

Bilingual Welsh-English children's acquisition of vocabulary and reading: implications for bilingual education¹

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Abstract

Previous studies have highlighted early differences in bilinguals' rate of language acquisition in comparison to monolinguals. However, these differences seem to disappear with increasing age and exposure to the language, and do so quicker in dominant community languages than in minority status languages. This study aimed to replicate these findings in relation to literacy development. Three groups of Welsh-English bilinguals (L1 Welsh, simultaneous bilinguals, and L1 English) were given receptive vocabulary tasks and reading tasks in Welsh and in English. An additional group of monolingual English-speaking controls was given the English tasks. Results revealed differential performance among the bilinguals in relation to the English tasks, with the L1 English bilinguals and monolinguals performing closer to age norms than L1 Welsh and simultaneous bilinguals by the end of primary school education. No differences were found between the L1 English bilinguals and the monolinguals on either task. On the Welsh measures, performance mirrored those of previous studies, on both tasks, demonstrating higher levels of performance relative to increasing amounts of exposure to Welsh. The implications of these findings for bilingual education strategies, particularly in relation to the development of bilingual language competence in minority language situations, are discussed.

[196]

Keywords: *Bilingualism, literacy, vocabulary, bilingual education, input*

Introduction

Previous studies comparing bilingual and monolingual children have long identified similarities in their patterns of acquisition (Voltera & Taeschner, 1989; Cenoz & Genessee, 2001; Genessee, 1989, 2001) but differences in their acquisition rate (Genessee & Nicoladis, 2006; Pearson, Fernandez & Oller, 1993). Young bilinguals often demonstrate delayed abilities in any one language when compared to their monolingual peers, but these early delays seem to disappear as they become more experienced with each language (Bahrick, Hall, Goggin, Bahrick & Berger, 1994). Such effects have been demonstrated extensively for vocabulary knowledge (e.g., Bialystok, 2006; Hakuta & Diaz, 1985; Umbel & Oller, 1994; Pearson, Fernández, & Oller, 1993), and have been attributed to the so-called ‘distributed characteristic’ of the bilingual speaker (Oller, 2005) or what Grosjean (2008) refers to as the ‘Complimentarity Principle’. According to this characteristic (or principle) the bilingual’s vocabulary tends to be distributed across their two languages, as a result of the fact that bilinguals often use and hear each language across different domains of language use (cf. Li, 1996). This ‘domain specificity’ of bilingual acquisition refers to the fact that bilinguals are not always exposed to both languages in all social or private domains. Consequently, bilinguals often develop language and context specific lexicons that are related to the language(s) being used in a given context. Thus, the development of vocabulary is clearly linked to a child’s linguistic exposure (Gathercole, 2007), with bilinguals developing different vocabulary in different contexts (Oller, 2005).

In situations where children become bilingual via bilingual or L2-medium education systems, a valid area of concern – among parents in particular – has to do with the impact of bilingualism (or the medium of instruction at school) on their child(ren)’s L1. Likewise, parents are concerned about their child’s progress in a language that is not their child’s home language, and the effects of their child’s developing fluency in that language on their ultimate

educational achievements. This is particularly the case in countries where the education system is promoting the survival of the heritage minority language despite the fact that a number of pupils attending the schools are L1 English speakers. Whilst the research in this area is sparse, there is evidence that schools employing an English as an Additional Language (EAL) programme have no detrimental effects on children's abilities in their L1 (e.g., Lindholm-Leary, 2000; Howard, Sugarman & Christian, 2003), and similar results have been found for L1 English speaking children involved in early French immersion education programmes. French immersion children '...gain fluency and literacy in French at no apparent cost to their English academic skills' (Cummins, 1998, p.34) regardless of the type of immersion programme involved (Ramírez, Pasta, Yuen, Romy, and Billings, 1991; Genesse, 1983). Furthermore, '[t]here is also no evidence of any long-term lag in mastery of subject matter taught through French in early, middle or late immersion programs' (Cummins, 1998, p. 35). However, although children's mastery of English and their receptive skills in French is reported to be native-like from an early age in such programmes, their productive skills in French tend to lag behind those of native L1 speakers, even at grade 6 (Harley, Allen, Cummins, & Swain, 1991; Lapkin, Swain, & Shapson, 1990). (This trend may be influenced by children's reluctance to use their L2 in social situations, away from the school, which is also an issue in Wales – see Thomas & Roberts, 2011 and Thomas, Lewis & Apolloni, 2012.) But obtaining their education through an L2 seems not to deter children's L1 (English) nor their ability to achieve academically.

One key factor that seems to influence a bilingual child's ultimate linguistic achievements is language dominance, both in society and within the individual (Paradis, 2010a, b; Paradis, Tremblay, & Crago, 2008; Oller & Eilers, 2002). In communities where one language holds majority status over another, exposure to the dominant language is likely to be more guaranteed than exposure to the minority language, rendering full acquisition of

the dominant language more of a certainty than acquisition of the minority language (Gathercole & Thomas, 2009; Gathercole, 2007; Alba, 2004). For example, Gathercole and Thomas (2009) explored the different profiles of three distinct types of bilinguals in Wales: those exposed only to Welsh by both parents in the home (OWH children); those exposed to both Welsh and English approximately equally in the home (e.g., one parent one language approach – WEH children); and those exposed only to English by both parents in the home (OEH children). Bilinguals were tested for their receptive knowledge of Welsh vocabulary, grammatical gender, and word order. In general, the OWH children outperformed the other children on these tasks, with the WEH children sometimes performing in between the OWH and OEH children. These patterns persisted even at 11 years of age. They went on to report separate studies of English (& Welsh) vocabulary in children and adults. Whilst young 3;6 – 5;0 year-old children demonstrated similar input effects in their vocabulary knowledge in English (i.e., the more English they had in the home, the wider their breadth of vocabulary), by the age of 7 years, children from OWH, WEH and OEH backgrounds all performed equally well on their receptive knowledge of English vocabulary. This trend continued into adulthood, suggesting that speakers are able to acquire a ‘mature command of English’ independent of exposure at school or at home (Gathercole & Thomas, 2009, p. 213). In a similar study, Duursma, Romero-Contreras, Szuber, Proctor, Snow, August & Calderón, (2007) explored the relationship between home language and vocabulary among Spanish-English bilinguals. They concluded that Spanish needed support at home and at school in order for bilinguals to become proficient in the language, whereas English proficiency was reached regardless. These studies suggest that simple exposure to majority-status languages is sufficient enough to allow full acquisition to develop, whereas exposure to minority-status languages is only sufficient if it is also well supported in the home and at school.

More recently, however, studies have demonstrated continued differences across bilinguals' and monolinguals' performance on English tests beyond the primary school years. These findings suggest that the bilingual 'catch-up' occurs later, and depends largely on continued exposure to both languages and the individual's levels of engagement with each language. In the Welsh-English context of Wales, children from different home language backgrounds reach similar levels of receptive vocabulary knowledge in English before they do so in Welsh (Gathercole & Thomas, 2009; Gathercole, Thomas, Roberts, Hughes & Hughes, in press). However, the age at which this happens for English varies from around age 7 in some studies (Gathercole & Thomas, 2009, as mentioned above) to the teenage years in others (Gathercole *et al.*, in press) whilst performance on Welsh continues to differ across home languages beyond these ages. Bialystok and her colleagues report similar differences across fluent bilinguals and monolinguals on measures of English receptive vocabulary at age 10 (Bialystok, Luk, Peets, & Yang, 2010). More recent findings have also demonstrated differences in vocabulary size across bilingual and monolingual samples throughout adulthood (Bialystok & Luk, 2012), although the age at which the bilinguals involved acquired their L2, and the reasons for acquiring the language, varied from one speaker to the next. Whilst it is reasonable to expect variation in performance across bilinguals relative to factors such as age of acquisition, dominance and proficiency, the use of standardised tests of English vocabulary normed on monolinguals may not measure the true breadth of bilinguals' vocabulary knowledge in English (see e.g., Pearson, Fernández, & Oller, 1993). Whilst having smaller vocabulary stores than age-matched monolinguals does not impact greatly on bilinguals' communicative success in a language, children may, nevertheless, be aware of a weakness (in this case in their use or knowledge of vocabulary) which may, in some cases, affect their confidence, particularly when drawing comparisons between their own and others' abilities (see Thomas & Lewis, 2011). Given the paucity of tests that provide

bilingual norms for English proficiency, one must, therefore be careful in the interpretation of bilingual's performance, particularly in their L2, even for those living in an English-dominant community. However, it is fair to say that the majority of findings thus far suggest bilinguals do catch-up with monolinguals, at least in relation to receptive vocabulary in English.

One area where the effects of input on bilinguals' linguistic skills have not been researched as extensively as vocabulary and grammar is literacy (and reading in particular), which has far-reaching implications for language policies in education. A major study that addressed this issue of input effects on literacy development was that by Oller and Eilers (2002), which examined Spanish-English children's development of literacy in the Miami area of Florida. Children from monolingual, immersion and two-way elementary bilingual education were tested on a variety of standardized tests to evaluate their oral language, reading and writing skills. Their results revealed that children from the two bilingual education settings (immersion & two-way) demonstrated comparable results, but the English monolingual children performed the best on English language measures. Moreover, Oller, Pearson and Cobo-Lewis (2007) reported comparable reading abilities across bilinguals and monolinguals at age 10 (5th grade), despite the bilinguals having lower vocabulary scores.

However, the impact of exposure patterns on bilingual children's literacy development is limited to a few studies, with none conducted in the Welsh-English context in Wales. Recently, this issue has received heightened attention in Wales following the Welsh Education minister's announcement that '...every pupil should, at the end of every academic year, reach the expected reading age if they are capable of doing so... However, we are clearly falling short of that at the present time' (Welsh Government, 2011). He suggested further that 'children attending Welsh medium schools [should be] equally literate in both languages by the end of key stage 2' (Welsh Government, 2011). In view of these comments, this paper aimed to explore the role of input on bilingual children's literacy development in

English as compared to Welsh. Furthermore, since it is known that successful reading comprehension is related to vocabulary knowledge (Duursma *et al.* 2007; Oller, Pearson and Cobo-Lewis, 2007), our study also measured bilinguals' vocabulary knowledge in both English and Welsh. Three types of bilingual Welsh-English children (L1 Welsh bilinguals, simultaneous Welsh-English bilinguals, and L1 English bilinguals) were tested in English and in Welsh. All children attended Welsh-medium (or 'bilingual'¹) schools in regions where Welsh is widely spoken in the community, but varied in terms of their home language experiences. Our results allowed us to map the progress made by each bilingual 'type' (according to home language dominance) in both English and Welsh, by the end of primary school education. The predictions regarding performance outcomes on Welsh and English tests of vocabulary and literacy are presented below, first in relation to performance on the Welsh tests, and then in relation to performance on the English tests.

Predictions for performance on Welsh tests:

1. Given the results of previous studies (Duursma *et al.*, 2007; Oller, Pearson & Cobo-Lewis, 2007; Bialystok, 2006), we predicted that there would be a correlation between vocabulary and reading scores in Welsh.
2. Performance on vocabulary and reading would increase with age, but the difference in age would be smaller for reading accuracy than for vocabulary, given that (i) all bilinguals tested received their education through the medium of Welsh, (ii) reading instruction in Welsh begins early, (iii) the Welsh orthography is transparent, and (iv) reading is not context-specific in the way vocabulary learning may be.
3. Within each age group, the greater the amount of exposure to Welsh, the better their performance on vocabulary (raw scores) and reading, with any differences across groups being smaller for reading.

Predictions for performance on English tests

1. We predicted that there would be a correlation between vocabulary and reading scores in English for the same reasons as outlined for Welsh above.
2. Performance on vocabulary and reading accuracy would increase with age, with a larger difference across ages in relation to vocabulary than reading due to the opacity of English orthography.
3. Any differences (if any) across participant groups for both vocabulary knowledge and reading abilities would be observed in the younger age group only, due to the dominance of English and its heightened exposure, with any differences disappearing by age 11.

Method

Participants

326 children took part in the study. Of those, only 207 sets of parents provided responses to a detailed background questionnaire revealing measures of language exposure and socio-economic status (SES). Since controlling for SES is essential for bilingual research (Hakuta & Diaz, 1985; Bialystok, 2006; Garcia, 2009), only the 207 children for whom we had SES information were involved in the analysis. The sample included 114 girls and 93 boys, aged between 7 and 11 years. Distribution of the children by age and home language is shown in Table 1.

Table 1 Number of participants by age and home language.

	Language Type			
	L1 Welsh	L1 English	Simultaneous Bilinguals	Monolingual
7/8	36	28	19	17
10/11	46	27	19	15
Total:	82	55	38	32

The bilingual children were placed into one of the three bilingual groups according to the categorization procedure developed by Gathercole, Thomas & Hughes (2008). In short, if both parents spoke mostly or only Welsh in the home, these children were labelled 'L1 Welsh'. If both parents spoke mostly or only English, these children were labelled 'L1 English'. If the children were exposed to both languages between 40% and 60% of the time in the home, they were labelled 'simultaneous bilinguals'. All bilinguals attended schools in north Wales where Welsh was the predominant medium of teaching. (A series of ESTYN school inspection reports and school language policy documents developed by each Local Education Authority was consulted for confirmation.) The Welsh schools were located in areas where the majority of the population in the community spoke Welsh. An additional group of monolingual children came from homes where only English was spoken and attended schools that taught almost exclusively through the medium of English and were located in predominantly English-speaking areas of north Wales.

Tests

1. Receptive Vocabulary Tests.

(i) Prawf Geirfa Cymraeg: Fersiwn 7-11/ Welsh Vocabulary Test: Version 7-11 (Gathercole & Thomas, 2007).

The *Prawf Geirfa Cymraeg* (PGC) is a standardized test of receptive vocabulary, normed for Welsh-English bilinguals according to age and home language background. The test produces four key norms: a general age norm and three separate age X home language norms (age X only Welsh at home; age X Welsh & English at home; and age X only English at home). The test measured children's knowledge of 111 Welsh words, each of which was accompanied by a series of four pictures, arranged in a 2x2 frame. The target word items

were administered orally and were not seen by the children at any time during the test. The child's task was to choose which picture, out of the four options, showed the target word. Only one picture matched the given word exactly; the remaining three pictures were distracters. Each child was required to respond to all 111 items in the test. The items ranged in difficulty from easiest to hardest, and the sequence remained the same for each child. The items were formatted in a booklet, with the researcher recording the child's oral response (a, b, c, or ch) on an answer sheet. The raw score was the number of items correct (out of 111) which was then converted into the standardised score according to the child's age and home language background.

(ii) *British Picture Vocabulary Scale (BPVS) 3rd edition (Dunn & Dunn, 2009).*

The BPVS is a standardized test of English receptive vocabulary knowledge consisting of 168 words arranged into 14 sets. Children were presented with twelve plates of four drawings in each set, and their task was to identify which picture, out of the four options, matched the word they heard. The remaining three pictures served as distracters, and the child's response (1, 2, 3, or 4) was recorded on a record sheet that was not seen by the child. Each child began the test at a point that was noted for their age, and if a child made no more than one error in the given set, this would constitute as the basal set, i.e. where the scoring would start. The test was stopped when the ceiling set was reached, which would be when the child made 10 or more errors in a given set of 12. The score was then calculated by subtracting all errors from the ceiling item to generate a raw score from which a standardized score could be calculated.

2. Reading Tests

(i) *Prawf Darllen Glannau Menai (Glannau Menai Reading Test) (Payne, 1998).*

As a measure of reading abilities, the bilingual children were given the *Prawf Darllen*

Glannau Menai, which is a standardized prose reading test consisting of passages, ranging in difficulty, for the purpose of assessing children's Welsh language reading accuracy and comprehension. The children were encouraged to read all 7 passages out loud and to answer questions relating to each passage in turn as a measure of their comprehension. Mistakes were marked on the response sheet by the researcher and the test was stopped if the child obtained a score of 5 or less on accuracy for the given passage. Two raw scores were calculated for each child: an accuracy score and a comprehension score. An age-normed standardized score, a percentile score and a reading age was then generated from the raw score.

(ii) *Neale Analysis of Reading Ability – Revised (NARA II) (Neale, 1997)*.

As a measure of English reading ability, all children (bilingual and monolingual) were given the NARA II. The NARA II is a standardized reading test consisting of passages with increasing levels of difficulty which is used for assessing children's English language reading accuracy and comprehension. The test consists of six passages and the child's starting point is determined by their age. The child was required to read the passage out loud and then answer questions relating to each passage as a measure of their comprehension. Mistakes were marked on the response sheet by the researcher and the test was stopped if the child made more than 16 errors in any given passage (this scoring increased to 20 or more for passage 6). Two raw scores were calculated for each child: an accuracy score and a comprehension score. An age-normed standardized score, a percentile score and a reading age was generated from the raw score.

3. Background Measures

In order to match the children on as many background variables as possible, parents were required to fill in a questionnaire detailing their child's language exposure and socio-economic background. Additionally, a non-verbal measure of IQ was administered in order to

eliminate differences in IQ as a potential confounding variable. These measures are detailed below.

(i) Socio-economic Status (SES)

Questionnaires were distributed to children's parents to assess language exposure and socio-economic background. A composite measure of SES was generated from their response to target questions concerning gross family income and parents' education level, and a separate additional measure involved whether or not their child was in receipt of free school meals. Responses for the composite score ranged from 1-5 for each question (with 1 indicating low income or education level and 5 indicating a high level) and the score was then calculated by averaging responses across the target questions.

(ii) Raven's Coloured Progressive Matrices (Raven, 2008).

The *Raven's Coloured Progressive Matrices* is a test of non-verbal intelligence consisting of three sets of twelve puzzles designed to assess children's intellectual processes. The child's task was to determine which shape from a choice of six matched the puzzle best in each trial. The puzzles increased in difficulty by the end of each set (A, Ab and B) and assessed 'mental development up to the stage when a person is sufficiently able to reason by analogy and to adopt this way of thinking as a consistent method of inference' (Raven, 2008, p.2). All children were given the full set of 36 items to complete, which produced a raw and a standardised score at the end.

Procedure

All children were tested in a quiet space away from the classroom. The order of testing varied from one child to another and depended largely on the school's timetable. Each test took between 20 and 80 minutes to complete. Tests were counter-balanced in terms of administration in order to eliminate fatigue effects. . Vocabulary and reading tests were administered to the children individually, and the Raven's was administered to groups of

children at a time. Whilst the bilinguals completed both the Welsh and the English versions of the vocabulary and reading tests, the monolingual sample only completed the English versions of those tests.

For both vocabulary tests, all children were given the same set of instructions which was to point to or say the letter/ number underneath the picture they thought went best with the word that they heard. Practice sets were first administered in order to identify whether a given child had problems understanding any aspect of the test, and each child was corrected for any mistakes during the practice trials but not during the experimental trials that followed.

Similarly for the reading tasks, all children were given the same set of instructions which required them to read the passage presented to them out loud, and then to answer the questions asked by the researcher about the passage to the best of their ability. The children were first given practice passages in order to determine their starting level. During the passages, if a child was unsure of a word, the researcher would help or provide them with the word in order to ensure that the comprehension of the piece was not lost as the child's knowledge of the passage was integral to answering the questions that followed. After finishing a given passage, the researcher asked a series of comprehension questions and the child moved on to the next passage unless more than 15 mistakes were made when reading the English passage (NARA II) or a score of 5 or less was achieved whilst reading the Welsh passage (*Profion Darllen Glannau Menai*).

In relation to the non-verbal IQ, all children were given the same set of instructions which was to colour-in the numbered square on the response sheet that they thought was the best fit item for each puzzle. The children were given a practice round where the researcher asked who knew which shape was the best fit for the puzzle. After the children responded they were asked 'why?' in order to make sure everyone understood the purpose of the test. The researcher held the test booklet in view of everyone and gave plenty of time for each

child to respond before moving on to the next puzzle. At the end of each set of 12, the children were told to move over to the next set of response squares.

Once the children had completed all tasks, they were thanked for their participation and returned to class.

Results

In order to demonstrate parity across sample groups, analyses were first performed on children's socio-economic background and non-verbal IQ. The results of these analyses are reported below.

1. Background variables

Socio-economic status (SES)

Two measures of SES were calculated and included as dependent variables (DVs). The first involved a composite score of parental education achievements and combined household income. The second involved a measure of whether or not the child was in receipt of free school dinners. In both cases, participant group (L1 Welsh, simultaneous bilingual, L1 English, and monolingual) was treated as the independent variable (IV). The results are presented in Table 2.

Table 2 SES comparisons across age and home language.

Factor	<i>F</i>	<i>p</i>	Result
SES (composite) & Home Language Group	$F(3, 197)=.115$.951	No difference
SES (school dinners) & Home Language Group	$F(1, 199)=1.091$.354	No difference
SES (composite) & Age	$F(1, 197)=.385$.536	No difference
SES (school dinners) & Age	$F(1, 199)=.3.166$.077	No difference

Analysis revealed no significant main effects of participant group. Any differences across the groups in terms of performance on the vocabulary and reading tests are therefore unlikely to be the direct result of differences in SES background or experiences.

Raven's Coloured Progressive Matrices (RCPM)

A one-way ANOVA involving standardised score on the RCPM as the DV in combination with participant group (L1 Welsh, simultaneous bilingual, L1 English, and monolingual) as IV revealed a significant main effect of participant group ($F(3, 196)= 3.102, p= .028$). Mean scores and Standard Deviations are shown in Table 3. Post hoc mean comparisons revealed that this effect was due to a difference between the monolinguals and the L1 English bilinguals ($p=.038$), with the monolinguals performing the best, and a weak significant difference between the monolinguals and the simultaneous bilinguals ($p=.045$). (However, note that there were fewer participants in the simultaneous bilingual group than in any of the other groups.) No other differences were found. These results suggest that whilst all children from all language backgrounds performed close to the average norm for their age, performance was best among the monolinguals. This highlights a need to be vigilant when interpreting any results relating to superior performance among the monolinguals on the English tasks, particularly in relation to L1 English bilinguals. (Interestingly, analysis performed on the raw scores revealed no clear significant effect across home language: $F(3.196)=2.619, p=.052$.)

Table 3 Raven's scores across home language groups.

Group	n	Mean (Standardised Scores)	Standard Deviation
L1 Welsh	80	101.25	16.54
Simultaneous Bilinguals	38	99.74	15.29
L1 English	53	100.19	16.58
Monolinguals	33	110.00	16.82

Analyses of children's performance on the different language tasks are presented below, first, in relation to correlations between vocabulary and reading scores, and second, in relation to the effects of age and input on children's performance on the tasks.

2. Correlational analyses within speakers across tasks

Correlational analyses were performed in order to explore the relationship between vocabulary and reading per language tested (see Welsh prediction 1 and English prediction 1). For all language groups (bar monolingual English), performance on the vocabulary test correlated with performance on both reading measures (see Table 4). (For the monolinguals, performance on the BPVS only correlated with the comprehension scores.)

Table 4 Correlations between vocabulary and reading.

	Monolingual	L1 English	Simultaneous Bilinguals	L1 Welsh
English Vocabulary vs. English Reading Accuracy	n.s.	$r(53)=.509^{**}$	$r(38)=.322^*$	$r(78)=.41^{**}$
English Vocabulary vs. English Reading Comprehension	$r(33)=.669^{**}$	$r(53)=.636^{**}$	$r(38)=.393^{**}$	$r(77)=.423^{**}$
Welsh Vocabulary vs. Welsh Reading Accuracy	-	$r(53)=.38^{**}$	$r(38)=.284^*$	$r(80)=.383^{**}$
Welsh Vocabulary vs. Welsh Reading Comprehension	-	$r(53)=.521^{**}$	$r(38)=.717^{**}$	$r(90)=.614^{**}$

*significance level of $<.05$. **significance level of $<.001$.

As can be seen from Table 4, although most of the correlations were significant at the .01 level, the weakest effect sizes were found for correlations between vocabulary and reading accuracy in Welsh, which may (partially) be the result of the way in which the marking criteria, as applied to Welsh, fails to account for the potential effects of the Welsh mutation system. (See Discussion below.) The strongest effect sizes were found for correlations between vocabulary and reading comprehension in Welsh.

Regarding the English tasks, correlations between vocabulary and reading was stronger among the children who received English in the home (the monolinguals and the L1 English bilinguals), with the weakest correlation among the simultaneous bilinguals (and not the L1 Welsh bilinguals). Similar comparisons across groups in relation to the Welsh tasks revealed a more complex pattern. For accuracy, L1 English and L1 Welsh bilinguals produced the same correlation effect, whilst the simultaneous bilinguals demonstrated a weaker (albeit significant) relationship between their scores. For comprehension, the simultaneous bilinguals demonstrated the strongest correlation, followed by the L1 Welsh bilinguals then the L1 English bilinguals. The only non-significant correlation was found among the monolinguals when comparing vocabulary with reading accuracy scores.

Together, these results suggest that scores on vocabulary and reading were highly correlated, particularly for the bilinguals. The next section presents comparisons across age and participant groups on the vocabulary measures.

3. Vocabulary Measures

For both languages, two separate univariate analysis of variance were conducted in order to compare children's vocabulary knowledge across groups. The first analysis involved children's raw scores as the DV, in order to measure optimal increases in development across age, and the second involved their standardised scores as the DV, in order to measure cross-group similarities and/or differences according to an expected group norm. Participant group (L1 Welsh, simultaneous bilinguals, L1 English [and monolingual English for the English BPVS]) and age (7 to 8 years and 10 to 11 years) were treated as IVs.

In both cases, analysis of the raw scores produced significant main effects of age for Welsh ($F(1,165)= 53.253, p= .000$) and for English ($F(1, 196)= 125.37, p= .000$) revealing superior performance among the older age group ($M=83.86$ vs. $M= 70.81$ for Welsh and

$M=122.82$ vs. $M=97.98$ for English), as expected. Proportion differences between the older children and the younger children's scores on the Welsh vocabulary test are shown in Table 5 below.

Table 5 Mean raw scores on Welsh and English vocabulary tests per home language group.

Group	Welsh Vocabulary		English Vocabulary	
	7-8	10-11	7-8	10-11
L1 Welsh	78.65	92.39	89.06	114.78
Simultaneous Bilinguals	68.84	80.42	92.74	115.95
L1 English	64.92	78.77	102.67	131.31
Monolinguals	-	-	107.47	129.25

The following section outlines the full results for the standardised scores.

Welsh Prawf Geirfa Cymraeg (Welsh Vocabulary Test)

Analysis of the standardised scores revealed a significant difference across participant groups ($F(2, 165)= 26.099, p= .000$). Pairwise mean comparisons revealed that this effect was due to the L1 Welsh bilinguals performing significantly better than the L1 English bilinguals (112.2 vs. 96.49) and the simultaneous bilinguals (101.45; $p= .000$ in both cases) (see Figure 1 below). No other effects were found. These results demonstrate that even when scores were converted to take account of linguistic exposure, differences between the groups (as demonstrated in the analysis of raw scores) remained. However, these differences were likely due to more L1 Welsh bilinguals performing above their group mean, with the simultaneous bilinguals averaging around their group mean and the L1 English bilinguals averaging a little below their group mean. In all cases, however, performance was within 1 SD above or below the mean (i.e., all group scores were between the normal expected range of 85 to 115).

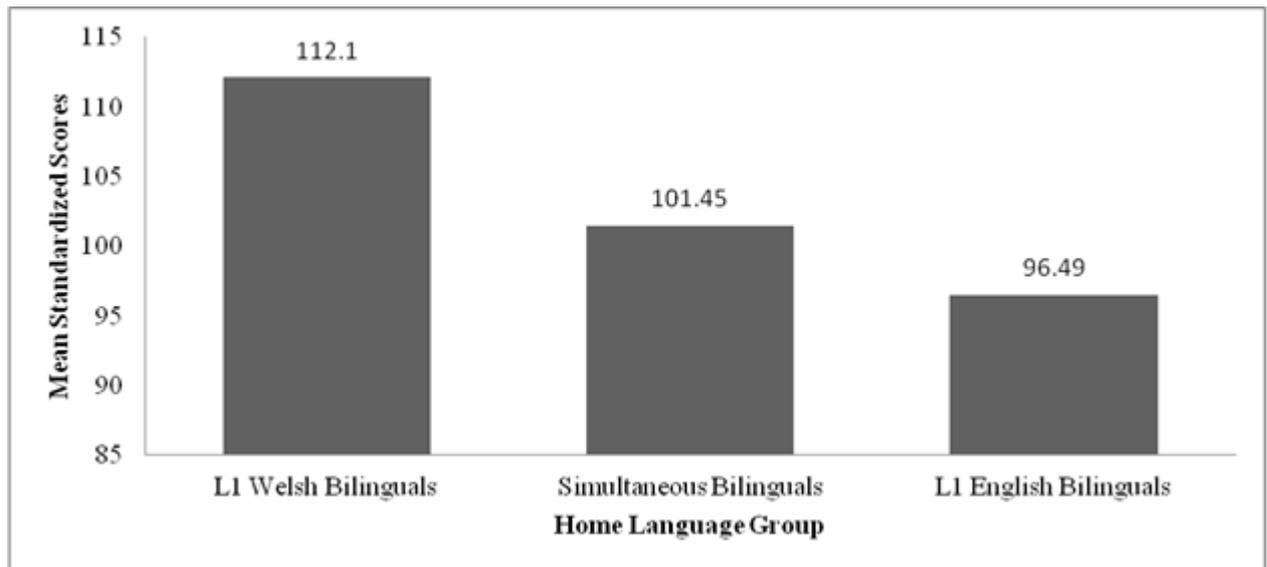


Figure 1 Mean standardized scores for children's Welsh vocabulary performance per home language group.

English British Picture Vocabulary Scale

Like the PGC, analysis of the standardised BPVS scores revealed a significant difference across participant groups ($F(3, 196) = 17.827, p = .000$). Post-hoc analysis revealed the monolingual English ($M = 93.88$) and L1 English bilinguals ($M = 94.86$) performed significantly better than the simultaneous bilinguals ($M = 84.32$) and L1 Welsh bilinguals ($M = 80.58$) (Tukey's $p < .05$), even at age 11. (See Figure 2 below.)

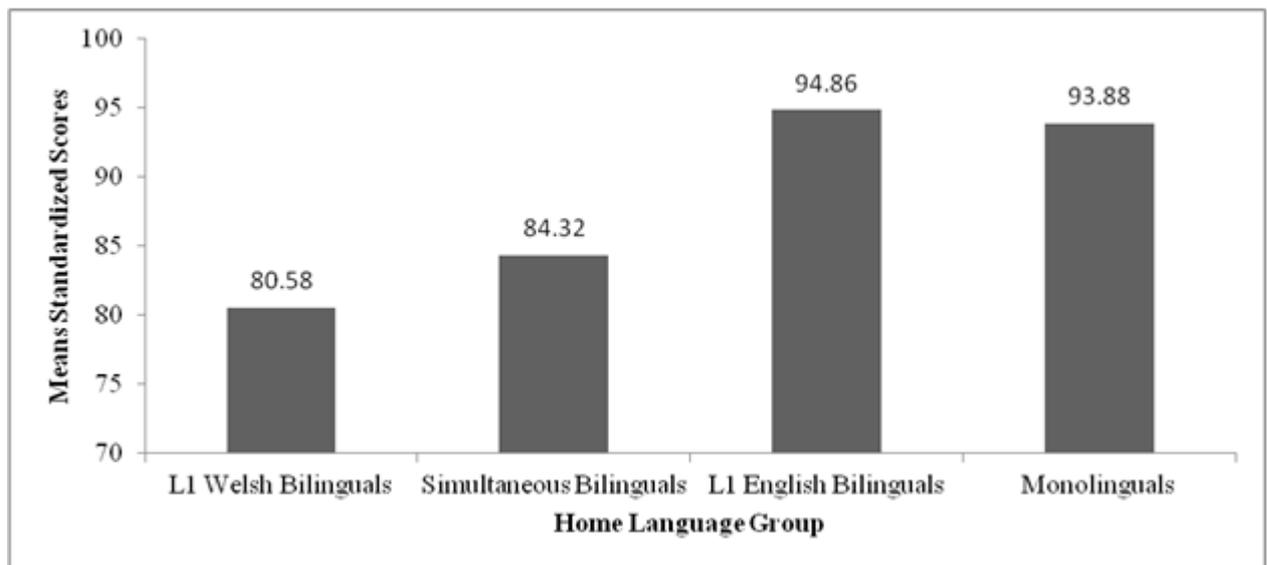


Figure 2 Mean standardized scores for children's English vocabulary performance per home language group.

Unlike with the Welsh vocabulary test, however, children's performance on the English test fell below 85 in two cases: simultaneous bilinguals ($M= 84.32$) and L1 Welsh bilinguals ($M=80.58$). Whilst this pattern is likely due to the fact that the BPVS produced a single, monolingual age-matched norm, the fact that a number of bilingual children failed to recognise a large proportion of age-appropriate English words is interesting, and warrants further exploration. We will return to this point in the Discussion.

The next section discusses children's performance on the reading tests.

4. Literacy Measures

For both languages, a repeated measures analysis of variance was conducted in order to compare children's reading abilities across groups. Participant group (L1 Welsh, simultaneous bilinguals, L1 English [and monolingual English for the English NARA II]), age (7 to 8 years and 10 to 11 years), and reading measure (accuracy, comprehension) were treated as IVs. Raw scores were analysed in order to investigate progression across age. Results revealed superior performance among the older children as compared to the younger

children on both tasks, and for scores in both Welsh ($F(1, 165)=38.93, p=.000$) for accuracy scores and ($F(1, 165)=85.92, p=.000$) for comprehension scores and English ($F(1,194)=140.6, p=.000$) for accuracy scores and ($F(1, 194)=123.44, p=.000$) for comprehension scores.

Table 6 Mean raw scores on Welsh and English reading accuracy and comprehension scores per home language group and age.

Group	Welsh Accuracy		Welsh Comprehension	
	7-8	10-11	7-8	10-11
L1 Welsh	63.15	81.17	19.53	29.13
Simultaneous Bilinguals	54.00	65.16	15.95	22.89
L1 English	46.11	76.35	14.37	27.11

Group	English Accuracy		English Comprehension	
	7-8	10-11	7-8	10-11
L1 Welsh	29.65	62.20	10.94	24.02
Simultaneous Bilinguals	32.26	56.05	12.26	22.37
L1 English	34.74	75.61	14.67	29.50
Monolinguals	36.94	78.94	17.12	28.81

The magnitude of the difference in scores between the older and younger children was somewhat larger for the English task than for the Welsh task, particularly for accuracy scores, suggesting faster within group ‘catch-up’ for literacy in English than in Welsh. Analyses of the standardised scores for both languages are reported separately below.

Welsh Literacy Measures (Accuracy and Comprehension): Standardised Scores

The results revealed a significant difference across participant groups ($F(2,165)=7.73, p=.001$). Pairwise mean comparisons revealed that the significant difference lay between the L1 Welsh bilinguals ($M=105.22$) and both the simultaneous bilinguals ($M=95.32, p=.001$) and the L1 English bilinguals ($M=97.95, p=.011$), as predicted (Welsh prediction 3) (see Figure 3).

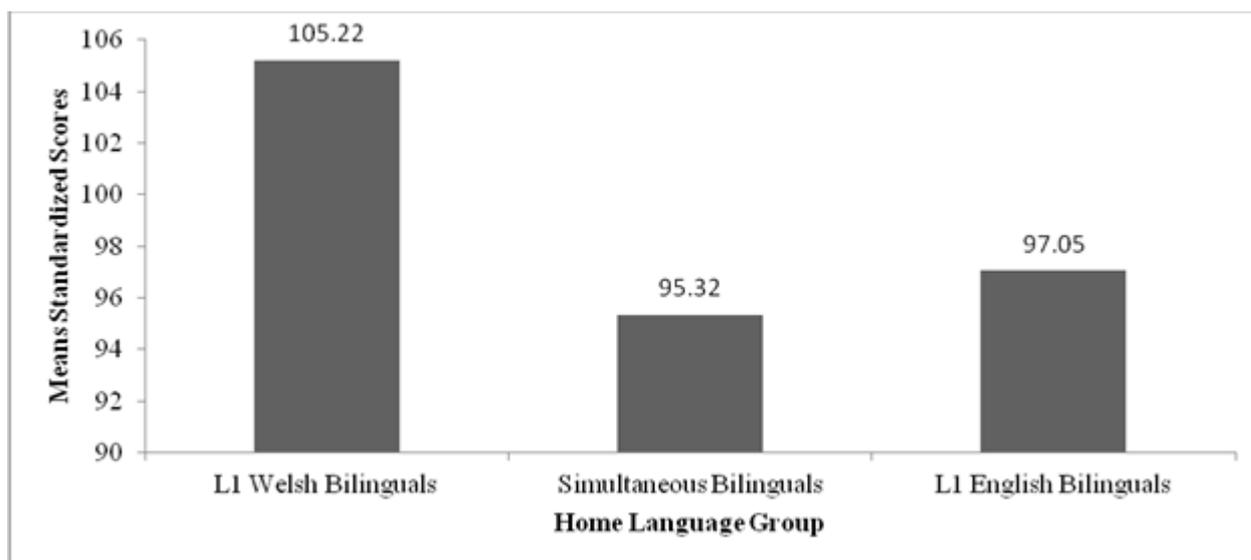


Figure 3 Mean standardized scores for children's Welsh reading performance per home language group

The analysis also revealed a significant effect of reading measurement ($F(1, 165)=25.68, p=.000$) and age ($F(1, 165)=28.43, p=.000$), and an interaction of reading measurement X age ($F(1, 165)=28.43, p=.000$). Post-hoc analyses revealed that the older children performed better on comprehension than on accuracy ($M=104.37$ vs. $M=92.37$ standardised scores), whilst there was no difference in performance across the two measures among the younger children ($M=100.47$ for comprehension and $M=100.78$ for accuracy) (see Figure 4). This lower performance (albeit within the normal range) on reading accuracy among the older children is interesting in relation to a transparent orthographic language like Welsh, and warrants further investigation and discussion (see below).

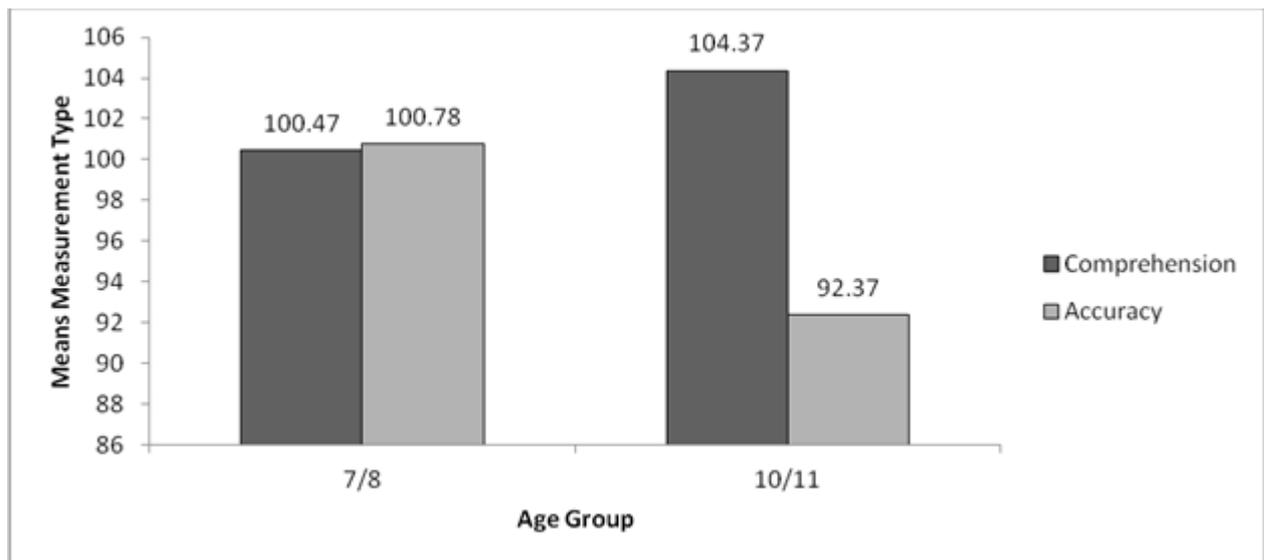


Figure 4 Mean standardized scores for children's Welsh reading comprehension and accuracy performance per age.

NARA II: accuracy and comprehension

Contrary to expectation, results revealed a clear significant difference across home language ($F(3,193) = 7.4, p = .000$), although all groups performed within the normal range for their age. Post-hoc analysis revealed no significant differences between monolingual English ($M = 100.98$ standard score) and L1 English bilinguals ($M = 99.77$ standard score). However, both groups outperformed the L1 Welsh bilinguals ($M=92.23$ standard score) (Tukey's $p=.006$ and $.017$ simultaneously) and the simultaneous bilinguals ($M=92.49$ standard score) (Tukey's $p=.007$ and $.024$ simultaneously) (see Figure 5). Results also revealed significant main effects of age ($F(1, 193) = 12.065, p=.001$) and of reading measurement ($F(1,193)=5,488, p=.02$). These effects were modified further by an interaction of reading measurement X age ($F(1, 193)=8.009, p=.005$) revealing better accuracy scores than comprehension scores among the older children ($M = 101.04$ vs. $M = 97.81$ standard scores), but no differences between the two measures among the younger children ($M = 93.16$ and $M = 93.46$ standard scores) (see Figure 5). This lower pattern of performance for reading

comprehension relative to accuracy may relate directly to children's knowledge of the words, particularly among those who scored the lowest on vocabulary. (See discussion).

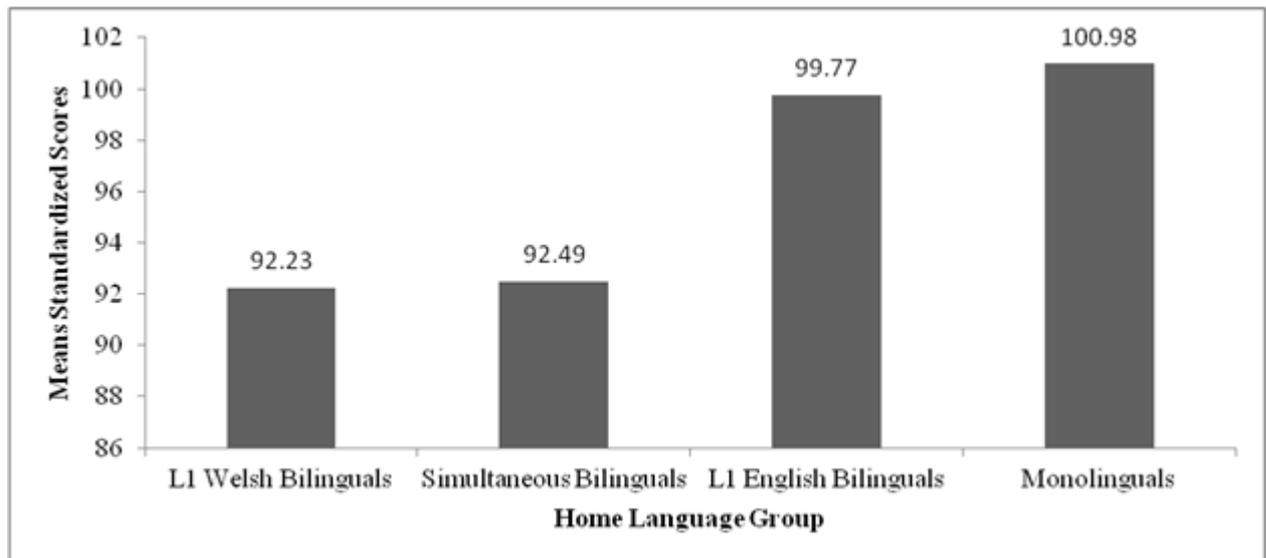


Figure 5 Mean standardized scores for children's English reading performance per home language group.

Together, the results of this study suggest that whilst all children performed within the normal range for most of the tasks, children's home language experience affects their performance on both vocabulary and reading tests, not only in Welsh, as demonstrated in previous studies of vocabulary and grammar, but also in English. These differences persist throughout the Primary School years, with children from English-speaking homes (monolingual English and L1 English bilinguals) continually outperforming the other children on tests of English – particularly in terms of vocabulary – and children receiving the greatest amount of input in Welsh (L1 Welsh bilinguals) performing the best on the Welsh tests across ages. At the same time, performance on vocabulary was related to their performance on reading. This suggests that exposure to (and subsequent engagement with) a given language plays a crucial role in relation to the development of proficiency, and that full acquisition of the dominant, majority community language is not necessarily automatic.

The implications of these findings for bilingual education are discussed below.

Discussion

The main aim of this current research was to explore Welsh-English bilinguals' literacy skills in English and in Welsh in comparison to their vocabulary development. A secondary aim was to identify the effects of home language exposure on children's developing competence, particularly in relation to the dominant community language – English - as compared to the language of instruction at school - Welsh. To our knowledge, this is the first paper to examine these issues in relation to vocabulary and literacy performance together in the Welsh-English context – both of which have clear roles to play in education. The results are discussed in relation to each of the predictions laid out in the introduction, dealing first with the results of the Welsh dataset followed by the results from the English dataset. This is then followed by a general discussion regarding the wider implications of these findings.

Welsh

The results of the correlational analysis supported our first prediction, namely that greater vocabulary skills relate to greater literacy success: vocabulary measures largely matched those for reading among children from similar home language backgrounds. These findings are consistent with the results of previous studies such as Duursma *et al.* (2007), Oller, Pearson and Cobo-Lewis (2007), and Bialystok (2006), who found a clear link between successful reading comprehension and vocabulary knowledge.

In relation to the second prediction, namely that children's performance on the Welsh tests would increase with age, our results demonstrate that this prediction was largely upheld. On both tasks, the children's raw scores demonstrated continual progression across age. This progression was found across the two age groups within each of the home language groups, suggesting that even those exposed to very little Welsh are demonstrating continual

progression with the language and are achieving scores within the expected range for their age (and home language exposure). The related prediction that the difference between age groups would be smaller on the reading task than on the vocabulary task was not supported. In fact, the results revealed that the difference in performance across age was smaller in relation to vocabulary than for reading accuracy. These data demonstrated faster ‘catch-up’ for vocabulary than for reading in Welsh, although all children’s standard scores were within the range for their age and language background (where norms were available) on both tasks. These data suggest even when a language possesses a transparent orthography like Welsh, continued literacy instruction is paramount to success. Further evidence was found in older children’s lower accuracy than comprehension scores. This pattern suggests that whilst older children have good vocabulary knowledge and can comprehend the passages well, they are unable to match that performance in relation to the accuracy of their oral reading abilities. . Recall, however, that the Welsh reading test provides a single age-normed standardised score. Given the differential performance we found across the three language backgrounds in both languages (as discussed below), the use of tests with single age-normed standards with bilinguals – even when tested in both their languages – is problematic. We believe our results demonstrate that this is not only an issue when dealing with a minority-status language (cf. Pearson, 1998; Peña, Gillam, Bedore & Boham, 2011), but also when dealing with a majority-status language such as English. This is a crucial issue when using such tasks either diagnostically or in an educational capacity.

In relation to the third prediction, namely the greater the amount of exposure to Welsh the better the performance on Welsh tasks, L1 Welsh bilinguals consistently outperformed the simultaneous bilinguals and the L1 English bilinguals on both the Welsh vocabulary and the Welsh reading test. These findings replicate other studies of bilinguals’ acquisition of vocabulary (Hakuta & Diaz, 1985; Pearson, Fernandez & Oller, 1995; Oller, 2005; Pearson,

1998; Genesee, 2001) and studies of morphological development (e.g., Gathercole, 2002 a,b,c) demonstrating differential performance relative to the amount of exposure one has to a language. However, in many of these cases, studies have also shown how bilinguals ‘catch up’ with their monolingual peers once they have gained enough experience with the language (e.g., Bahrack, Hall, Goggin, Bahrack a Berger, 1994; Oller, Pearson, & Cobo-Lewis, 2007; Hammer, Miccio & Rodriguez, 2004; Umbel, Pearson. Fernandez, & Oller, 1992; Kovelman, Baker & Petitto, 2008; Oller & Eilers, 2002). These data suggest similarly, in that all groups performed within the expected range for their age/home language. However, the simultaneous bilinguals and the L1 English bilinguals read less accurately and comprehended less aspects of the texts than L1 Welsh bilinguals in Welsh, even at age 11, and even when the language involved a transparent system, which was unexpected (Spencer & Hanley, 2004; Hanley, Masterson, Spencer, & Evans, 2004). There are three main reasons why this may be:

First, these results may relate directly to L1 English bilinguals’ lack of use of Welsh with peers in school (Thomas & Roberts, 2011; Thomas, Lewis, & Apolloni, 2012), rendering certain pronunciation patterns difficult to master. A second explanation for these results has to do with the way the test is marked in Welsh. ‘Correct’ accuracy scores were awarded when children produced the exact word in the exact context. Any violations were coded ‘incorrect’. In the case of Welsh, such marking may appear strict in some context because of the presence of the mutations system. Mutation, in Welsh, is a morphophonological system whereby the initial sounds of words change when they appear in certain syntactic contexts (see Thomas & Gathercole, 2007, and Thomas & Mayr, 2010 for more thorough descriptions). This process affects a closed set of consonant sounds and is obligatory in a closed (but relatively extensive) set of triggering contexts. Thus, for example, words beginning with an initial /k/ that appear after the preposition *ar* ‘on’ must undergo a

process of lenition called Soft Mutation, such that *bwrdd* /burð/ ‘table’ would change into *fwrdd* /vurð/ ‘table’ (Soft Mutation) in *ar fwrdd* ‘on (a) table’. Although the triggering rules for these changes are syntactic, the outcome of the process is a phonological sound change. However, some children, when reading, may have erroneously produced the wrong word-initial sound resulting in an ‘incorrect’ score against that word. L2 Welsh speakers may have produced the correct word (hence providing the correct comprehension score), but may have decoded the word incorrectly, producing the word in its un-mutated form, suggesting a need to highlight the link between written mutation and production during reading instruction. Further studies are needed in order to explore these issues further.

A third explanation has to do with the availability and (perceived) desirability of Welsh books. Whilst it is known that the “amount of free reading outside of school has consistently been found to relate to vocabulary, comprehension ability, and other verbal skills” (Allen, Cipielewski & Stanovich, 1992, p.489), leisure reading is at its lowest for 20 years (e.g., NRP Report, 2007). In minority language contexts such as that in Wales, although there is a strong age-appropriate literacy tradition both in original book form and in the form of translations, this provision is in constant competition with the much broader and easily accessible English market. Children who habitually read English books instead of Welsh outside school limit their abilities to enhance their knowledge of words and limit their experiences of decoding and transforming letters into sounds in Welsh. Increasing children’s engagement with Welsh literature outside school would benefit their Welsh literacy in the long term, leading to improvements in word decoding skills and vocabulary. These findings correspond to those of other studies that suggest a need for educational and parental strategies to be further tailored so that more attention is given to vocabulary and literacy in order for bilingual children from varying home language backgrounds to thrive academically (NRP report, 2007; Pikulski & Templeton, 2004; Allen, Cipielewski & Stanovich, 1992).

In general, then, performance on the Welsh tasks demonstrate clear effects of language exposure patterns with those exposed almost exclusively to Welsh at home performing the best on these tasks. However, the fact that the Welsh orthographic system is transparent does not seem to help children less exposed to Welsh to catch up with their more L1-speaking peers any quicker than they do with vocabulary. Our results support previous findings in the literature, particularly in relation to minority status languages, and suggest a need for continued focus on vocabulary and reading development, particularly for L1 English and simultaneous Welsh-English bilinguals. The next section discussed the results for the English tests.

English

Regarding the first prediction, performance on vocabulary and reading was also highly correlated, as was the case in Welsh. The only exception was between vocabulary and reading accuracy for monolinguals. Regarding the second prediction, children's performance on the English tasks also increased with age, as expected. As was the case for the Welsh tests, this increase in age on the English tasks was also seen in all participant groups. Our prediction relative to smaller differences across ages in relation to vocabulary than accuracy was also upheld, suggesting faster development of vocabulary than or reading accuracy across the two age groups.

All groups performed within the expected ranges on measures of English reading. However, contrary to our third prediction, L1 Welsh bilinguals and simultaneous bilinguals *did not* catch up with their L1 English bilingual or monolingual English peers on measures of vocabulary, performing lower than 1 Standard Deviation below the expected mean, and older children performed better on reading accuracy than on comprehension, suggesting some level

of difficulty accessing the meaning of words. Whilst these results mirror those of Oller, Pearson and Cobo-Lewis (2007) our results are surprising for the following reasons.

First, previous studies have demonstrated comparable rates of performance in English across the same three types of Welsh-English bilingual groups – on measures of vocabulary and aspects of grammatical knowledge – at least by age 9 (Gathercole & Thomas, 2009). Those results were interpreted in light of the dominant pattern of English vs. Welsh in the communities where those children lived. The bilingual children involved in this study were from the same area as those tested in Gathercole & Thomas (2009).

Second, all adult Welsh-English bilinguals are fluent in both English and Welsh. Children are thus exposed to input that is native-like in both languages (Gathercole, 2007), particularly in relation to English.

Third, English is the dominant community language in many regions of Wales. Consequently, all public examples of language are expressed either in English only, or bilinguallyⁱⁱ when in accordance with concurrent Welsh language governmental strategies. Children are therefore exposed to English written material in almost all domains of language use and are exposed to spoken English by a wide variety of individuals, and across numerous contexts of language use.

Due to the all-pervasive dominance of English in the Welsh communities, coupled with the native(-like) abilities of L1 Welsh-speaking adults when speaking, reading, and writing in English, it is widely supposed that children acquire English almost automatically. However, these data suggest that in parts of Wales where children are enrolled in Welsh-medium education, fluency in English vocabulary knowledge falls sufficiently behind their monolingual peers to warrant continued targeted instruction within the curriculum. Welsh-medium teaching or bilingual education that focuses mainly (or solely) on increasing

exposure to, and acquisition of, Welsh is only viable if English proficiency is met independently. Whilst increasing exposure to Welsh is vital for the development of Welsh language skills and a core principle of minority language education in Wales, our results suggest that there is room to further enhance children's development of English vocabulary, and to a lesser extent their oral English reading abilities, whilst, at the same time, increasing their exposure to and engagement with leisure reading and interpersonal communication in Welsh. Our results therefore support the goals of classroom *translanguaging* (Baker, 2000; Williams, 2003), namely the juxtaposition of two linguistic mediums within the same learning task in class. A move towards more bilingual classroom experiences are not only being championed in Wales, but also in other minority language contexts such as the Māori immersion programmes, as a means of closing the gap in bilingual children's proficiency development (Baker, 2010; Hill, 2010).

One positive aspect of these results is the fact that the L1 English bilinguals' performance on the English tests did not differ from that of their monolingual English peers. That is, the L1 English bilingual and the monolingual English children performed exactly the same, at least in terms of breadth of vocabulary knowledge and abilities to read out loud, in English. From an education language policy point of view, this suggests that bilingual education does not have any detrimental effect on L1 English speakers' abilities in English. Rather, these children seem to continue to excel in English, whilst, at the same time, they continue to progress with their abilities in Welsh. These findings help alleviate parental concerns about the impact of minority language education on children's development of vocabulary and/or reading in their L1, in the Welsh context and beyond (e.g., similar concerns have been documented in the Māori immersion education context – see Hill, 2010). Further studies are now needed to explore these effects further, including measures of

children's depth of vocabulary knowledge, which requires deeper knowledge of the application of word meanings.

What is surprising in the current study, however, is that simultaneous bilinguals seemed to perform 'in between' the L1 Welsh and L1 English groups; that is, they were mostly comparable with children from Welsh speaking homes in relation to their English abilities, but more in line with their L1 English peers in relation to their abilities in Welsh. Whilst previous studies have reported such patterns for simultaneous Welsh-English bilinguals in relation to their mastery of complex structures in Welsh (Gathercole, Laporte & Thomas, 2005; Gathercole & Thomas, 2005, 2009; Gathercole, Thomas, & Laporte, 2001), this study highlights, for the very first time, these results in relation to their abilities in English. This runs counter to Kovelman, Baker and Petitto's (2008) suggestion that early exposure to both languages is the key to literacy success. Simultaneous bilinguals are the most likely to be exposed to both languages from birth, yet their development in terms of Welsh-language and English-language skills are still lagging behind those from single language home environments, even at age 11. However, the significant status gap between English and Welsh may render early exposure to spoken language irrelevant if this is not supported with ample literacy experience in both languages as well. More research is needed to map these children's linguistic achievements as they progress to secondary school education and beyond. Such studies are particularly important to measure the rate of catch-up, particularly in relation to the linguistic choices they make at school, in recreation, and as the language of interaction with peers (see, e.g. Morris, 2010), and the impact of those choices and experiences on their linguistic developments during their teenage years.

It is important to note, however, that these results are based on specific aspects of vocabulary knowledge and reading skills and are by no means exhaustive. Further studies should include measures of productive vocabulary in addition to receptive vocabulary, and, as

mentioned above, should measure children's breadth and depth of vocabulary knowledge. Moreover, additional measures of literacy skills, including pragmatics, phonetics, discourse analysis and writing skills would provide a fuller picture of children's abilities in both languages in Wales. In addition to this, further studies should also take into consideration issues relating to school variables, such as teaching methodology and emphasis on vocabulary and reading (in one or both languages) in the school curriculum.

Together, the results of this current research suggest that children's linguistic skills in their L2, be that Welsh or English, are not as developed as those of their L1-speaking peers by the end of primary school-aged bilingual education. That said, all children performed within the expected range for their age on all but one test, lending evidence in support of the aims of the education policy in the region tested, namely "to ensure that all pupils in the County possess balanced bilingual age-related proficiency so as to enable them to fully participate in a bilingual community" (Gwynedd Welsh Medium Education Plan, 2010, p.4). Nevertheless, whilst children's vocabulary and literacy skills in their L1 are adequately developed, those same skills in their L2 need further enhancement in order to off-set potential feelings of inadequacy among the children as they develop (Thomas & Lewis, 2011). These observations are in line with Baker's (2010) notion that a more 'bilingual' experience where Welsh and English are used together within an educational context may develop proficiency in children's weaker language, and needs to be explored in more depth in minority language contexts. Through such practice, children from English speaking homes could aid children from Welsh speaking homes with their English development, and vice versa, and may even help elevate the status of Welsh outside the classrooms (Thomas & Roberts, 2011; Lewis, 2008). By creating an environment where both languages are used together, children's linguistic skills in *both* languages would be able to thrive, thus achieving the goals set out by the Welsh Government and many local education authorities for children attending bilingual

education to become proficient in both Welsh and English by the time they leave primary school.

Conclusion

The current research demonstrated quite clearly that bilingual education in Wales did not negatively affect L1 English-speakers' abilities in English. In fact, L1 English bilinguals and their monolingual English peers performed equally well on measures of English vocabulary and English reading skills, despite the fact that L1 English bilinguals attended schools where Welsh was the main language of instruction. All children continued to progress with their abilities in English and in Welsh, although L1 Welsh bilinguals were ahead of the other bilinguals, as expected, in relation to Welsh vocabulary and reading due to their additional exposure to the language at home. Coupled with the fact that L1 Welsh bilinguals and simultaneous Welsh-English bilinguals were yet to 'catch up' with their L1 English bilingual peers in terms of English proficiency by age 11, the results raise important issues relating to best classroom practices. Supporting the continued development of both languages is key to providing children with the best start towards becoming bilingual and biliterate, and in fulfilling the Welsh Government's goal towards a truly bilingual Wales.

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ⁱ Schools in Wales are categorized as Welsh medium, dual stream, immersion, mostly English, or English medium (Lewis, 2008; Jones, 2010). All terms bar English-medium are technically ‘bilingual’ schools, but the extent to which Welsh is used varies from one school to another and from one region to another.

ⁱⁱ The only exceptions include places of worship, which may operate in Welsh or in another language other than English. Most Primary Schools, even if labelled as ‘Welsh-medium’ have some wall art (usually in relation to English lessons or other subjects taught through the medium of English, such as science) and public displays/dissemination of information bilingually for parents.