THE REALISATION OF STRESS IN WELSH ENGLISH

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ABSTRACT

Primary lexical stress is realised differently in English and Welsh. English lexical stress involves greater vowel duration in the associated syllable, whereas Welsh involves the shortening of the vowel associated with the stressed syllable and the lengthening of the immediately following consonant. Some accounts have suggested that Welsh English also features this long post-stress consonant.

This study examined the realisation of primary lexical stress in Welsh English by comparing it to Welsh and Standard Southern British English (SSBE). The results show that the long post-stress consonant duration in Welsh English is similar to Welsh.

Keywords: prosody, stress, Welsh, English, bilingualism

1. INTRODUCTION

Stress in language is "the accentuation of syllables within words or words within sentences" [4] (p.264). The former, referred to as lexical stress, is the focus of this study. In particular, the acoustic realisation of lexical stress in Welsh and Welsh English will be examined.

1.1. Stress in English

Stress has been well researched in English, and the general consensus is that the features that are most important to its realisation are F0 movement, syllable duration, and amplitude. Research by Fry [6, 7] studied the contrast between noun/verb pairs (such as object/object) in order to examine stress in English. Initially he found that stressed syllables had a higher amplitude and longer syllable duration than unstressed syllables. Further perception experiments showed that listeners judged syllable duration as having a stronger effect than amplitude, but that the strongest effect was from F0 movement.

Later studies confirmed that the duration of the stressed vowel was longer in stressed syllables than in unstressed. Liberman [13] showed that 66% of stressed vowels were longer, whilst this was the case 94% of the time in a study by McClean and Tiffany [12].

Later studies [1] have shown that the realisation of stress in English is more complicated than just F0 movement and syllable duration. Amplitude can play a more important role depending on how it is measured, as can the location of the word in the sentence, i.e. if the word is in prenuclear, nuclear, or postnuclear position.

It is certainly true that none of these features exist in isolation, and that all play a part in the realisation and perception of lexical stress in English. However, Cutler states that F0 movement and greater syllable duration "are the most strongly related and the least controversial" [4] (p.269), and it is the latter of these two which is of the greatest concern to this study (as explained further below), particularly segment duration within the stressed syllable.

1.2. Stress in Welsh

Lexical stress in Welsh has not received as much attention as stress in English, and though there is some very early acoustic work on the subject, only a few studies have examined it experimentally [14, 15].

Firstly, it must be made clear that the placement of Welsh lexical stress is very regular - it almost always occurs on the penultimate syllable, with some irregular exceptions usually due to borrowings. Evidence for the penultimate placement of stress is posited by Williams [15] as being "...that Welsh speakers, and traditional grammar-books, agree that it is. Also, in Welsh songs, the penult is the syllable that occurs on the beat of the music." (p. 43).

The most comprehensive experimental research of lexical stress in Welsh is by Williams. One of her studies [15] involved recording a South Welsh speaker reading aloud a list of words and sentences. These recordings were then played to two English speakers, and to one Welsh speaker, and they had to identify which they thought was the stressed syllable. Unfortunately it is not specified from which region the listeners came. She then examined the features of the syllables that were identified as stressed. The features of the syllables that the English monolinguals selected were more often those with a pitch change of greater than 10Hz, longer vowel duration, and greater envelope amplitude within the vowel. The Welsh speaker on the other hand chose syllables that showed the opposite features - less than

10Hz pitch change, shorter vowel duration, and lower envelope amplitude within the vowel.

Further analysis showed that amplitude and pitch were not reliable indicators of stress in Welsh, but that segment length was significant. Williams then showed that the duration of the stressed vowel was not statistically significant (though in earlier work she does point out that the stressed vowel is often shorter than the unstressed vowel), and that the duration of the following (i.e. post-stress) consonant was significant - the mean duration of consonants in an unstressed and a stressed position were 81 msec and 94 msec respectively.

On the basis of these results Williams concluded that the lengthened duration of the post-stress consonant is the most important cue to stress in Welsh.

1.3. Stress in Welsh English

As far as I am aware there is no published experimental work on lexical stress in Welsh English. Some accounts based on impressionistic observations (see: [3]) report that it too features a lengthened post-stress consonant that is similar to Welsh rather than other varieties of English (which would more likely lengthen the stressed vowel). This is not surprising, given that past studies have shown that a particular variety of English can share features with the language with which it is in contact. For example, in respect to prosodic features, research has been conducted on Irish English and Irish Gaelic showing intonational similarities between the two languages, and that these features differ to other varieties of Irish English and Gaelic in another region [5, 13]. This suggests the similarity is due to language contact, and so we would expect that Welsh English shares some features of Welsh.

1.4. Aim of the study

The aim of this study was to examine the realisation of lexical stress in Welsh English, in terms of segment duration. This will not only add to past comparative research on dialect prosody, such as [5, 8, 9, 10, 13], but will also serve as a description of Welsh and Welsh English prosody which may form the basis of future research into prosody in language contact and second language acquisition in Wales.

I hypothesized that, perhaps due to a long history of Welsh/English contact, the realisation of lexical stress in Welsh English would have features in common with Welsh. In particular, the post-stress consonant would not be significantly longer in duration compared to Welsh, but would show a significant difference in duration compared to Standard Southern British English (SSBE).

2. METHODS AND MATERIALS

2.1. Participants

The participants in the study consisted of two groups - a) SSBE speaking monolinguals; and b) Welsh/English bilinguals.

The first group were five female undergraduate students studying at Bangor University. They were recruited via an advertisement on the university intranet page, and were required to fit the criteria of being between ages 18 and 26, having grown up in southern England, not having a strong regional accent, and having little to no knowledge of Welsh. The second group were six female students at a Welsh-medium high school in North Wales who were selected by the deputy head of the school and fit the criteria of having lived in the Caernarfon region of North Wales their whole lives, and being raised in a Welsh speaking household. This second group was recorded speaking the English stimuli in an initial session, and one week later they completed the same task using the Welsh stimuli.

1.1. Stimuli

Two word lists were created for the stimuli, one in English and the other in Welsh, a selection of which are presented in Table 1. The words were chosen as pairs in which the initial syllable was the same or as similar as possible in both English and Welsh, with the post-stress consonant being either /n/ or /s/. A variety of different vowels occured in the stressed position.

Each word was inserted into the phrase:

a) “Say [*word*] again” (English); or

b) “Dudwch [*word*] eto” (Welsh).

The phrases were read one at a time as they were presented on a computer monitor.

Table 1: An example of the word pairs used in the task.

English	Welsh
Cannon	Canol
Panel	Panad
Gossip	Gosod
Possum	Posau

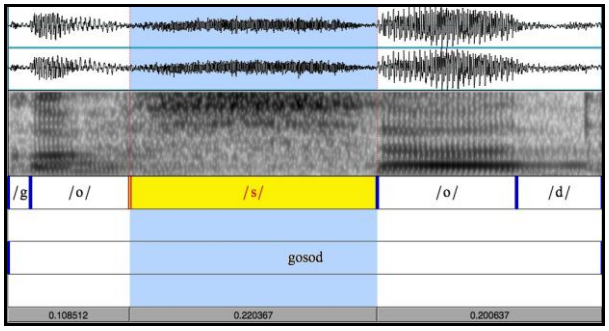
2.2. Data analysis

The participants were recorded on a digital recording device at 96kHz. The sound files were then annotated using specialised acoustic analysis software [2]. Firstly, the word boundaries were annotated (word initial plosives were measured from their release) and the word duration measured. Then the procedure was repeated for the stressed vowel and the post-stress

consonant. The duration of the unstressed vowel was also measured in words that ended in a single consonant (eight words in the English stimuli, and six words in the Welsh). The consonant /n/ was marked from the end of the F2 formant of the previous vowel to the beginning of the F2 formant of the following vowel. The consonant /s/ was marked from the beginning of alveolar frication to the beginning of the voicing of the following vowel. Figure 1 shows an example of the annotation of a Welsh word.

In order to account for any effects that group speaking rate may have on the data, it was decided to analyse the resulting duration measurements as a percentage relative to the word duration.

Figure 1: The Welsh word 'gosod' (with an /s/ post-stress consonant) showing the annotation used.



3. RESULTS

3.1. Absolute segment duration

The measurements show that the mean absolute duration of the post-stress consonants is shortest in SSBE, longer in Welsh English, and longest in Welsh. The mean duration of the stressed vowel shows the opposite pattern, being longest in SSBE, shorter in Welsh English, and shortest in Welsh (Table 2.). Word duration did not show a consistent pattern, with Welsh English being the longest, then Welsh, and SSBE the shortest.

Table 2: Mean duration of stressed vowel, post-stress consonant, and word in msec.

	SSBE	Welsh English	Welsh
Stressed Vowel	96	91	79
Post-stress consonant	81	122	134
Word	437	478	464

3.2. Consonant duration relative to word duration

A one-way ANOVA was conducted to compare the mean consonant duration as a percentage of total word duration in all three languages. The result showed a significant difference [$F(189,2) = 23.07$, $p<.001$]. Post hoc comparisons reveal that there is a significant difference between the duration of post-stress consonants of SSBE and Welsh English ($p<.001$), and between SSBE and Welsh ($p<.001$), but that there is no statistical significance between the duration of Welsh English and Welsh post-stress consonants ($p=.098$).

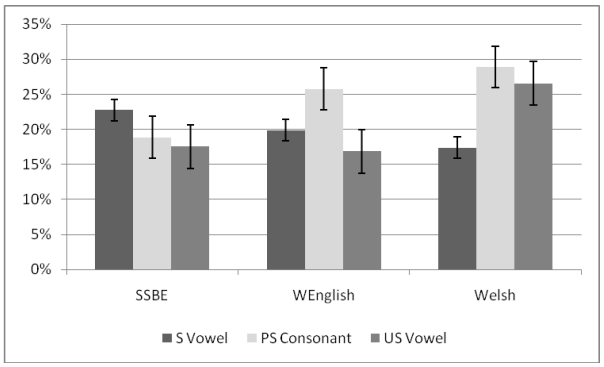
3.3. Vowel duration

The stressed vowels showed a similar pattern to the post-stress consonants, though inverted. A one-way ANOVA was conducted that compared the mean stressed vowel duration as a percentage of the word which showed a significant difference [$F(188,2) = 14.75$, $p<.001$]. Post hoc tests showed a statistical difference between all three languages ($p<.05$).

The unstressed vowels were firstly compared to the stressed vowel of the same word as a percentage calculation. In SSBE, the unstressed vowels were on average 81% of the length of the stressed vowel, and in Welsh English they were a little longer, averaging 91% of the length of the stressed vowel. In Welsh however they were much longer, being on average 169% of the length of the stressed vowel.

A one-way ANOVA showed a significant difference in terms of the unstressed vowel in relation to word length [$F(114,2) = 27.79$, $p<.001$] and a post hoc analysis showed that there was a significant difference between Welsh and both the other groups ($p=<.001$), but no significant difference between SSBE and Welsh English ($p=.868$). These results show that SSBE and Welsh English are quite similar in the percentage of the word taken up by the unstressed syllable, and that it is substantially longer in Welsh. These results are further illustrated in Figure 2.

Figure 2: The mean length of stressed vowels, post-stress consonants and unstressed vowels as a percentage of total word length in all three languages showing standard error bars.



4. DISCUSSION AND CONCLUSIONS

The results show that, in terms of segment duration, the realisation of lexical stress in Welsh English has some similarities to stress in Welsh, namely a lengthened post-stress consonant. This finding supports impressionistic accounts in the past [3].

The statistically significant difference of post-stress consonant duration between SSBE and Welsh support the findings of previous work by [15], that post-stress consonants have a lengthened duration in Welsh. Stressed vowel duration was longest in English, where longer vowel duration has been shown to be a feature of lexical stress [11, 12], and shortest in Welsh, where, when compared to the unstressed vowel, Williams' [15] observation of a short stressed and long unstressed vowel was supported empirically. Further research to strengthen these results will analyse segments in the final, unstressed syllable in some bisyllabic English and Welsh words with matching final syllables.

The realisation of stress in Welsh English seems to lie somewhere between SSBE and Welsh. The duration of its stressed vowels is shorter than SSBE and longer than Welsh whilst not appearing to be more like one or the other. The post-stress consonants seem to be closer to Welsh in duration, whilst the unstressed vowel appears to be closer to SSBE. Initially it seems to be a fair assumption that the contact between English and Welsh in Wales is what has caused the lengthened post-stress consonant feature in Welsh English, which would appear to agree with the conclusions of work on prosodic similarity between Irish English and Irish Gaelic [5, 13].

However, simply viewing Welsh English as a variety of English and considering historical language contact as the explanation is probably not sufficient in this case. Another possible explanation for the realisation of stress in these speakers' English is that it is a result of the interaction between the two languages of bilinguals. Further research could examine this issue, to discover if there are any differences in the realisation of stress between Welsh English monolinguals and bilinguals (i.e. those living in Wales that only speak only English versus those that speak both English and Welsh), and whether speakers can discern if a person is monolingual Welsh English or bilingual Welsh/English from hearing only their English.

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