

# INFLUENCES OF LANGUAGE CONTACT AND LINGUISTIC EXPERIENCE ON THE PRODUCTION OF LEXICAL STRESS IN WELSH AND WELSH ENGLISH

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## ABSTRACT

This paper presents preliminary findings of an investigation into the realisation of lexical stress in monolingual and bilingual male adolescents from a community in West Wales. Monolingual speakers of Welsh English were compared with bilinguals from Welsh-speaking and English-speaking homes. This allowed us to explore the effects of language contact and individual linguistic experience on the realisation of lexical stress in Welsh and Welsh English.

Results showed that stressed vowels are shorter, post-stress consonants and unstressed vowels are longer, and the F0 difference between stressed and unstressed syllables is smaller in Welsh than in English. Linguistic experience was found to affect the realisation of acoustic stress correlates differently. While no effect was found for any of the durational correlates, linguistic experience was found to affect F0. Individuals from the same community were found to realise F0 differently depending on whether their home language is Welsh or English.

**Keywords:** bilingual speech, lexical stress, language contact, individual linguistic experience.

## 1. INTRODUCTION

It is commonly observed that the phonetic properties of bilinguals' speech productions differ from those produced by monolinguals, most commonly attributed to cross-language interaction. This interaction often results in the bilinguals' phonetic values in each language being intermediate between the monolingual values of the first (L1) and second language (L2) (e.g., [7], [8]). Although most empirical evidence for the occurrence of such compromise phonetic values comes from studies on late consecutive bilinguals, it has also been attested in simultaneous bilinguals, and it has been attested for both segmental and prosodic properties ([6] [7], [8], [12], [15]).

The occurrence of prolonged and systematic cross-language interactions in bilingual communities may lead to the emergence of contact varieties ([5],

[11]). For example, Welsh and Welsh English are reported to share many accentual features that are commonly reported to result from long-term contact between the languages. It is thought that this shift-induced interference between Welsh and Welsh English arose "as a result of transfer from Welsh to English when Welsh monolinguals became bilingual in English", and many of these features are evident as a substrate in English monolinguals' speech [16: p. 30].

There are several accounts of the accents of Welsh English varieties in South East Wales, an area which is dominated by monolingual speakers. For example, [14] investigated a number of phonetic features of Cardiff English, and [18] focused on accent features of Rhondda Valley English. In contrast, the varieties of Welsh English spoken in largely bilingual areas have been less well documented. Even less is known about phonetic differences between Welsh and Welsh English varieties [16].

The current study bridges this gap by investigating the realisation of lexical stress in adolescents from a community in Carmarthenshire (West Wales) where bilingual speakers of Welsh and Welsh English live alongside monolingual speakers of Welsh English. This allows us to examine the extent to which there are phonetic differences between the two varieties as a result of long-term contact. Furthermore, the current study includes two groups of bilingual adolescents who differ in their linguistic background, being either from Welsh-speaking or English-speaking homes. The comparison of monolingual speakers and bilingual speakers with differing home languages allows us to explore the effect of linguistic experience on speech production and to distinguish it from effects of long-term language contact.

In light of the above, this preliminary study aims to determine (1) the extent to which there are cross-linguistic differences between Welsh and Welsh English accents, (2) the role of individual linguistic experience in any cross-linguistic interactions, and (3) possible differences in the pronunciation of Welsh English by monolinguals and bilinguals from the same community.

## 2. METHOD

### 2.1. Participants

A total of 30 participants were recruited to form the corpus for a larger-scale investigation. In the current paper, preliminary results will be presented for 9 speakers from this corpus. All participants were male 16-18 year old adolescents from the Ammanford area of East Carmarthenshire (West Wales). According to the 2011 Census, 43.9% of the population in Carmarthenshire is able to speak Welsh, making it one of the counties in Wales where the Welsh language is most widely spoken.

The participants all attended the 6th form of the same secondary school in Carmarthenshire, where subjects are taught in either English or Welsh. This allowed for an equal stratification of participants in terms of their linguistic background. That is, there were three sets of participants: (i) Welsh-English bilinguals from Welsh-speaking homes (BIL W-HOMES); (ii) Welsh-English bilinguals from English-speaking homes (BIL E-HOMES); and (iii) English monolinguals (MONO E). Each group had 10 participants, but we are reporting on three participants per group in this preliminary study.

The English monolinguals followed the English-medium pathway, and had received all their education in English, except for mandatory Welsh classes (studying for a Welsh as a Second Language qualification). They reported being unable to hold a conversation in Welsh. Both sets of bilinguals had received all their education through the medium of Welsh. The patterns of self-reported language use between the two sets of bilinguals differed quite dramatically, as shown in Table 1.

**Table 1:** Percentages of self-reported weekly use of Welsh amongst bilingual participants from Welsh-speaking and English-speaking homes.

	Welsh-speaking homes	English-speaking homes
parents	87	0
siblings	73	0
school	8	0
friends outside school	0	0
in the community	3	8
media	10	7

### 2.2. Welsh and English lexical stress

For this study, we chose to investigate the realisation of lexical stress. This was motivated by the fact that

Welsh and English are reported to differ in the way lexical stress is signaled. Welsh lexical stress is fixed predominantly on the penultimate syllable, although there are some rare exceptions where primary stress occurs on the final syllable, and an even less common pattern in some loanwords from English where it occurs on the antepenultimate syllable (e.g., [2]). Conversely, English is a stress-accent language with variable stress, where the position of primary stress is less predictable [3].

More importantly, there are reported cross-language differences in the acoustic correlates of lexical stress between Welsh and English. In English, in words that are produced in isolation or in focus, stressed syllables can be acoustically and perceptually distinguished from unstressed syllables by a combination of longer duration, higher intensity, increased  $f_0$ , and full phonetic quality of the vowel (e.g [9], [13]).

For Welsh, it is claimed that the acoustic correlates of stress in accented words are not “directly related to the usual acoustic cues of  $F_0$ , intensity and duration of the stressed vowel” [19: 381]. Instead, it is claimed that the immediately following consonant is lengthened, with the  $F_0$  change occurring on the following unstressed syllable [19].

### 2.3. Materials and procedure

Two sets of 34 bisyllabic target words with stress on the penultimate syllable were designed; one for English and one for Welsh. Care was taken to use target words which were segmentally as similar as possible in the two languages, such as ‘melon’ /‘mɛlən/ and ‘melyn’ /‘mɛlm/ (‘yellow’). Target words were embedded in the carrier phrase “Say [*target word*] again” (English); or “Dyweda [*target word*] eto” (Welsh). Thus, the lexical items always occurred in non-final accented position.

The monolingual participants were asked to read the set of English materials. The bilingual participants read both sets of materials during two recording sessions, each taking place on a different day. English materials were always recorded during the first recording session, during which the experimenter only spoke English. The second recording session was solely conducted in Welsh. This was done in order to control for possible effects of language mode ([10]. The respective sets were read out twice (in random order), generating 68 target words per set. Data were recorded on a Zoom H2 Handy Recorder with integrated microphone. The sampling frequency was 96 kHz with 16-bit quantization. All recordings took place in a quiet room on the school premises.

## 2.4. Annotation and measurement

Only the first repetition of each target word was annotated and analysed, using PRAAT software [4], except when it was affected by obvious dysfluencies, hesitation, or noise. In those cases, the second reading of the target word was used for further analysis. Measurements were taken for the duration of the whole target word, the initial stressed vowel, the post-stress consonant, and the final unstressed vowel. Durations were measured from waveforms and spectrograms following segmentation criteria described in [17]. The duration of the stressed and unstressed vowels and the post-stress consonants were expressed as a percentage of the duration of the respective target word, in order to normalise for individual speaker differences. F0 was measured at the highest point within the stressed and unstressed vowels. The difference between F0 on the stressed and unstressed vowel in each target word was expressed in semitones (ST).

## 3. RESULTS

Multivariate ANOVAs were run with duration of the stressed (DUR\_SV) and unstressed vowel (DUR\_USV), duration of the post-stress consonant (DUR\_PSC), and F0 difference in semitones between stressed and unstressed vowels (F0\_Δ ST) as dependent variables, and *group* (2 or 3 levels, depending on the comparison) or *language* (2 levels) as the independent variable. Three comparisons were carried out: a cross-language comparison; a comparison of monolingual and bilingual participants in English; and a comparison of monolingual and bilingual participants in Welsh.

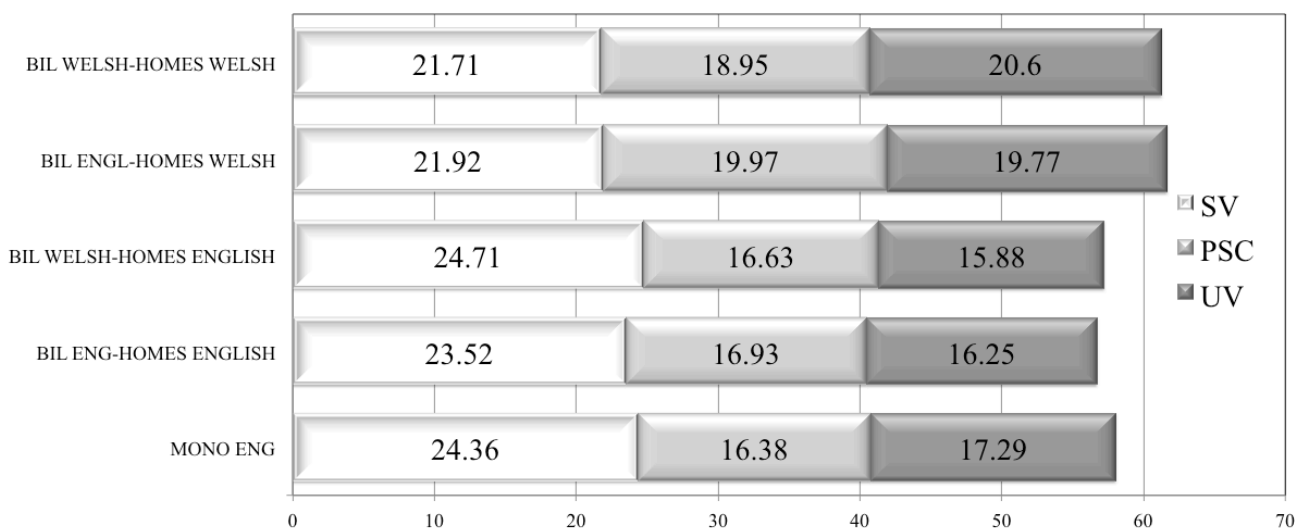
## 3.1. Cross-language comparison

Effects of language contact are commonly investigated by comparing the productions of monolingual speakers of each of the languages involved. There are, however, no adult speakers of Welsh who are not also competent in English. Hence, we have chosen to compare the bilinguals who have been exposed to Welsh the most (i.e. the set of speakers from Welsh-speaking homes) with the monolingual English participants. Results of a multivariate ANOVA (see above) showed a significant main effect of *language* (2 levels: BIL W-HOMES in Welsh, MONO E in English) for DUR\_SV [ $F(1, 201)=6.48, p=0.012$ ], DUR\_PSC [ $F(1, 201)=6.17, p=0.014$ ], DUR\_USV [ $F(1, 201)=23.35, p=0.005$ ], and F0\_Δ ST [ $F(1, 201)=7.41, p=0.007$ ]. That is, stressed vowels were *shorter*, post-stress consonants and unstressed vowels were *longer*, and the F0 difference (ST) was *smaller* in Welsh than in English, showing clear cross-language differences between the languages in all measures. Figure 1 shows the mean durational measures for the bilingual participants from Welsh-speaking homes (top bars) and the monolingual English participants (bottom bars). Figure 2 shows the F0 difference (ST) between stressed and unstressed syllables for the bilingual participants from Welsh-speaking homes (left bar) and the monolingual English participants (right bar).

## 3.2. English lexical stress

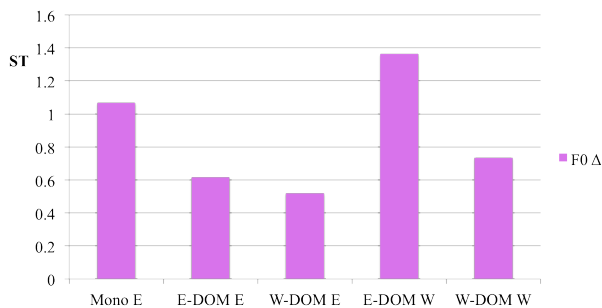
To determine the role of linguistic experience in the production of English lexical stress, we compared the monolingual participants and the two sets of bilingual participants. A significant main effect of *group* (3 levels: BIL W-HOMES in English, BIL E-

**Figure 1:** The mean length of stressed vowels, post-stress consonants, and unstressed vowels as a percentage of total word length in Welsh and English.



HOMES in English, MONO E) was found for  $F0\_Δ$  ST [ $F(2, 291)=9.57, p<.005$ ], but no significant effects for any of the duration measures ( $p>.05$ ). Bonferroni post-hoc tests revealed that  $F0\_Δ$  ST was significantly larger for the monolingual group than the two bilingual groups, between which there were no significant differences. See also Figures 1 and 2.

**Figure 2:** Mean values of  $F0\_Δ$  (semitones) showing the difference in F0 between stressed and unstressed vowels for the language-based groups.



### 3.3. Welsh lexical stress

In order to determine the role of linguistic experience in the production of Welsh lexical stress, the two sets of bilinguals were compared. A significant main effect of *group* (2 levels: BIL W-HOMES, BIL E-HOMES) was found for  $F0\_Δ$  [ $F(1, 206)=20.63, p<.005$ ], but no significant effect was found for any of the duration measures ( $p>.05$ ). An inspection of the means showed that the  $F0\_Δ$  was larger for the bilinguals from English-speaking homes than the Welsh-speaking homes (see figures 1 and 2).

In order to determine whether the two sets of bilinguals realised lexical stress differently depending on whether they spoke Welsh or English at home, we carried out a multivariate ANOVA with the factors *group* (2 levels: BIL W-HOMES, BIL E-HOMES) and *language* (2 levels: Welsh, English). Results showed a significant main effect of *language* (Welsh, English) for all measures (DUR\_SV [ $F(1, 401)=8.35, p=0.004$ ]; DUR\_PSC [ $F(1, 401)=12.16, p=0.001$ ], DUR\_UV [ $F(1, 401)=75.09, p=0.001$ ],  $F0\_Δ$  ST [ $F(1, 401)=21.59, p=0.001$ ], a main effect of *group* for  $F0\_Δ$  ST [ $F(1, 401)=14.08, p=0.001$ ], and significant *group\*language* interaction for  $F0\_Δ$  ST [ $F(1, 401)=4.42, p=0.036$ ], showing that the difference between Welsh and English in  $F0\_Δ$  ST is significant in the bilinguals from English-speaking homes but not in the bilinguals from Welsh-speaking homes (see also figures 1 and 2).

## 4. DISCUSSION

This study investigated the realisation of lexical stress in the speech of adolescent males who attended a bilingual school in Carmarthenshire, West Wales. The study had three aims. The first was to examine the effect of language contact on the sound systems of Welsh and English. This was done through a comparison of the English lexical stress realisations by English monolinguals with the Welsh stress realisations by bilinguals from Welsh-speaking homes from the same community. Preliminary results indicate that the stress correlates examined (i.e. duration and F0) were found to be cross-linguistically different: stressed vowels were found to be shorter, post-stress consonants and unstressed vowels were longer, and the F0 difference between stressed and unstressed syllables was smaller in Welsh than in English.

Unlike results for vowel realisations [1], this suggests that despite long-term language contact, the sound systems of Welsh and English – at least for those acoustical correlates of stress that were investigated – have not converged in this community, and that there remain cross-language differences between Welsh and English.

Our second and third aims were to determine the role of individual linguistic experience in the participants' lexical stress realisations, and to examine whether there were possible differences in the pronunciation of Welsh English by monolinguals and bilinguals from the same community. To this end, we compared lexical stress realisation in all three groups of speakers (Welsh-English bilinguals from Welsh-speaking homes; Welsh-English bilinguals from English-speaking homes; and English monolinguals). The results revealed no difference among the three groups in the realisation of the English durational cues, and no difference between the two sets of bilinguals in the realisation of the Welsh durational cues. However, differences were found between the English F0 realisation by the English monolinguals and the two sets of bilinguals. Furthermore, the two sets of bilinguals differed in their Welsh F0 realisation.

This suggests that linguistic experience has affected the realisations of acoustic stress correlates differently: while there is evidence of an effect of linguistic experience on F0, no such effect was found for any of the durational cues.

It remains to be seen to what extent these accentual features are used in perception to establish whether an individual from this community has Welsh or English as their home language.

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