system but /ʌ/, spelled *A* is one of the most similar sounds to /ə/. Additionally, here no monolingual used the letter A to spell this phoneme. However, Read (1975) found that both *A* and *I* were common misspellings for /ə/ amongst his sample.

SHOE /ʃu:/

Table 11. *Misspellings for the phoneme /ʃ/ in shoe*

Letter (s) Used	Monolinguals N	Bilinguals N
S	3	6
CH	1	5
H		8
X		2

There was some similarity between the data obtained with bilinguals and monolinguals on the phoneme /ʃ/ and the results from Read's (1975) and Treiman's (1993) studies. Only the use of *H* for /ʃ/ by bilinguals seemed to be higher than that observed in the studies just mentioned. This, however, does not seem to be a case of L2 influence because in Portuguese *H* is a silent letter. The high use of *CH* by bilinguals to spell /ʃ/ could, in part, be a case of L2 transference because in Portuguese *CH* is the most common spelling of /ʃ/. However, as one monolingual produced the same spelling error and other authors have also reported the same misspelling amongst young spellers (Raynolds & Uhry, 2010; Read, 1975), this error was considered here only as possible L2 error.

Clearer L2 transference errors were found, however, on two spellings where /ʃ/ was represented with the letter *X*.

Table 12. *Misspellings for the phoneme /u:/ in shoe*

Letter (s) Used	Monolinguals N	Bilinguals N
O	5	19
OO	5	13
OW	16	10
U	2	10
OOW	8	3

All the spellings observed for the phoneme/u:/ in the word *shoe* were also reported by Mayhew (1977), Read (1975), and Treiman (1993). Although the

percentage and rank order of the spellings observed by these authors varied slightly, they were an approximate representation of the percentages found here for monolinguals and bilinguals.

Spelling of Nonwords

REJUNE /rɪdʒuːn /
/r/--

Table 13. *Children's misspellings for the phoneme /ɪ/ in rejune*

Letter (s) Used	Monolinguals N	Bilinguals N
I	6	24
U	2	1
EI	2	
EE		2

The fact that bilinguals more often than monolinguals chose to spell /ɪ/ with *I* instead of an *E,* could be due to their reliance on the Portuguese orthographic system, where /ɪ/ is more often spelled with *I* than with *E*. However, this error is likely to result from a reliance on phonetic strategies, because not only did several monolinguals also spell /ɪ/ as *I*, but previous studies also indicated this as a commonly spelling choice amongst young spellers (Mayhew, 1977, Read, 1975, Treiman, 1993).

Table 14. *Misspellings for the phoneme /dʒ/ in rejune*

Letter (s) Used	Monolinguals N	Bilinguals N
G	9	13
D	5	3

Children's spellings of /dʒ/ were very similar amongst monolinguals and bilinguals and were also in agreement with the results reported by Treiman (1993).

Table 15. *Misspellings for the phoneme /uː/ in rejune*

Letter (s) Used	Monolinguals N	Bilinguals N
O	5	11
E	3	
OO	1	3

Apart from *U* which was the expected spelling for /uː/ in *rejune*, *O* and *OO* were the most frequently used spellings by bilinguals. The results for this phoneme are in accordance with the data gathered by Treiman (1993) and Read (1975).

Table 16. *Misspellings for the phoneme /n/ in rejune*

Letter (s) Used	Monolinguals N	Bilinguals N
N	18	27

The high number of bilinguals omitting the final *E* in the syllable *NE* was not likely to be due to L2 transference as in Portuguese words do not end in a single *N* without a vowel, including the silent vowel *E*.

DAKE /deɪk/
/d/--

Table 17. *Children's misspellings for the phoneme /eɪ/ in dake*

Letter (s) Used	Monolinguals N	Bilinguals N
I	15	1
AY	8	3
E	1	10

A, which was the likely spelling for this phoneme, was children's first choice to spell /eɪ/. All other representations observed here by both groups were also observed by Mayhew (1977), Read (1975) and Treiman (1993). The high number of bilinguals spelling /eɪ/ as *E* does not seem to be the result of reliance

on the L2 alphabetic system, as in Portuguese the most likely spelling of /eɪ/ is *EI*. No clear evidence of L2 type errors was found amongst bilinguals on the spelling of this phoneme.

Table 18. *Misspellings for the phoneme /k/ in dake*

Letter (s) Used	Monolinguals N	Bilinguals N
CK	42	18
C	23	49
Q	8	3

The fact that so many bilinguals used *C* for /k/ seems to be expected. According to Read (1975) this was the most common spelling choice for /k/ amongst his younger subjects. No clear L2 transference errors were observed on bilinguals' spellings for this phoneme. It was interesting to observe that less bilinguals than monolinguals used *Q* to spell /k/, which according to the Portuguese orthographic system would be the most likely representation of /k/ in this nonword

Discussion and Conclusions

Group Similarities and Differences: Spelling, Literacy Skills and Non-Verbal Reasoning
The present findings identify important group similarities and differences in terms of the spelling strategies of bilinguals and monolinguals. Overall, monolinguals had significantly higher spelling scores than bilinguals at all testing times. Monolinguals could on average also name more letters of the alphabet than bilinguals, although this difference was reduced at Time 2 and no group differences were found in terms of identifying letter sounds. Monolinguals also showed significantly higher average scores in terms of word concept and receptive vocabulary in English. No significant group differences were observed in terms of PA and non-verbal reasoning measures.

To further understand if different spelling strategies were also explaining group differences, a qualitative spelling error analysis was carried out. The results show that bilinguals produced more phonetic spellings suggesting less

compliance with the orthographic and morphemic characteristics of English than monolinguals.

Bilinguals' Spelling Strategies
Overall, the results offer clear evidence about the strategies used by bilinguals and monolinguals when spelling. Regression analyses indicate that for both bilinguals and monolinguals letter knowledge, PA and word concept were important predictors of spelling. However, while no group differences were observed in terms of PA, word concept task was the only systematic contributor to spelling where bilinguals performed significantly lower than monolinguals. Early print knowledge was required in the word concept task to decide if an item could be accepted as a word or not, suggesting bilinguals' lower exposure to English orthography as a main reason for their lower spelling performance.

Analysis of spelling errors offered further evidence that bilinguals lower spelling scores were linked to lower print knowledge, likely derived from limited exposure to written English outside school. Less literacy-learning opportunities in English at home and in the community will initially lead to a shorter orthographic lexicon and explain bilinguals' lower compliance with the English orthographic system and overreliance on phonetic spelling strategies (Yeong et al., 2014). A reliance on non-lexical strategies to spell is required when children do not yet possess sufficient orthographic representations in long-term memory that can be automatically retrieved (Czapka et al., 2019; Raynolds & Uhry, 2010; Steffler et al., 1998). Orthographic conventions are learnt more through experience with print than through explicit teaching (Cassar & Treiman, 1997, Vale, 2011). Through reading, children develop a written vocabulary, which supports the formation of orthographic units that are frequent in a language (Deacon et al., 2013).

The spelling errors of bilinguals also suggest, albeit to a much smaller degree, the use of the Portuguese writing system as a source of information for spelling in English. Confirming the view that even in monolingual mode, bilinguals may search for both lexicons when confronted with words that are also orthographically close (Mishra & Singh, 2014). Bilinguals may transfer information (phonetic or orthographic) from L2 to L1 to overcome gaps of

information in L1. Or, they may simply transfer information across languages because this is an important strategy when spelling sounds that are common across both systems such as with cognates (positive language transference) (Raynolds & Uhry, 2010). The challenge for young bilinguals is to learn when to apply this strategy and when to refrain from using it. Here it is important to also consider that despite some irregularities Portuguese has a more regular writing system than English and is therefore easier to "access". The orthographic depth of both L1 and L2 may therefore also play a role in language transference in spelling (Sparks et al., 2008).

The fact that for bilinguals, non-verbal ability had an increasing role in explaining variance in terms of spelling performance, suggests that learning to spell in two alphabetic languages may, in the initial stages, place more demands on non-verbal skills. The role played by non-verbal skills in spelling for bilinguals may result from the cognitive control required to separate the two writing systems (Czapka et al., 2019; Olulade et al., 2016). The BAS Matrices in particular involve visual analogies. Directing attention to visual patterns is important in spelling and even more crucial when two alphabetic languages share some, but far from all, of the phoneme-grapheme correspondences.

Supporting Bilinguals' Spelling Strategies
The present results have important implications for educational practice in supporting young bilingual spellers and, in particular, where the language used at school may differ from the home environment or wider community. The bilinguals in this study attended English medium schools, learned Portuguese as a second language at school but lived in a Portuguese-speaking country so their exposure to Portuguese was significant.

Learning two alphabetic systems will require more opportunities to understand the similarities and differences between the spelling patterns in both languages (Deacon et al., 2013). These differences and similarities can be internalised through experiences where children are encouraged to develop and test their own hypotheses about the orthography of each language. It is also important to teach bilinguals a variety of strategies for spelling which can be applied when they are not able to automatically retrieve a spelling from memory (Steffler et al., 1998). Spelling error analysis also proved to be an

important assessment tool in providing clues to the spelling strategies used by bilingual children and to identify which spellings may be particularly challenging. Linan-Thompson, Degollado & Ingram (2017) emphasise the importance of considering spelling errors as part of a developmental process in bilinguals, instead of evidence of negative language transference.

Finally, the present study contains several limitations linked to the difficulty of considering bilingual children in relation to monolingual groups. Bilinguals are challenging to study because of the complexity of factors associated with bilingualism, including: two spoken languages, two writing systems and the linguistic and psychosocial diversity associated with bilingualism. Bilingual children will start school with varying degrees of exposure to oral and written language and it is important to support them to deepen their insight into both writing systems in a manner that is appropriate and enjoyable. Parents in partnership with teachers play an important role in providing support which helps children to become familiar with the writing system of each language and coming to understand common and distinct spelling patterns across both languages.

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