More than phonics; Visual imagery and flashcard interventions for bilingual learners with spelling difficulties

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Abstract

A great deal of research has been invested in literacy acquisition and the reasons why literacy acquisition is a complex process for some. Spelling research and successful interventions have mainly focused on English speaking children, although a significant number of studies have addressed writing systems other than English in recent years (O'Brien *et al.,* 2020). Understanding literacy acquisition and language performance not only in monolingual children (Pan, Rickard and Bjork, 2021) but also in bilingual children is important, as bilingualism and biliteracy are becoming the norm rather than the exception (Kormos, 2017). Transfer effects between languages can affect the way we learn to spell (Niolaki and Masterson, 2012). Transfer effects are meant to be the bi- or unidirectional influence of language and cognitive skills between the languages a learner is literate in (Figueredo, 2006; Koda, 2008). In addition, usually, interventions target phonological ability, but these are not always effective for older learners or individuals who do not have a phonological difficulty (Niolaki, Masterson and Terzopoulos, 2014). We present the successful interventions we conducted with bilingual and monolingual learners targeting spelling and using visual imagery and flashcard techniques. We also discuss the importance of a detailed background assessment of the languages the individual is literate in, in order to tailor effective intervention. We hope that specialist dyslexia assessors and tutors will find these techniques helpful, and these will serve as an alternative way to strengthen spelling in multilingual and monolingual learners.

Key words: Visual imagery; flashcards; interventions; bilingual learners; spelling difficulties

Introduction

Many bilingual children struggle with reading and spelling skills in the first or second language or both languages, and knowing how to support their literacy skills is of great interest for teachers, SENCos, Educational Psychologists and Specialist Dyslexia tutors (Niolaki and Masterson, 2015; Niolaki, Terzopoulos and Masterson, 2017; Wydell and Kondo, 2003). Recent evidence indicates that the attainment gap has widened for children from other ethnicities to English speakers over the past decade, especially for those from Black backgrounds (an umbrella term including Black Caribbean and African students) and pupils arriving late in the English educational system (Hutchinson, Reader and Akhal, 2020). With English

Additional Language (EAL) learners, it is always difficult to ascertain whether the literacy difficulty is due to a genuine cognitive difficulty or the lack of exposure to the second language, partially due to the lack of practical tools to identify literacy difficulties, and as a result, we are at constant risk of inappropriate use of SEN labels (Mortimore *et al.,* 2012). Another important factor frequently stated by schools is the lack of resources and time to assess the EAL learner's not only second (English) but also first language.

There is currently evidence to indicate that core cognitive skills (e.g., phonological ability, memory and rapid naming ability) will be intact or impaired in both languages in which the individual is literate (Ziegler and Goswami, 2005; Niolaki *et al.,* 2014). There is also evidence to indicate that the transparency of the orthography can drive the severity of the difficulty in each cognitive or linguistic skill, as we will discuss in more detail next. Writing systems can be classified on a continuum of transparency ranging from having largely one-to-one associations between letter-sounds (transparent orthographies, e.g., Greek) to having more equivocal associations (opaque orthographies, e.g., English) (Seymour *et al.,* 2003). We are also currently well aware that an effective intervention for literacy difficulties in monolingual and bilingual children should be rooted in detailed theoretically-based assessment (see, Niolaki *et al.,* 2020), and especially for bilingual children this should consider the characteristics of individual languages in which they are literate. If, for example, the first language is more transparent than the second then it might be the case that the process of learning the second language will be influenced by expectations/processes acquired via the first language (in the current example, a strong phonics influence).

Prior to our discussion about the case study and spelling interventions with bilingual and monolingual children, we would like to review evidence concerning how literacy difficulties and strengths are manifested when someone is biliterate or multiliterate. Several studies have explored whether literacy difficulties of multiliterate children and adults exist in their different orthographies and if the characteristics of each language modulate the severity of the difficulties (Joshi, Padakannaya and Nishanimath, 2010; Morfidi *et al.,* 2007). Research has indicated that literacy difficulties can be manifested in all the multilingual person's languages, but the type of difficulty might differ due to the specific traits of each writing system (Wydell and Kondo, 2003).

In a cross-linguistic study with bilingual Dutch and English-speaking poor and average secondary school (Grades 8 and 9) readers Morfidi *et al.* (2007) examined predictors of first language (L1) and second language (L2) reading. They tested the Linguistic Coding Differences Hypothesis, which suggests that L1 and L2 are closely associated, and if one has difficulties in L1, these will be evident in L2 (Sparks *et al.,* 1997). They also acknowledge the importance of L1 phonology, orthography, syntax and semantics in acquiring L2. They found that reading difficulties in L1 appear to be similar in L2 and that rapid naming was the strongest predictor of reading performance within and between languages. Another finding was

that phonological difficulties, as assessed by a spoonerisms task, were found in both Dutch and English, supporting Nikolopoulos, Goulandris and Snowling's (2003) argument that phonological difficulties will be apparent for dyslexic readers of transparent orthographies if more demanding phonological tasks are used (such as spoonerisms, where the initial phonemes of a pair of words are swapped, e,g,, *king - john -> jing – kohn*). Their findings also agree with Vellutino and Scanlon's (1989) argument that poor readers' difficulties are primarily related to poor phonological processing rather than semantic or language comprehension problems.

Joshi *et al.,* (2010) report two case studies of adolescents, VN and MS, who were bilingual in Kannada and English. VN had dyslexia and MS hyperlexia (reading comprehension difficulties but intact reading ability), and both individuals had the same pattern of results in both languages. The researchers conclude that the core difficulty rests in phonological ability for children with dyslexia, such as VN. They also agree with the "psycholinguistic grain size theory". According to this, differences in orthographic depth modulate the level of the difficulty (Ziegler and Goswami, 2005). By orthographic depth is meant the extent of deviation from one-to-one letter(s)-sound(s) associations within the writing system.

In support of the psycholinguistic grain size theory, Wydell and Kondo (2003) reported the case of an English-Japanese bilingual adult, AS, who appeared to have phonological dyslexia only in one of his two languages. AS appeared to encounter difficulties reading in opaque English, which was classified as a fine-grained writing system (relying on smaller chunks, phonemes). The argument was that AS relied on visual memorization and not phonological strategies, and the former were adequate for learning to read Japanese Kanji and transparent syllabic Kana (relying on larger chunk syllables- a syllabic writing system). Thus, his reading difficulty was only apparent in English, where finer grained processing was required (grapheme parsing, conversion to phonemes, etc.). AS had a phonological ability difficulty only. Wydell and Kondo suggested that languages that rely on larger grain sizes (syllables) and contain transparent associations will have a lower incidence of dyslexia than opaque ones. Therefore, the characteristics of each language will determine the extent and severity of the difficulty. AS's phonological dyslexia was apparent in English (where there was a need to have intact sublexical skills to read novel words) but there was a lack of any literacy difficulty in Japanese, which operates in terms of larger syllabic units. AS's core phonological deficit subsequently affected his ability to develop his sight word reading in English on a par with same-age students. The researchers suggested that whole word recognition techniques (e.g., repeated copying or reading of words, a strategy used for Japanese word learning) could help with the phonological difficulty.

In line with this, Nikolopoulos *et al.* (2003), following their research with monolingual Greek dyslexic children, suggested that the transparency of Greek ameliorates the severity of the reading and phonological difficulty. Similarly, Spencer and Hanley (2003), based on data from Welsh and English monolingual

children closely matched in age (5 and 7 years) and who lived in the same area, found that children speaking Welsh (which has a transparent orthography) performed significantly better in reading of words and non-words and in phonological awareness (PA) tasks than their English counterparts. So, orthographic transparency seems to be a factor that determines the pace of development of phonological abilities and reading skills in each language (Seymour *et al.,* 2003). Hanley *et al.* (2004), three years after their initial study (Spencer and Hanley, 2003), re-assessed the same Welsh and English children's reading of words (they were now ten years old) and found that the Welsh-speaking children still outperformed the English-speaking children in reading words. Further analysis of the reading performance of the children indicated that the least able quartile of English children was well below the least able quartile of Welsh children.

This review indicates the need to be aware of the transparency of the languages in which a child is literate. There are universal skills that could be impaired in any language the child is assessed in (i.e., phonological ability and memory and rapid naming). Next, we present the case study, the rationale and the spelling intervention we conducted with a trilingual but biliterate English and Greek-speaking girl.

Case study

NT was 10-years-old when she was referred to the first author by her school teacher (NT's case study and detailed presentation of the background assessments and intervention can be found in Niolaki, G. and Masterson, J., 2015. Spelling difficulty in a 10-year-old trilingual child: A case study and report of an effective intervention programme. *Learning and Using Multiple Languages: Current Findings from Research on Multilingualism*, p.82.). The teacher was worried about NT's abysmal spelling in Greek. Discussion with NT's English teacher revealed that she had spelling difficulties in English as well. NT is trilingual. She speaks English, Greek and a third language of Turkish origin which she uses at home (and Greek and English with friends and at school). She is biliterate as she can read and write in Greek and English. No attempt was made to teach NT to read or write in Turkish. When the assessment began, NT was attending a Greek medium school in London, where pupils were taught in Greek based on the Greek National Curriculum. They had ten hours per week of English literacy taught by L1 English teachers.

Next, we briefly present NT's strengths and challenges. NT had average general cognitive ability, as indicated by her score in a non-verbal ability test. We chose a non-verbal ability test to reduce the bias from a verbal assessment which can indicate a difficulty in L2 vocabulary knowledge. NT presented in both languages (English and Greek) the following challenges. Her reading accuracy and comprehension were age-appropriate. Detailed background assessment in literacy and cognitive skills using reliable and valid tests in both languages indicated that NT had the characteristics of mixed dysgraphia reflected in poor performance in spelling non-words and irregular words. She also had significant difficulty in text

reading rate (number of words read in a passage). For English reading rate NT's standard score was 84, and for spelling, it was 74. For Greek, analyses using modified t-tests indicated significant differences in reading rate and spelling scores for NT and the comparison group ($t_{\text{reading rate Greek}}$=3.36, p=0.03 and $t_{\text{spelling Greek}}$=3.60, p=0.03). Qualitative analysis of NT's spelling errors indicated a predominance of phonologically appropriate errors (for example, in English: jumped->jumpt and in Greek: πηγή (source /piyi/)-> πειγή). The preponderance of phonologically appropriate spelling errors suggests that she may be relying to a greater extent on sublexical/phonological than lexical-semantic processes for spelling.

Assessments of cognitive-related abilities did not reveal any difficulties in phonological ability, phonological memory, or rapid automatized naming. However, NT appeared to have a visual attention span difficulty (a problem processing simultaneously and at single glance elements (digits, letters or symbols) presented in a multi-element array). Valdois *et al.* (2011) have reported a case study with mixed dyslexia and surface dysgraphia who had a difficulty of visual attention span (VAS). Martial, a French 9 –year-old boy, had dyslexia albeit his phonological ability and phonological short term memory were assessed as being at an age appropriate level. His difficulty, similarly to NT, was located in visual attention span only. The researchers related a deficiency in VAS with poor ability to consolidate orthographic information, which in the case of NT ties nicely with her spelling difficulty where demands on orthography (knowledge stored in memory on how to represent spoken language in written form) are high. Our results support other evidence that a difficulty in orthographies of similar depth, at least for spelling, will be manifested in both languages (see *Linguistic Coding Differences Hypothesis* presented in the introduction). We found similar supporting evidence of this in a number of case studies we have published, see for example, ED and LK published in *Multilingual Education* (Niolaki, G.Z., Masterson, J. and Terzopoulos, A.R., 2014. Spelling improvement through letter-sound and whole-word training in two multilingual Greek-and English-speaking children. *Multilingual Education, 4*(1), pp.1-23), and RI, where discussion with his Greek and English teachers revealed that RI was weak in reading and spelling in both writing systems (Niolaki et al., 2017).

Rationale for training

We utilised a spelling intervention as NT's primary difficulty was in spelling. This negatively affected her ability to produce a lengthy piece of writing as she dedicated a significant amount of time to decide the correct spelling of a word. We chose to target both languages as NT aimed to continue her education in a bilingual (Greek and English) secondary school in London. As a result of the nonexistent phonological ability difficulties, we targeted whole-word spelling, comparing two different teaching techniques (visual imagery vs. flashcards). Typically, in visual imagery spelling interventions, the individual pairs the word with the visual representation (Behrmann, 1987; Brunsdon *et al.* (2002), and Brunsdon, Coltheart and Nickels, (2005)). In our adaptation, the individual has to provide the picture and embed on it the misspelt

part but now with the correct spelling (see procedure below). We have used this technique with great success in specialist dyslexia interventions with children and adults with dyslexia (Niolaki *et al.,* 2014; 2015; Terzopoulos, Niolaki and Masterson, 2020).

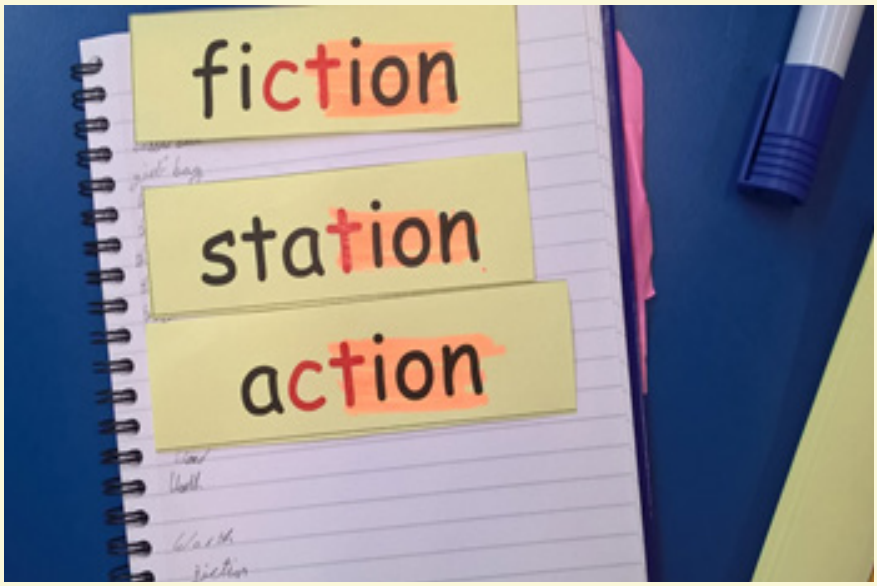
Training programme

NT was assessed using 120 English and 100 Greek words, in two different baseline assessments, which varied in frequency, length, and regularity (irregular: *yacht* and regular: *mat*). Only items that were misspelt in both assessments were included in the training, which lasted nine sessions of 30 mins for each language and 15 mins for each technique. Two different baseline assessments were administered as it was important to ensure that only truly difficult-to-spell items were included. In that way, we can ascertain that only words the individual struggles with are selected. The intervention is easy to administer by a teacher or teaching assistant. It does not take a significant amount of time; it can also be administered to a small group of children with similar difficulties. NT made 54 misspellings in each language, and these words were divided equally into the nine intervention sessions. The sessions took place three times per week in NT's school, and each session included the training of six words. In that way, success and accomplishment can be achieved, and the student's motivation is sustained.

Procedure

For both techniques, a flashcard was shown to NT with the misspelt part highlighted or presented in different font colour (e.g. –tion) NT read the word, and we discussed the meaning and the type of error/s she made. For the visual imagery technique, she was asked to think of a semantically related picture that would help her associate the word - with her pre-existing background knowledge in her L1 or L2 (Figure 1). An alternative to this procedure is to provide the semantically related picture with the tricky section for the individual graphemes embedded in the picture (Figure 2). We have successfully used this alternative technique with a monolingual Greek dysgraphic adolescent TH (Niolaki *et al.,* 2016). NT next created the picture with the word (e.g. criticised) embedded in it (Figure 1). The next step was for NT to copy the picture, and after ten seconds, NT was asked to reproduce the drawing with the embedded word from memory (her earlier picture with the word and the flashcard were not visible). If she made an error, NT was asked to repeat the last two steps. At the next step, NT wrote the word without the picture, and the final activity was to include the word in a sentence (Figure 1).

Figure 1


fiction
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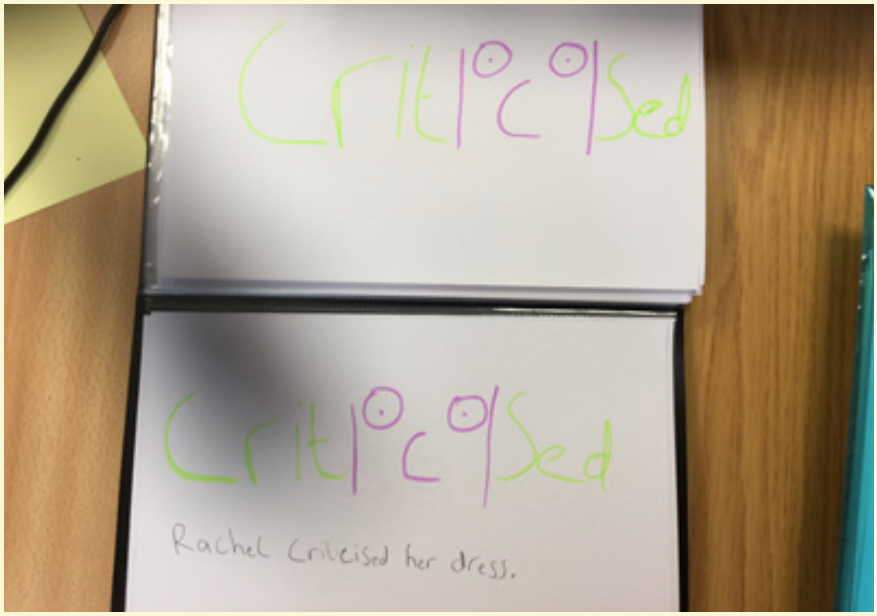
Rachel Criticised her dress.

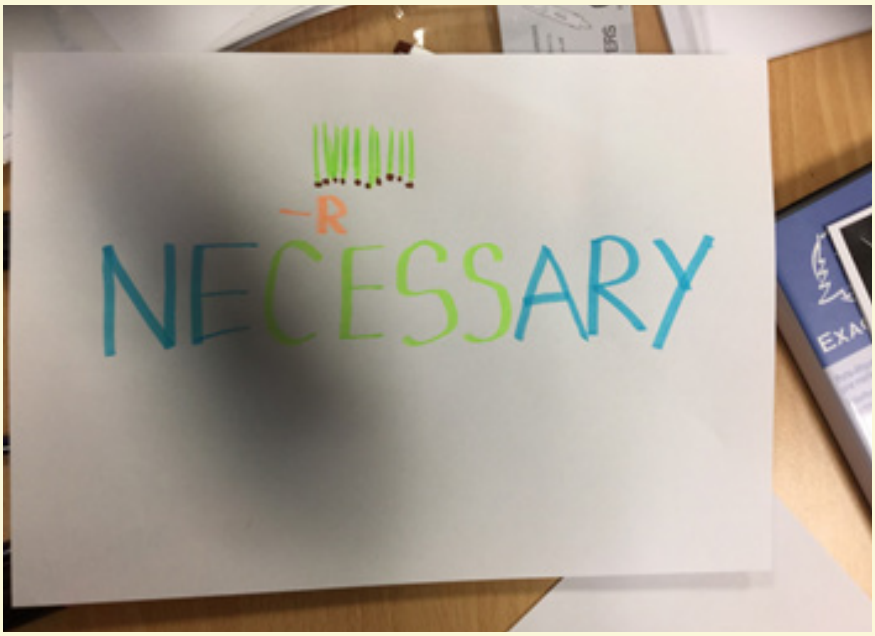
NECESSARY

Figure 2

Μυστήριο /mistirio/ (mystery)

The flashcard technique followed the same steps, but a picture was not created or provided. For example, NT had to copy the word, then the flashcard and word were removed, and after a 10-second delay, she reproduced the word. In case of an error, she returned to the earlier step and finally, she produced a sentence using the word.

A letter explaining the procedure was provided to the parents, and they were asked to support NT with practising the words at home. Prior to introducing the new words to be practised, NT was asked to spell the words she had to practise at home. In that way, we could check that she worked at home with her parents. Also, partnerships with parents and inclusion in the intervention procedure is an additional key determinant for the success of the intervention.

Results and Discussion

As a result of the intervention, NT significantly improved in spelling, and her good performance remained high even as assessed three months after the intervention. This sustained improvement was observed for both languages, and the effect of the two different intervention techniques did not differ. So, both visual imagery and flashcards were successful. Similar results were found after the spelling intervention we carried out with a monolingual English boy AM. His pre-intervention standard score in spelling was 70, and after the intervention, it was average, 98 (Niolaki *et al.,* 2021). The visual imagery and flashcard spelling intervention had also very positive results for a monolingual Greek dysgraphic adolescent, TH. His post-intervention assessment results revealed a significant improvement in irregular word spelling, which generalised to untrained items and was sustained over time (Niolaki *et al.,* 2016). It is noteworthy that in

all cases, we also observed improvement in reading rate, which was not directly trained, at least in NT and TH. This suggests that training in spelling can be also beneficial for reading speed. Overall, our findings suggest that visual imagery as an alternative, more creative and multisensory way of teaching spelling for poor spellers has very positive results. Also, it can be effective not only for English but also for other orthographies. In the learners presented (NT, AM and TH) each of them had his/her own strengths and weaknesses. NT had difficulties in both phonology and orthography, AM a more profound phonological difficulty which negatively affected his sight word reading and TH in sight word spelling. One can conclude that explicit teaching of spellings coupled with visual imagery and repeated writing as a single word and in a sentence can help the learners strengthen their memory of the correct and appropriate sequence of letters (visual input) which is a central ingredient of accurate spelling.

For bilingual learners, it is good to know the languages the individual is literate in as difficulties frequently appear in both languages. As in NT's case, a possible phonological difficulty might have been mitigated at the early stages of education due to the transparency of the Greek orthography and transfer effect from L1 to L2 (Niolaki and Masterson, 2012). Thorough background assessment and support of both languages, if this is possible, can provide a more detailed profile of strengths and weaknesses and a better outcome of the intervention as was observed for NT. Detailed assessment can also help target the specific difficulties an individual has. In the case of NT, it is unlikely that an additional phonics intervention would have brought the desired outcome. Her difficulty was primarily in whole word recognition, and her phonological processing skills were intact, so blending and segmenting of words would not get the same positive result. In addition, words were treated as wholes during the flashcard and visual imagery techniques and were not broken down into smaller phonological chunks. One might suggest that there could be a subliminal phonological influence, but as we explain next in the case of ED, who had a severe phonological deficit, this was not the case. For ED, a phonics intervention did not bring the same result as a whole-word intervention did. ED's phonics skills were so compromised that only a whole-word visual imagery and flashcard technique were effective (Niolaki *et al.,* 2014).

Overall, the results from NT indicate that the locus of the difficulty was the same for both English and Greek, regardless of the differences in the two writing systems. NT appeared to have a selective difficulty of visual attention span and not phonological ability or processing. The finding is in accordance with the results of Bosse *et al.* (2007). They found a selective difficulty in either phonological skills or visual attention span in monolingual English- and French-speaking children with dyslexia. Future intervention case studies and small group research with different writing systems and participants of different ages could further elucidate the interplay of cognitive and linguistic processes involved in being literate in more than one language, and how we can effectively support our multilingual learners.

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