Title: Can you tell by their English if they can speak Welsh? Accent perception in a language contact situation

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Abstract

Aims: The purpose of this research was to gain a better understanding of accent perception in language contact situations in which monolingual speakers of a contact variety and bilinguals live in the same community.

Design: We investigated the English accents of monolinguals and bilinguals from the same area in South-West Wales, and listeners' perceptions thereof, in three inter-related studies.

Data: In Study 1, an accent perception experiment, participants from four different listener groups were asked to differentiate English monolinguals and Welsh-English bilinguals on the basis of short English speech samples. In Study 2, the same participants' views about differences between the accentual features of monolinguals and bilinguals were examined in individual structured interviews. Finally, in Study 3, the speech samples from the accent perception experiment were analysed phonetically based on the accentual features mentioned in Study 2.

Findings: Study 1 revealed that monolinguals and bilinguals can be identified above chance based on their English accent, but performance was unexceptional. Identification was better with greater accent familiarity, but unrelated to listeners' ability to speak Welsh. Study 2 revealed the specific segmental and suprasegmental features that the listeners considered indicative of monolingual and bilingual speakers' English accents, while Study 3 showed that only some of the listeners' views are consistent with the production data from Study 1.

Originality: This paper is the first to examine whether monolinguals and bilinguals from a bilingual area with historical language contact can be identified on the basis of their majority language accent, and on what grounds these identifications are made.

Implications: This research shows that settings in which minority-language features originate from both historical language contact and individual bilingualism yield subtle accentual differences in the majority language between monolinguals and bilinguals to which even listeners from the same accent background may not be responsive.

1. Introduction and Background

It is well known that the widespread acquisition of a new language often results in the creation of a new variety which is heavily influenced by the community's original language (e.g. Dubois & Horvath, 1998; Sankoff, 2001). Such substratum effects often remain following shift to the new language and become features of a distinct contact variety (Thomason & Kaufman, 1988: 38; Johanson, 2002: 304). In the case of Welsh English, an umbrella term used to describe the varieties of English spoken in Wales (see Penhallurick, (2007: 152–153) for a discussion of this term), substratum effects from the Welsh language are notable in communities where there has been historical language shift (Thomas, 1994: 113). In contrast, Welsh remains the dominant community language in many areas (particularly in northern and western areas) and therefore it is thought that Welsh often influences the English of Welsh-English bilinguals due to synchronic cross-linguistic interaction (Paulasto, 2016: 125). Consequently, varieties of Welsh English are often described by the extent to which a Welsh influence is present, either as a consequence of widespread bilingualism in an area and cross-linguistic transfer or because of historic language shift and substratum effects from Welsh (e.g. Awbery, 1997: 86–88).

The situation is, however, more complex than the broad overview above suggests. This is due in part to language revitalization and the creation of 'new speakers' (cf. O'Rourke, Pujolar & Ramallo, 2015), but also due to the fact that many 'traditional speakers'

remain in communities where the dominant language is English (see, for example, Aitchison & Carter (2004) for an overview). In terms of production, recent work has shown a tendency for bilingual speakers from both Welsh- and non-Welsh-speaking backgrounds to produce both English monophthongs and lexical stress near-identically to monolinguals from the same area (Mayr, Morris, Mennen & Williams, 2017; Mennen, Kelly, Mayr, Morris & Kong-Insam, under review). These studies focus on the production of single linguistic features, however, and it remains to be seen (1) to what extent the entire system of Welsh-English bilinguals is different from that of monolinguals from the same area and (2) to what extent these differences are perceptible to other speakers of Welsh English. These are the overarching questions which the current paper seeks to address.

1.1 Perception studies in bilingual contexts

Perception studies have been used primarily in studies of L2 acquisition in order to ascertain the extent to which speakers sound 'foreign' to native-speaker listeners (see Piske, MacKay & Flege (2001) for an overview). Such studies have targeted both individual features such as vowel production (Flege, MacKay & Meador, 1999) or global foreign accent and have shown that listeners are generally able to identify non-native accents relatively easily (e.g. Flege, 1984; Munro, 1995; Munro, Derwing & Burgess, 2003). Although the correlations between extra-linguistic factors, such as age of L2 learning, and perceived nativeness are relatively clear from such studies, it is not often clear which cues listeners associate with foreign accents, and not all deviations from native-speaker norms result are perceptually salient enough to result in a higher foreign accent rating (Hazan & Boulakia, 1993; Jilka, 2000). Generally, cues are thought to comprise both segmental and suprasegmental non-traditional features as well as hesitation phenomena and speech rate (Piske et al., 2001: 212).

Similar experiments have shown that bilingual speakers' L1 can also deviate from monolingual native-speaker norms either due to synchronic cross-linguistic interaction with the L2, L1 language attrition, or language dominance. Sancier and Fowler (1997), for instance, found that listeners rated the accent of a native speaker of Brazilian Portuguese as more foreign following an extended stay in the U.S. (where she spoke English). This gestural drift, they assert, is due to the tendency for human beings to accommodate or imitate others' speech (Sancier & Fowler 1997: 422). In a study of L1 attrition among native German speakers living abroad, De Leeuw, Schmid and Mennen (2010) found that migration to a non-German-speaking country was not more likely to result in a higher foreign accent rating, but rather the contact with German and the communicative settings in which German was used were significant predictors of foreign accent (De Leeuw et al., 2010: 39). Similarly, Bergmann, Nota, Sprenger and Schmid (2016) found that native German speakers living in North America received higher foreign accent ratings than native German speakers in Germany. The authors hypothesised that these global accent perceptions were based on a series of small changes in L1 accent due to interaction with L2 English. However, when comparing the productions of /aː/, /ɛ/, /ɔ/ and /l/ acoustically across potential attriters with and without non-native scores, they did not find any significant differences. Somewhat relatedly, Tomé-Lourido (2018) found that listeners could differentiate between Galician- and Spanish-dominant bilinguals in her study but not 'new speakers' of Galician, perhaps because of uncertainties surrounding the specific properties of their accent.

Generally, there is an abundance of evidence that listeners have greater perceptual sensitivity to familiar than unfamiliar accents. Thus, infants have been shown not only to discriminate native and non-native accents reliably (Kinzler, Dupoux & Spelke, 2007), but also familiar and unfamiliar regional accents in their native language (Butler, Floccia, Goslin & Panneton, 2011). By the age of 7, children are able to categorise speakers of regional L1

varieties explicitly (Floccia, Butler, Girard & Goslin, 2009; Wagner, Clopper & Pate, 2014), while adults have been shown to process familiar accents faster than unfamiliar ones (Adank, Evans, Stuart-Smith & Scott, 2009). Finally, non-native listeners, while less responsive to regional variation in native L2 accents than native speakers (Clopper & Bradlow, 2009), outperform the latter in the non-native accents of talkers with whom they share the L1 (Atagi & Bent, 2016). It is, however, unclear to what extent accent familiarity also plays a role in the perception of contact varieties.

On that note, a number of perception studies have been carried out in language contact settings. Sinner (2002) interviewed seven Catalan-Spanish bilinguals and five Spanish monolinguals from Madrid in order to ascertain how aware speakers are of Catalan-influenced Spanish (known as Catalan Contact Spanish). He found that, despite a strong influence from Catalan at all levels of linguistic structure (see Davidson (2012) for an overview), speakers from both Catalonia and Madrid seemed largely unaware of distinct Catalan Contact Spanish features (Sinner, 2002: 181). The main feature noted was heavily velarized instances of /l/ in Catalan Contact Spanish which was found to be highly stigmatised (Sinner, 2002: 165). Davidson (2015) investigated social evaluations of /l/ in Catalan Contact Spanish by conducting a match-guised test and follow-up interview. He found that there was a complex interplay between negative associations with heavily velarized /l/ in Catalan speakers' Spanish (which was often judged to be incorrect and less attractive) and also positive associations related to solidarity between Catalan-Spanish bilinguals (Davidson, 2015: 195-196).

There is also an extensive body of research on the perception of 'World Englishes', i.e. contact varieties of English that have arisen in multilingual settings (e.g., Lambert, Alam & Stuart-Smith, 2007; Cavallaro & Chin, 2009; Cheshire, Kerswill, Fox & Torgersen, 2011;

Zhang, 2013; Hansen Edwards, Zampini & Cunningham, 2018; Limin Foo & Tan, 2019). These studies suggest that non-educated contact varieties, such as broad Hong Kong English (Zhang, 2013) or Colloquial Singapore English (Cavallero & Chin, 2009), are commonly perceived negatively, with lower ratings than non-educated inner circle varieties, e.g. Tyneside English (Zhang, 2013). On the other hand, educated varieties, such as educated Hong Kong English, Mandarin-accented English (Zhang, 2013) or Standard Singapore English (Cavallero & Chin, 2009), often attract favourable ratings, in line with inner circle standard varieties, such as RP. Such research suggests that contact-induced features can take on social meaning and be salient to listeners. It remains to be seen, however, to what extent this is the case in contexts where there are both monolingual speakers of the contact variety and bilinguals who speak the contact variety as well as the original language.

1.2 Welsh and Welsh English

Varieties of Welsh English are often defined by the extent to which the Welsh language is spoken in a given area, with more Welsh-accented English being noted in areas where a greater proportion of the population speak Welsh (Thomas, 1994: 112-113). At the level of phonology, features noted in traditionally Welsh-speaking areas include the realisation of /r/ following vowels (rhoticity), trilled and tapped realisations of /r/, heavily aspirated productions of voiceless plosives and fricatives, and the lack of a phonemic distinction between [ə] and [ʌ] (Morris, 2017: 185; Penhallurick, 2004). Despite some recent work on language variation and change in Welsh English (e.g. Paulasto, 2016) and in the speech of Welsh-English bilinguals (e.g. Morris, 2013, 2017; Mayr et al., 2017), we know very little about the influence of extra-linguistic factors in particular areas and specifically the extent to which there are differences between Welsh-English bilinguals and English monolinguals in the same area.

A number of early works on the social psychology of bilingualism shed light on the way in which Welsh English is perceived in relation to Received Pronunciation (e.g. Bourhis, Giles & Tafjel 1973). In these studies, which used matched-guise techniques to elicit listeners' perceptions, varieties of Welsh English were often rated as being more socially attractive than RP, but RP was rated higher in terms of speaker intelligence (see Giles (1990) for a summary). Following this early work, research using a perceptual dialectological framework (Preston, 1989) has examined attitudes towards different varieties within Welsh English (e.g. Coupland, Garrett & Williams, 1994; Garrett, Coupland & Williams, 1995; Montgomery, 2016; Williams, Garrett & Coupland, 1996). Much of this work showed that Welsh people themselves often label varieties of Welsh English as either English or Welsh with more eastern areas and Pembrokeshire being labelled as English (Williams et al., 1996: 183). Many, though not all, of the areas which were labelled as having a more Welsh-accented English have traditionally been predominantly Welsh-speaking with speakers often being evaluated as speaking with difficulty in English. Within these areas, Williams et al. (1996: 189-90) note differences between relatively positive evaluations of the 'melodious' south west of Wales and the 'nasal' and 'gutteral' north west.

It is therefore clear that previous perception studies have focussed on either the affective evaluation of Welsh English compared to RP or the perception of different dialect areas within Wales. Whilst many studies refer to heavily Welsh-accented speech being associated with predominantly Welsh-speaking areas, little is known about whether speakers can perceive differences between Welsh-English bilinguals and non-Welsh-speakers within areas and the features upon which they base their evaluations.

1.3 Research aims and questions

The aim of the current paper is to examine for the first time whether monolinguals and bilinguals from a bilingual area with long-term language contact can be identified on the basis of their majority language accent, and on what grounds these identifications are made. As such, this research extends existing work (1) by investigating accent perception in situations of long-term language contact and (2) by focusing on the entire system, rather than a set of preselected features. In order to achieve this aim, we present three inter-related studies:

- Study 1: An accent perception experiment, in which listeners were asked to identify monolingual English speakers and Welsh-English bilingual speakers on the basis of short English speech samples.
- Study 2: An investigation of the listeners' perceptions of differences between the accentual features of a monolingual's or a bilingual's English accent.
- Study 3: An auditory and acoustic analysis of the identified features in the monolingual and bilingual speech samples.

Together the studies aim to answer the following research questions:

(*RQ 1*) Is it possible to identify Welsh-English bilinguals and English monolinguals from Wales by listening to their accent in English? (*Study 1*)

(*RQ 2*) Does accuracy and confidence in speaker identification depend on accent familiarity and/or a listener's own ability to speak Welsh? (*Study 1*)

(*RQ 3*) Which accentual features do listeners consider when deciding that someone *can* or *can not* speak Welsh? (*Study 2*)

(*RQ 4*) To what extent do listeners' perceptions of the accentual features of monolingual and bilingual speakers match the patterns found in the samples to which they listened? (*Study 3*)

2. Study 1: Accent perception experiment

The principal aim of this study was to determine whether it is possible to identify an individual's ability to speak Welsh solely based on their accent in English. Moreover, the study sought to determine whether identification accuracy was dependent on accent familiarity and listeners' ability to speak Welsh. To answer these questions, we carried out an accent perception experiment in which monolingual and bilingual listeners from different areas of Wales were exposed to short English speech samples from English monolinguals and Welsh-English bilinguals from Llanelli (Carmarthenshire). Listeners were asked to indicate whether they thought the speaker in a given sample was able to speak Welsh or not, and to rate the level of confidence about their decision.

2.1. Methodology

Speech materials

The speech samples to be rated were extracted from recordings of a picture retelling task produced by monolingual English speakers (n=12, 9 females) and Welsh-English bilingual speakers (n=12, 5 females) from the town of Llanelli in Carmarthenshire, South Wales. This location was selected because the county has a relatively equal proportion of Welsh and non-Welsh speakers (43.9% of the population of Carmarthenshire speak Welsh according to the 2011 Census, StatsWales, 2012). Previous sociolinguistic research has also shown that Carmarthenshire English is perceived as particularly influenced by Welsh (Williams et al., 1996: 191).

The bilingual and monolingual speakers were matched in age (mean: 16.42 years (SD: .58); independent samples t-test: $t(22)= -.692$, $p = .496$) and were recruited via established networks and schools in the area. None of them reported any speech, language and communication difficulties. The bilingual speakers all came from Welsh-speaking homes,

had been solely educated in Welsh-medium schools, and gave their command in Welsh the highest rating, i.e. *fluent*, in a language background questionnaire[1]. The monolinguals, in contrast, came from entirely English-speaking homes, had received their education solely through the medium of English, and, despite compulsory Welsh as a Second Language classes, indicated having no ability to speak Welsh beyond a few simple sentences.

In the experiment, the participants were recorded retelling two picture-based stories, 'Peter and the Cat' (Leitão & Allan, 2003) and the 'Squirrel Story' (Carey, Leitão & Allan, 2006), using a Zoom H2 Handy Recorder with integrated microphone. This approach was chosen so as to obtain quasi-spontaneous speech samples whilst limiting variability in the choice of lexical and grammatical material. The 'Peter and the Cat' story book contains nine pictures with a story script of 20 sentences and 257 words, and the 'Squirrel Story' story book contains ten pictures with a story script of 31 sentences and 273 words. During the familiarisation stage, the participants were allowed to read through the story scripts, but when retelling the stories, they only had access to the picture books[2].

From each of the 24 x 2 = 48 narratives, a speech sample of approximately 14-15 seconds was extracted in PRAAT (Boersma & Weenink, 2016). Samples were selected that contained grammatically complete utterances and avoided long pauses and other hesitation phenomena. Moreover, they were screened for any lexical material that could reveal the speaker's linguistic identity, such as the use of Welsh words in otherwise English sentences.

[1] All participants in the study completed a questionnaire, designed specifically for the purposes of this study, which covers (1) demographic information (date and place of birth; gender; educational attainment; employment details; places lived); and (2) language background details (use of Welsh/ English in the home and in education; self-rated proficiency in Welsh; current language use).

[2] Note that when we originally designed the study, we also intended to investigate the role of language mode (Dunn & Fox Tree, 2014; Grosjean, 2001) on accent identification. In order to do so, the bilingual participants producing the samples were asked to retell one story entirely in English (i.e. in a monolingual mode) and to alternate between Welsh and English when retelling the second story, with two consecutive pictures narrated in the same language before alternating to the other language (i.e. in a bilingual mode). However, mode exhibited no significant effect in any of our models when analysing the results of our accent perception experiment. We therefore decided to pool the two sets of samples for subsequent analysis, and not to consider mode further in this study.

The samples produced by the monolingual and bilingual speakers were matched in duration (mean MON: 14.57 seconds (SD: 0.99); mean BIL: 14.08 seconds (SD: 1.35); independent samples t-test: $t(46)= -1.421$, $p=.162$).

Listeners

A total of 75 listeners from Wales participated in the accent rating experiment (Table 1). They were assigned to one of four groups: (1) Bilinguals from the same area (BIL-SAME), i.e. Carmarthenshire and Swansea ($n=19$; 4 males), (2) Bilinguals from a different area (BIL-DIFF)[3] ($n=20$; 5 males), (3) Monolinguals from the same area (MON-SAME; $n=15$; 5 males), and (4) Monolinguals from a different area (MON-DIFF, $n=21$; 1 male). The listeners were predominantly recruited from the staff and student populations at Cardiff Metropolitan University and Cardiff University and were matched in age across the groups (mean: 24.97 years (SD: 5.38); one-way ANOVA: $F(3,71)= .579$, $p= .631$). All bilingual listeners were educated in Welsh-medium primary and secondary schools, and gave their command of Welsh the highest rating, i.e. *fluent*. The vast majority of them were also raised in Welsh-speaking homes ($n=37$ of 39). The monolingual listeners, in turn, were raised in entirely English-speaking homes, had received their education solely through the medium of English, apart from Welsh as a second language classes, and indicated either no ability to speak Welsh ($n=15$), only being able to say a few words ($n=7$), or being able just to 'speak a little Welsh' ($n=14$).

It should be kept in mind that the listeners were rating samples produced by younger speakers and might have held preconceived views of youth language. Despite this, however,

[3] Listeners in the MON-DIFF group came from south-eastern areas of Wales which are geographically closer to Carmarthenshire or Swansea than northern counties. This may have meant that these listeners had had greater exposure to Carmarthenshire/ Swansea accents and share a greater number of accentual features with them. However, none of the listeners in BIL-DIFF and MON-DIFF had ever lived in Carmarthenshire/ Swansea at any point in their lives and all of them resided in Cardiff or surrounding areas at the time of the study.

the age of the speakers was not discussed with listeners and listeners were not asked to make judgements regarding the age of speakers. Similarly, all speakers were from the same area in order to minimise the possibility that listeners were answering based on their perceptions of traditionally Welsh-speaking areas (see Section 1.2).

[INSERT TABLE 1 ABOUT HERE]

Procedure

The accent rating experiment, generated via PRAAT's Multiple Forced Choice listening experiment function (http://www.fon.hum.uva.nl/praat/manual/ExperimentMFC.html), was carried out in a quiet laboratory room on university premises. Listeners were seated in front of a standard laptop and exposed to the 48 stimulus samples in random order via Beyerdynamic DT231 Galactic Stereo Headphones. They were informed that they were going to listen to monolingual speakers from Wales as well as Welsh-English bilinguals, albeit not in what proportions nor from which geographical area, and that their task was to determine for each item (1) whether they thought the speaker in the sample was able to speak Welsh (response categories: 'Yes'; 'No'), and (2) how confident they felt about their choice (response categories: 'certain'; 'uncertain'). Moreover, the listeners were instructed to guess if unsure, that they could take as long as they needed to make their decisions, but that they could only listen to each sample once. Upon selection of the response categories, the following auditory sample started automatically after a 2-second delay. All 48 samples were presented in a single block without breaks. Including instructions, the experiment lasted for approximately 25 minutes.

Analysis

The experimental data were extracted from PRAAT and transferred to a .CSV file for subsequent statistical analysis. In what follows, the accuracy of the listeners' identifications

was firstly considered in order to ascertain the extent to which they were above chance. Subsequently, we ran a series of *mixed effects logistic regression models*, all conducted in R (R Core Team, 2016) using the *lme4* package (Bates, Maelcher, Bolker & Walker, 2015) with *accuracy*, *confidence* and *accuracy & confidence* as dependent variables.

Individual factors (as well as interactions between these factors) were added to the model and retained if they significantly improved the fit of the model (as ascertained by log-likelihood tests). The best-fitting models (reported below) include both the fixed factors *group* (4 levels: BIL-SAME; BIL-DIFF; MON-SAME; MON-DIFF), the baseline for which was BIL-SAME, and *sample* (2 levels: MON SAMPLE; BIL SAMPLE), the baseline for which was BIL SAMPLE. *Participant* and *item* were included as random intercepts.

2.2. Results

Accuracy

Figure 1 depicts the participants' percent accuracy overall by group (1a) and sample (1b).

[INSERT FIGURE 1 ABOUT HERE]

Inspection of the figure shows that performance was fair overall (mean: 63.08%, SD: 8.7) despite some variability. Accordingly, a one-sample t-test across all participants (n=75) revealed accuracy to be significantly above chance ($t(74)= 13.027$, $p< .001$). This was also the case when examining accuracy separately for each group (BIL SAME: 67.81% (6.96), $t(18)= 11.151$, $p<.001$; BIL DIFF: 59.7 % (10.26), $t(19)= 4.231$, $p<.001$; MON SAME: 63.92% (7.26), $t(14)= 7.432$, $p<.001$; MON DIFF: 61.42% (7.96), $t(20)= 6.576$, $p<.001$). Moreover, performance was also above chance when examining the monolingual samples ($t(74)= 6.082$, $p< .001$) and the bilingual samples ($t(74)= 11.315$, $p<.001$) on their own. Note,

however, that the mean for the latter was higher (MON: 59% (12.9) vs BIL: 67% (SD: 13.1)) and only 12% of the participants (*n*=9) performed at chance or below on the bilingual samples, while 26.67% of the participants (*n*=20) were not above chance on the monolingual samples. Overall, these results suggest that the participants were generally able to differentiate monolingual and bilingual speakers on the basis of their English accent. However, performance was not exceptional with substantial numbers of listeners unable to perform above chance, in particular on the monolingual samples.

To examine differences in accuracy between the groups and across the monolingual and bilingual samples, we ran *mixed effects logistic regression analyses* with *accuracy* as the dependent variable, *group* (4 levels: BIL-SAME; BIL-DIFF; MON-SAME; MON-DIFF) and *sample* (2 levels: BIL SAMPLE; MON SAMPLE) as fixed factors, and *participant* and *item* as random intercepts. BIL-SAME and BIL SAMPLE were set as baselines. The best-fitting model, depicted in Table 2, revealed no significant effect of *sample* although the difference approached significance. However, the model did show significant between-group differences, with monolinguals and bilinguals from the same area as the speakers in the sample outperforming those from other areas in Wales. This suggests that accent familiarity, but not the ability to speak Welsh, resulted in better identification performance.

[INSERT TABLE 2 ABOUT HERE]

Confidence

Figure 2 depicts the participants' confidence ratings for each group (2a) and by sample (2b), with '1' denoting complete confidence, and '0' complete lack thereof.

[INSERT FIGURE 2 ABOUT HERE]

Inspection of Figures 2a and 2b suggests a large amount of variability in each group with approximately equal numbers of samples on which the listeners felt confident and not confident on average (BIL-SAME: 56.14% (SD: 20.71); BIL-DIFF: 46.04% (SD: 26.32); MON-SAME: 52.22% (SD: 21.97); MON-DIFF: 47.52% (SD: 23.32)), and greater confidence on bilingual samples than monolingual ones (BIL SAMPLE: 54.83% (SD: 22.95); MON SAMPLE: 45.67% (SD: 24.98)).

To examine whether any differences are significant, we ran *mixed effects logistic regression analyses* with *confidence* as the dependent variable, *group* (4 levels: BIL-SAME; BIL-DIFF; MON-SAME; MON-DIFF) and *sample* (2 levels: BIL SAMPLE; MON SAMPLE) as fixed factors, and *participant* and *item* as random intercepts. BIL-SAME and BIL SAMPLE were set as baselines, as before. The results of the best-fitting model, depicted in Table 3, revealed no significant effect of *group*, suggesting that accent familiarity and/ or the ability to speak Welsh did not affect the confidence of the listeners' choices overall. However, they did show significantly greater confidence in the decisions made on bilingual samples than monolingual ones.

[INSERT TABLE 3 ABOUT HERE]

Accuracy and confidence

Since accuracy levels may have been affected by individuals' guessing behaviour, we also examined the extent to which the groups differed when confidence ratings were taken into account alongside accuracy. Thus, we compared performance on samples that were correctly identified and for which the listeners selected 'certain', coded as '1', with all other combinations of responses, coded as '0', i.e. correct & uncertain; incorrect & certain; incorrect & uncertain. The results, depicted in Figure 3, revealed a higher mean value on this

measure for listeners in BIL-SAME (41.78% (SD: 14.57)) than those in MON-SAME (SD: 34.31% (SD: 14.62)), MON-DIFF (32.04% (SD: 17.22)) and BIL-DIFF (30.21% (SD: 18.04)). Moreover, accuracy with confidence was greater on the bilingual samples (40.78% (SD: 18.2)) than the monolingual ones (28.17% (SD: 18.96)).

[INSERT FIGURE 3 ABOUT HERE]

To examine whether any differences are significant, we ran *mixed effects logistic regression analyses* with the combined accuracy & confidence factor as dependent variable. BIL-SAME and BIL SAMPLE were baseline levels in the modelling. The results of the best-fitting model, shown in Table 4, revealed significant effects of both *group* and *sample.* Thus, listeners with greater accent familiarity were better at correctly identifying samples with confidence, while the ability to speak Welsh made no difference on this measure. Moreover, accurate identification with confidence was significantly better on the bilingual samples than the monolingual ones.

[INSERT TABLE 4 ABOUT HERE]

2.3. Discussion

The primary purpose of Study 1 was to establish whether it is possible to identify Welsh-English bilinguals and English monolinguals from Wales solely on the basis of their accent in English. The results suggest that this is indeed the case since performance was significantly above chance in all instances. In other words, the listeners managed to identify both monolinguals and bilinguals correctly above the 50% chance level, and this was irrespective of their own accent background and ability to speak Welsh. At the same time, however, it

should be noted that performance was not exceptional. In particular, only 59% of the monolingual samples were identified correctly on average. These results are interesting compared to findings from other bilingual settings and, in particular, perception studies of L1 and L2 speech. Flege (1984), for instance, found that most native English listeners were able to identify non-native accents in speech samples of as little as 30 milliseconds in duration. Similarly, Kinzler, Dupoux & Spelke, (2007) suggest that babies as young as five months old can differentiate native and non-native speech. Moreover, foreign accents can be consistently identified in low-pass filtered speech (Munro, 1995) and when speech is played backwards (Munro et al., 2003). So why did the listeners in the present study not perform better?

Unlike studies on adult L2 acquisition, our speakers all had early exposure to English, either as the only language heard from birth or as one of the languages experienced in early childhood alongside Welsh. Moreover, while the speech of L2 learners exhibits accentual features from their native language, in the present context there are two potential sources of cross-linguistic influence from Welsh. On the one hand, it may be a result of individual bilingualism, with Welsh-English bilinguals transferring pronunciation patterns from Welsh to English, as with L2 learners. On the other hand, it may derive from historical language contact between Welsh and English, and hence surface in the speech of both monolinguals and bilinguals (Penhallurick, 2004; Walters, 2003; Wells, 1982). The listeners' task was hence much more challenging than in typical tutored or naturalistic L2 learning contexts and involved more subtle accentual differences. As such, it is more akin in demand to perception experiments in other language contact settings. To the best of our knowledge, the only comparable study is Tomé-Lourido (2018) which examined identification of three groups of Galician-Spanish bilinguals, i.e. Galician-dominant bilinguals, Spanish-dominant bilinguals, and Galician-Spanish new speakers. While listeners from Galicia were able to identify Galician-dominant bilinguals and Spanish-dominant bilinguals significantly above the 33%

chance level based on their productions of a sentence from the Galician version of 'The Northwind and the Sun', they were unable to do so for Galician-Spanish new speakers, so-called *neofalantes*. Overall, performance was comparable to that in the present study, but note that Tomé-Lourido (2018) did not include monolingual speakers.

In addition, the results showed differences in accuracy across the listener groups. Thus, monolinguals and bilinguals from the same accent background as the speakers in the sample performed significantly better than those from the rest of Wales. This finding is not surprising as greater familiarity allows listeners to home in on subtle features that may not be accessible to those less familiar with the accent. Previous studies have yielded similar results (Adank et al., 2009; Atagi & Bent, 2016; Floccia et al., 2009; Wagner et al., 2014). For example, Atagi & Bent (2016) showed that native Korean and native Spanish L2 learners of English and native English monolinguals were more responsive to their own accents than different ones in an auditory free classification task that included native and non-native accents of English.

At the same time, being able to speak Welsh did not put listeners at an advantage. This suggests that in some contexts and without non-linguistic clues, Welsh speakers may not have the meta-linguistic awareness of Welsh-influenced English which is anecdotally often assumed. This is not particularly surprising, however, given that the area under discussion has a sizeable Welsh-speaking population, but is not a majority Welsh-speaking area. Moreover, bilinguals may actually hear less English spoken from Welsh speakers than English monolinguals from the same area.

Taken together, Study 1 has demonstrated that listeners from Wales are able to identify Welsh-English bilinguals and English monolinguals on the basis of their English accent, that performance was better with greater accent familiarity, but that it was unaffected by listeners' ability to speak Welsh. It is, however, unclear on what grounds listeners made

their decisions and, more specifically, which features they considered indicative of a Welsh speaker's and a non-Welsh speaker's English accent. Study 2 aimed to clarify this question.

3. Study 2: Perceived accentual features

The aim of this study was to determine what accentual features listeners from Wales consider when deciding that someone can or can not speak Welsh (RQ3). To answer this question, we carried out individual structured interviews with the listeners from Study 1.

3.1. Method

Following completion of the accent perception task, the 75 listeners from Study 1 took part in individual structured interviews in which they were asked to identify the specific features that informed their decisions in the experiment, i.e. what marked out Welsh-English bilinguals and English monolinguals in their English accent. Since the purpose of the interviews was to elicit specific accentual features, probing follow-up questions were asked if participants' responses were of a general nature, e.g. if they merely referred to bilingual speakers as having "stronger Welsh accents" or as "articulating more clearly". Moreover, since the participants' description of features was largely non-technical, they were also encouraged to illustrate them on the basis of concrete examples. The interviews were audio recorded in WAV format using a Zoom H2 Handy Recorder with integrated microphone and lasted for an average of 4.03 minutes (SD: 2.17).

In order to identify which features the listeners associated with a monolingual's and a bilingual's English accent, we analysed the interview data using *content analysis* (Krippendorff, 2018). This involved coding and quantifying the participants' responses in terms of relevant categories. In the first instance, comments were coded as referring to *monolinguals*, *bilinguals,* or *both*, and labelled as *linguistic* or *other*. The latter category

included, for example, general statements about the perceived difficulty of the task, or that listeners approached the task by comparing the speakers in the sample with people they knew. Only linguistic comments relating to accentual features in monolinguals and bilinguals were analysed further. These were noted faithfully in terms of the wording used by the participants, and subsequently assigned a broad category label that relates to a particular area of pronunciation, e.g. intonation, rhythm, etc. This was done separately for each comment.

As a measure of reliability, coding was done independently by two phonetically trained coders on 100% of the data. This yielded an agreement score of 93.2%. Divergences between the coders encompassed differences in labelling (e.g. where the same comment was coded differently, e.g. as *vowel duration* or *lexical stress*) or the absence of an entry by one of the coders. All differences were discussed and agreement was reached by consensus.

3.2. Results

A total of 220 comments were coded as referring to accentual features. Of these, 37 referred to monolinguals, 171 to bilinguals, and 12 to both, with the latter category including comments that involved a direct juxtaposition of features. The majority of the participants managed to specify relevant accentual features when prompted, although 4 of the 75 (5.3%) were unable to identify any. Moreover, even though all participants were explicitly asked to comment on the characteristics of both monolinguals and bilinguals, 35 (46.67%) only identified bilingual features, while just 2 (2.67%) only commented on monolingual ones. While 27 (36%) were able to identify at least one monolingual and bilingual feature, or a feature on which the two differ, coded as 'both', in most cases they mentioned several bilingual ones, but only a single monolingual one. These results suggest that the participants had a clearer notion of what characterises a bilingual's English accent than a monolingual's accent.

Table 5 displays the most commonly identified features of a bilingual's English accent, Table 6 the most commonly identified features of a monolingual's English accent. Comments originally labelled as referring to both are included. No differences in the comments between the four listener groups were observed.

[INSERT TABLES 5 AND 6 ABOUT HERE]

The most frequently identified feature in a bilingual's accent was /r/, with comments referring to realisations as being "rolled" or "sounding harder". The alveolar trill or tap is expected in Welsh (Jones, 1984: 49-50) and in the English of bilinguals, at least in predominantly Welsh-speaking communities (Penhallurick, 2007: 162-163). Unsurprisingly, therefore, this comment was mostly accompanied by a word containing an alveolar trill or tap, although there were also a few examples of affricated realisations of clusters, e.g. 'tree' as [ˈtʃi]. These forms were considered exclusive to bilinguals by many, although a few participants suggested they were merely more common in this group. All comments about /r/ in monolinguals referred to the absence of "rolled" realisations. While we interpreted these comments as referring to distinct phonetic realisations of /r/, it is also possible that they were meant to denote rhoticity, although none of the examples given contained post-vocalic /r/.

The second most commonly identified feature in a bilingual's accent was vowel quality. Thus, some maintained that bilinguals produce FACE and GOAT with "more pure vowel sounds", i.e. as monophthongs, while monolinguals realise them as diphthongs. Indeed, Wilson (2014) found monophthongal realisations of FACE and GOAT to be common in his sample of Welsh-English bilinguals although these vowel realisations are not necessarily a contact feature (cf. Penhallurick, 2007: 153; Wells, 1982: 382). Furthermore, in our study monophthongal realisations of SQUARE were considered to be typical of a

monolingual's English accent, e.g. 'hair' realised as [ˈheː]. Several participants also commented on NURSE being realised as a front rounded vowel, e.g. 'heard' as [ˈçjød], although they differed in their assessment as to whether this was a feature of a monolingual's or a bilingual's accent, and on /a/ and /ʌ/ being realised as long central open vowels by bilinguals, e.g. in 'apple' or 'mummy'.

The participants' comments also suggested perceived differences in vowel duration between monolinguals and bilinguals. In their comparison of Welsh, Welsh English, and Southern Standard British English (SSBE), Mennen et al. (under review) found that stressed vowel durations were significantly longer in Welsh and Welsh English (between which there were no significant differences) than in SSBE. It is therefore possible that raters associated longer vowels with a more Welsh-influenced accent. However, the claims made were somewhat contradictory, with some positing that monolinguals produced longer vowels, although most claimed that bilinguals did.

Many comments on bilinguals' speech also referred to word-final consonants as a characteristic feature, in particular /t/ and /d/, but also /s/, which were described as being "more enunciated" or "more precise". The pronunciation of word-final plosives is noted as being heavily aspirated or affricated in Welsh and Welsh English due to language contact (Morris & Hejná, 2019: 16). Wells (1982: 388) also notes that voiceless fricatives are heavily aspirated particularly in traditionally Welsh-speaking areas. In the case of plosives, they were accompanied with examples of aspirated or affricated realisations of word-final /t/, or the use of an epenthetic schwa word-finally. One participant referred explicitly to the addition of a syllable at the end of words as a characteristic of bilingual speakers' accents and illustrated this by realising 'help' as [ˈhɛlpə].

In addition to segments, the participants commented on a number of prosodic features. Thus, many suggested that bilinguals' intonation patterns were more varied with "more of a

lilt" than those of monolinguals, although one participant claimed the opposite, positing that they were "more monotonous". Monolinguals, in turn, were mostly described as having a more monotonous intonation, although one participant stated that they tend to "go up at the end of a sentence". It is well-known that Welsh Englishes are often described as having a varied intonation pattern although such 'sing-song' intonation is not thought to be restricted to the speech of bilinguals (Wells, 1982: 392).

Many comments also referred to lexical stress patterns, with participants stating that there was "more emphasis on the end of words" in bilinguals, while this was absent in the speech of monolinguals. The phenomenon was illustrated by the word 'garden' being pronounced with syllables of roughly similar prominence and the retention of full vowel quality in the second syllable. Moreover, there were a number of comments on differences in speaking rate, but these were contradictory, since some claimed that bilinguals spoke faster, while others thought they spoke more slowly.

Finally, while most comments on monolingual speakers' English accents referred to the absence of features associated with bilinguals, a few features were mentioned whose presence was considered indicative of an inability to speak Welsh. These all encompassed vernacular forms that are not confined to Wales but occur more widely in British English accents (Foulkes & Docherty, 1999; Hughes, Trudgill & Watt, 2013; Wells, 1982). Specifically, the participants mentioned t-glottalling, h-dropping and the use of alveolar nasals for (ing) as characteristic of a monolingual speaker's accent. However, they did not specify any further details, e.g. the range of contexts in which these features occur. Bilinguals, in contrast, were characterised as speaking "more clearly" and as "not dropping their 'h's".

3.3. Discussion

The purpose of Study 2 was to examine what features the participants considered when deciding that someone could or could not speak Welsh. It is important to note at this point that they were not informed about the regional origin of the speakers in the samples. Interestingly, many participants from different parts of Wales were unable to place them geographically, commenting in the interviews on speakers with a "Valley's accent", i.e. originating from the South-Wales Valleys north of Cardiff, or even with a "North Walian" accent.

The results from individual interviews revealed a much larger number of comments on the features of bilinguals than monolinguals. Most of the features noted by participants are said to be contact features influenced by the Welsh language. Moreover, where the speech of monolinguals was discussed, it was mostly described in terms of the absence of the features they considered characteristic of bilinguals. Together, these results suggest that the listeners have a clearer notion of what constitutes a bilingual speaker's English accent than a monolingual speaker's accent. However, it is unclear whether the features listed are indeed a result of individual cross-linguistic transfer, and hence a marker of bilingual status, or part of strongly Welsh-accented varieties of English as used by monolinguals and bilinguals alike. These findings are consistent with the participants' lack of confidence in their decisions on the monolingual samples in Study 1, and their overall poorer identification accuracy on these, in particular when disregarding guesses. How can we explain these findings?

One possibility is that they are task-related. After all, the listeners were asked to indicate in the accent perception experiment whether they thought the speakers in the sample could speak Welsh, and not whether they thought the speakers were English monolinguals. As a result, they may have listened out for the features they deemed characteristic of Welsh speakers, and identified monolinguals based on the absence of these features. However, this does not explain why the interviewees, when explicitly prompted to identify features of

monolingual speakers' English accents, found this difficult. If they had had a clear notion of the latter, it might be assumed that they would have been able to enumerate a greater number of relevant features. A more likely explanation is that they genuinely had a better notion of a bilingual speaker's English accent because its primary (or even exclusive) origin is obvious: the Welsh language. In contrast, there is no obvious alternative source for monolingual accents, except perhaps wider British English vernacular norms, but they are conflated with additional social characteristics.

Finally, it is important to point out that the features identified by the participants in Study 2 may not, or not entirely, coincide with those actually produced by the speakers in Study 1. On the one hand, this is because there may be a range of characteristics that the interviewees did not notice or were unable to verbalise; however, they may also have attributed features to monolinguals and bilinguals that do not stand up to scrutiny. The purpose of our final study was to examine this latter issue.

4. Study 3: Acoustic and auditory analysis of accentual features

The purpose of Study 3 was to determine whether the *perceived* accentual differences between monolinguals and bilinguals are reflected in their actual productions (RQ4). To answer this question, we examined the 48 speech samples from Study 1 in terms of the features mentioned in Study 2, using auditory and acoustic methods of analysis.

4.1. Method

A total of ten measures were taken from the 24 monolingual and 24 bilingual speech samples. Their selection was motivated in the first place by the participants' responses in Study 2. However, we were also constrained by the semi-spontaneous nature of our data and the ensuing variability across the samples. It was, for example, not feasible to investigate

intonation patterns or the acoustic characteristics of lexical stress patterns[4]. Given these constraints, we took the following measures:

[INSERT TABLE 7 ABOUT HERE]

The auditory and acoustic analyses were run in PRAAT software (version 6.0.23, Boersma & Weenink, 2016) by a phonetically trained experimenter. As a measure of reliability, 932 tokens across all measures were subsequently reanalysed by a second phonetically trained experimenter. This yielded an agreement score of 93.5%. Any differences between the two sets of analysis were resolved by consensus.

The segmental features were measured auditorily in the first instance. However, where categorical decisions could not be made unambiguously on that basis, waveforms and spectrographic displays were also consulted. For example, differentiation between glottal /t/ and deleted /t/ was not always unambiguous, and hence we only coded /t/ as *coronal* or *other*, with the latter category including both glottal and deleted tokens.

Our suprasegmental measures, in turn, encompassed an analysis of articulation rate and pitch. Articulation rate was calculated in terms of the number of syllables/ second for each sample (Laver, 1994), as based on manual counts. Note that portions of acoustic silence were removed unless they had phonetic significance, e.g. the closure period for plosives. Our pitch measures involved acoustic analyses of fundamental frequency (f0). First, we calculated the maximum and minimum f0 for each tone unit[5] in PRAAT. The f0 patterns were carefully inspected, and instances of creaky voice and tracking errors were removed from analysis.

[4] We recognise that our data would have allowed some additional measures to be taken, such as vowel duration, and are grateful to an anonymous reviewer for pointing this out.

[5] According to Ladefoged (1993: 109), a tone unit is "the part of the sentence over which a particular pattern of pitch extends". They contain a nucleus and potentially pre-nuclear and post-nuclear syllables (cf. Laver, 1994: 492 for further details).

Using these measures, we subsequently calculated *pitch span.* As in previous work (Ladd, 2008; Ordin & Mennen, 2017), we defined it as the difference between maximum and minimum f0 values for each tone unit, expressed in semitones. Since men have a lower f0 on average than women, we ran separate analyses for each sex.

4.2. Results

Table 8 depicts the results for the phonetic analyses across the monolingual and bilingual samples. Between-group differences for the categorical variables were established via chi-square analyses; independent samples t-tests were used to test for differences on scalar variables.

[INSERT TABLE 8 ABOUT HERE]

Inspection of the table shows that the monolingual and bilingual productions differed significantly on a number of measures. To begin with, bilinguals produced significantly more FACE vowels as monophthongs than monolinguals. Bilinguals also produced significantly more trilled and tapped realisations of /r/ than monolinguals who realised the variable virtually exclusively as approximants. Moreover, the results revealed a significant between-group difference on rhoticity with only bilinguals producing /r/ in syllable rhymes albeit in only six instances. A significant difference between the monolingual and bilingual speakers was also found for (ing) with monolingual speakers being more likely to realise (ing) as [ɪn]. Finally, we found significant differences in pitch, but they were sex-specific. Thus, male bilinguals exhibited a greater pitch span than their monolingual counterparts, with significantly higher f0 (max) values. Monolingual and bilingual women, on the other hand, showed no difference in pitch span.

The remaining measures showed no significant differences between monolinguals and bilinguals. Accordingly, both groups monophthongised GOAT in equal measure, produced coronal and other variants of /t/ in the same way word-medially, word-finally and overall, dropped word-initial /h/ equally, and did not differ in their articulation rate.

4.3. Discussion

The purpose of Study 3 was to examine whether the claims about differences in the English accents of monolinguals and bilinguals in Study 2 are borne out in the samples from Study 1. Overall, the results confirmed many of the participants' perceptions. Thus, the use of trilled or flapped realisations of /r/ in English are indeed suggestive of bilingual speakers, as is the use of rhoticity. At the same time, it is important to note that, as with the monolinguals, the bilinguals predominantly produced approximant realisations of /r/, and their accent is largely non-rhotic. This is perhaps unsurprising given previous work which shows the transfer of trilled and tapped realisations of /r/ and, to a lesser extent rhoticity in the English speech of Welsh-English bilinguals from Welsh-speaking homes (Morris, 2013). Similarly, while the participants' contention that monophthongisation was more common in bilinguals was borne out for FACE, monolinguals and bilinguals monophthongised GOAT in equal measure. Finally, bilinguals were found to exhibit a significantly wider pitch span than monolinguals. This finding is consistent with the participants' comments in Study 2 in that bilinguals' intonation patterns were commonly perceived as more varied while monolinguals' patterns were considered to be "more monotonous". Importantly, however, only males exhibited these differences, while monolingual and bilingual females did not differ in their pitch span.

Next, on the features deemed characteristic of monolingual speakers' English accents, only one, (ing), was confirmed in the analysis of the speech samples. Thus, in line with the participants' claims, the vernacular variant [ɪn] was more prevalent in monolingual

speakers than bilingual speakers. Taken together, the participants' perceptions of differences in the English accents of monolinguals and bilinguals were borne out on many of the measures taken here. However, since most of these are not categorical, perhaps with the exception of rhoticity, they constitute rather subtle cues for the identification of monolinguals and bilinguals and can explain the participants' unexceptional performance in the accent perception task.

On other measures, the participants' contentions were not confirmed. For example, monolinguals and bilinguals were not found to differ in their /h/-dropping patterns or the use of non-coronal realisations of /t/. These findings could be interpreted as suggesting that the participants had unwarranted preconceptions about the English accents of monolinguals and Welsh-English bilinguals. In other words, they may have 'erroneously' attributed features to these groups that do not stand up to empirical investigation of their actual speech patterns.

However, such a conclusion may be premature for a number of reasons. First, while some of the participants' perceptions were not confirmed in the analysis of the speech samples, it is possible that they accurately reflect the characteristics of other monolinguals and bilinguals from the same area, e.g. older age groups. Recall that the speech samples were taken from adolescents in their late teens, while the participants rating them were in their mid-twenties on average. Second, listeners may be aware of differences on certain features and may have mentioned them during the interviews in Study 2, but there were not enough tokens in the samples for these to come out as statistically significant. Third, the measures we took involved some degree of interpretation of the participants' comments and relied on their ability to verbalise what they had heard. Finally, we were only able to examine some of the features mentioned in Study 2, with a range of commonly mentioned ones unexplored, such as lexical stress patterns or rhythm, or more fine-grained analyses of vowel productions. It is

therefore likely that their decisions in the accent perception task were also influenced by features which were not examined here.

5. General discussion and conclusion

The aim of the work presented here was to extend our understanding of accent perception in language contact situations. Specifically, we examined for the first time whether monolinguals and bilinguals from a bilingual area with long-term language contact can be identified on the basis of their majority language accent, and on what grounds these identifications were made. To this end, we investigated the English accents of monolinguals and bilinguals from the same area in South-West Wales across three inter-related studies. The results of Study 1 revealed that Welsh-English bilinguals and English monolinguals can be identified above chance in an accent perception experiment, although performance was unexceptional overall, in particular on the monolingual samples. This suggests that the English accents of the monolinguals and bilinguals from the community investigated must be sufficiently distinct to be discernible. Furthermore, the study showed that identification was better with greater accent familiarity, but unrelated to listeners' ability to speak Welsh. Study 2, in turn, revealed which specific features the listeners considered indicative of monolingual and bilingual speakers' English accents, while Study 3 showed that only some of the listeners' claims are consistent with the production data from Study 1. In what follows, we will discuss the implications of these findings.

To begin with, let us consider why the English accents of the monolinguals and bilinguals exhibited differences. The most obvious source of influence on the bilinguals' English speech patterns is the Welsh language. In other words, they could be a result of individual cross-linguistic transfer, as has been widely documented in previous work on bilingual speech (e.g., Aoyama et al., 2004; Guion, 2003; Mayr & Siddika, 2018; Paradis,

2001). Indeed, it is clear that many of the features attributed to bilinguals' English accents in the present study also occur in Welsh, such as trilled realisations of /r/. At the same time, however, the analysis of the speech samples showed that virtually all of these features also occurred in the speech of English monolinguals from the same area, albeit in different proportions. Since these individuals had only had incidental exposure to Welsh and no productive ability in the language, they are unlikely to originate from individual cross-linguistic transfer. Instead, they appear to be part of the contact variety that emerged from historical language contact between Welsh and English. The listeners' difficulties in differentiating between monolinguals' and bilinguals' English accents therefore need to be understood in terms of a dual influence from Welsh - via historical language contact and individual bilingualism.

At the same time, cognitive and input-based explanations may only be part of the story. Socio-indexical factors also need to be considered. Thus, our previous work on speech productions by 16 to 18-year-old students from a secondary school in West Wales with an English-medium and a Welsh-medium pathway showed no differences in the vowel realisations (Mayr et al., 2017) and lexical stress patterns (Mennen et al., under review) of monolinguals and bilinguals. We argued that the effects of linguistic experience may have been overridden by membership in a homogeneous peer group with shared values (see Nance (2019) for similar results from children attending a Gaelic-medium primary school). In contrast, Morris (2013) found differences in the realisation of /r/ across peer groups from North Wales who differed in their home language use and the values that defined them.

While the monolingual and bilingual participants in the present study did not belong to the same peer group, their English accents may nevertheless have been affected by socio-indexical factors, such as their views of Welshness and/ or the importance ascribed to the Welsh language. Indeed, several previous studies found a strong correlation between positive

attitudes towards these issues and the use of Welsh English features (Bourhis, Giles & Tajfel, 1973; Bourhis & Giles, 1976; Williams, Garrett & Coupland, 1996; but see Wilson & Deuchar, 2017). However, since we did not collect ethnographic/attitudinal data from our participants, we can only speculate at this point about the role of socio-indexical factors. Future research is needed to extend this issue further.

The listeners' evaluations of Welsh Englishes may undoubtedly play an important part in the extent to which they are able to perceive the differences between Welsh-English bilinguals and non-Welsh-speakers in Wales. Previous work on speech production and perception has noted that particularly (so-called) 'Welshy' accents are linked with areas where there is a high proportion of Welsh speakers (e.g. Williams et al., 1996: 189; Wells, 1982: 379). As shown in Section 3.2, the monophthongal realisations of FACE and GOAT, production of trills and taps, rhoticity, and heavily-aspirated productions of plosives and voiceless fricatives are noted as being features of predominantly Welsh-speaking areas whereas other features noted by the listeners were also noted in more anglicised areas of Wales. It seems likely therefore that listeners often used their own perceptions of Welsh-accented English as a proxy for bilingualism. This supports the tendency to perceive some varieties of Welsh English as 'Welsh' and others as 'English' (Williams et al., 1996: 189). Again, further research on listeners' evaluations of different varieties of Welsh English and the influence of the Welsh language thereon would allow us to further examine these claims.

What then are the social consequences of our results? Being able to identify someone as a Welsh speaker on the basis of their English accent may prove useful in conversational interactions and affect behaviour. Thus, in most social contexts involving strangers, English constitutes the unmarked choice (Myers-Scotton, 1993; Myers-Scotton & Bolonyai, 2001). However, if bilinguals realise that their interlocutor speaks Welsh solely by listening to their English accent, they can readily switch languages without requiring any other cues, such as

lexical, metalinguistic or cultural ones. Moreover, since Welsh identity is multi-layered, and the Welsh language constitutes a crucial component within it, knowing that someone is able to speak Welsh may provide critical clues about their social and cultural identity. However, as our results have shown, many individuals were unable to differentiate between monolinguals and bilinguals above chance, and no single listener achieved an overall accuracy score of 80% or more in the accent perception experiment. As a result, accentual features may not always be salient enough for listeners to identify Welsh speakers with confidence, or rule out that individuals they deem monolingual are able to speak Welsh after all.

Finally, it is worth considering whether the monolingual and bilingual speakers' English accents constitute distinct varieties. While there is a substantial body of literature on contact varieties, including recently emerged ones in urban and multiethnic contexts (e.g., Cheshire, Kerswill, Fox, & Torgersen, 2011; Heselwood & McChrystal, 2000; Kirkham, 2011; Kirkham & Wormald, 2015), and those arising from historical language contact, such as English in Wales (Paulasto, 2013; Penhallurick, 2007; Wells, 1982), the concept of a variety has not been widely applied to communities where monolinguals and bilinguals live side by side. According to Hudson (1996: 22), a variety is defined as "a set of linguistic items with similar social distribution", such that specific human speech patterns can be uniquely associated with some external social factor. As such, varieties can be understood broadly and encompass what are conventionally referred to as 'languages', 'dialects' or 'registers'. At the same time, a community in which two or more languages co-exist may be considered a single variety if the linguistic items used have a similar social distribution (Hudson, 1996: 23). In the present context, monolinguals and bilinguals from the same community were found to use different, albeit partially overlapping, linguistic items. To the extent that they are recognisable, these two groups may be said to use distinct varieties. On the other hand, at this

point it is still not entirely clear which specific features or combinations of features can be uniquely associated with monolinguals and bilinguals, and to what extent they hold for other members of the community with different social characteristics, such as middle-aged and older people, or people from different socio-economic backgrounds. Future research is hence needed to build on the work reported here in order to extend our understanding of the factors that affect a speaker's accent in contexts of language contact and individual bilingualism.

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Table 1: *Listeners*

	N	**Gender**	**Mean Age (SD)**	**Origin**	**Welsh proficiency* (self-rated)**	**Language (home)**	**Language (compulsory education)**
BIL-SAME	19	15f;4m	24.47 (6.04)	Carmarthenshire; Swansea	(1): *n*=19	Welsh (*n*=18) English (*n*=1)	Welsh (*n*=19)
BIL-DIFF	20	15f;5m	25.0 (6.25)	Anglesey; Cardiff; Denbighshire; Flintshire; Gwynedd; Merthyr Tydfil; Rhondda Cynon Taff;	(1): *n*=20	Welsh (*n*=19) English (*n*=1)	Welsh (*n*=20)
MON-SAME	15	10f;5m	26.53 (4.12)	Carmarthenshire; Swansea	(3): *n*=7; (4): *n*=3 (5): *n*=5	English (*n*=15)	English (*n*=15)
MON-DIFF	21	20f;1m	24.29 (4.78)	Bridgend; Cardiff; Caerphilly; Monmouthshire; Neath/ Port Talbot; Newport; Rhondda Cynon Taff;	(3): *n*=7; (4): *n*=4 (5): *n*=10	English (*n*=21)	English (*n*=21)

*Ratings: (1)"I'm fluent in Welsh"; (2) "I'm able to speak a fair amount of Welsh"; (3) "I can only speak a little Welsh"; (4) "I can just say a few words in Welsh"; (5) "None of the above".

Table 2. *Mixed effects logistic regression: accuracy*

	ß	***SE***	***z***	***p***
(Intercept)	1.04	0.18	5.78	<0.01
BIL-DIFF	**-0.39**	**0.13**	**-3.13**	**<0.01**
MON-SAME	-0.19	0.14	-1.41	0.16
MON-DIFF	**-0.30**	**0.12**	**-2.43**	**0.02**
MON SAMPLE	-0.39	0.22	-1.75	0.08

Table 3. *Mixed effects logistic regression: confidence*

	β	***SE***	***z***	***p***
(Intercept)	0.54	0.30	1.84	0.07
BIL-DIFF	-0.61	0.39	-1.55	0.12
MON-SAME	-0.19	0.42	-0.45	0.65
MON-DIFF	-0.50	0.39	-1.29	0.20
MON SAMPLE	**-0.49**	**0.15**	**-3.22**	**<0.01**

Table 4. *Mixed effects logistic regression: accuracy & confidence*

	β	***SE***	***z***	***p***
(Intercept)	-0.07	0.29	-0.25	0.80
BIL-DIFF	**-0.76**	**0.33**	**-2.31**	**0.02**
MON-SAME	-0.42	0.35	-1.20	0.23
MON-DIFF	**-0.62**	**0.32**	**-1.92**	**0.05**
MON SAMPLE	**-0.68**	**0.26**	**-2.66**	**0.01**

Table 5: *Perceived features of bilingual speakers' English accent*

Feature mentioned	***Number (%) of participants***	***Example***
/r/	42 (56%)	"… the Welsh speakers were rolling their 'r's a bit more."
vowel quality	27 (36%)	"...those with pure vowel sounds, like 'o', 'a', 'e', were more likely to be Welsh speakers"
speaking rate	27 (36%)	"… it was a faster rate of speech" "… Welsh speakers speak more slowly"
intonation/ pitch	24 (32%)	"… more of a lilt in the way that they spoke" "... it seems to be more monotonous"
vowel duration	23 (31%)	"… those who drew their vowels out more were more likely to be Welsh speakers"
word-final consonants	15 (20%)	"… more enunciating their 't's and 'd's" "... a teethy kind of t"
lexical stress	13 (17.3%)	"… more emphasis on the end of words"
rhythm	6 (8%)	"... different speed between words"
other	6 (8%)	"… pronounces 'h's" "... add in a syllable, so like [ˈhɛlpə]"

Table 6: *Perceived features of monolingual speakers' English accent*

Feature mentioned	***Number (%) of participants***	***Example***
vowel quality	12 (16%)	"... they said [heɪt] rather than [het]"
speaking rate	10 (13.3%)	"... they speak faster"
vowel duration	6 (8%)	"... they tended to hold out vowels for longer"
/r/	6 (8%)	"... they don't have rolled /r/s"
intonation/ pitch	3 (4%)	"... they were going up at the end of a sentence"
t-glottaling	3 (4%)	"... instead of [ðat], they say [ðaʔ]"
lexical stress	2 (2.7%)	"...less emphasis on the end of words"
h-dropping	2 (2.7%)	"... they said 'house' like [aʊs]"
other	2 (2.7%)	"...they say [ˈslipɪn] instead of [ˈslipɪŋ]"

Table 7: *Phonetic measures (Study 3)*

Measures	***N***	***Details***
SEGMENTAL		
FACE	97	Coding of all FACE and GOAT items as
GOAT*	72	monophthongal or diphthongal
/r/	247	Coding of all non-zero realisations of /r/ as approximants (as expected in English) or as 'other' (trills/taps, as expected in Welsh, see Morris 2013).
rhoticity	180	Coding of all instances of word-final /r/ as rhotic or non-rhotic
/t/	206	Coding of all instances of word-medial and word-final /t/ as coronal or other
/h/	287	Coding of all word-initial /h/ tokens as pronounced or not pronounced
(ing)	46	Coding of all (ing) tokens as [ŋ] or [n]; no instances of [ŋg]
SUPRASEGMENTAL		
articulation rate	2866 syllables	Average syllable/ second rate identified for each sample; portions of acoustic silence were removed
f0 (min)	211 tone units	Minimum fundamental frequency (f0) in Hertz identified for each tone unit
f0 (max)		Maximum fundamental frequency in Hertz identified for each tone unit
pitch span		Difference between maximum f0 and minimum f0 in semitones calculated for each tone unit

*The samples did not contain enough SQUARE tokens for analysis

Table 8: *Results for monolingual and bilingual samples on phonetic measures*

Measure	*Monolingual*		*Bilingual*		*Difference*
SEGMENTAL					
monophthongisation					
ALL	*monophthong* 28 (38%)	*diphthong* 46 (62%)	*monophthong* 38 (40%)	*diphthong* 57 (60%)	χ^2= 0.082, *p*= .775
FACE	6 (15%)	35 (85%)	19 (34%)	37 (66%)	*χ^2= 4.606, *p*= .032
GOAT	22 (67%)	11 (33%)	19 (49%)	20 (51%)	χ^2= 2.349, *p*= .125
/r/	*approximant* 135 (98%)	*other* 3 (2%)	*approximant* 78 (72%)	*other* 31 (28%)	*χ^2= 35.395, *p*<.001
rhoticity	*non-rhotic* 94 (100%)	*rhotic* 0 (0%)	*non-rhotic* 80 (93%)	*rhotic* 6 (7%)	*χ^2= 6.784, *p*= .009
/t/	*coronal* WM: 27 (84%) WF: 52 (67%) All: 79 (72%)	*other* WM: 5 (16%) WF: 26 (33%) All: 31 (28%)	*coronal* WM:14 (100%) WF: 64 (78%) All: 78 (81%)	*other* WM: 0 (0%) WF: 18 (22%) All: 18 (19%)	χ^2= 2.454, *p*= .117 χ^2= 2.60, *p*= .11 χ^2= 2.516, *p*= .113
/h/	pronounced 141 (87%)	dropped 22 (13%)	pronounced 109 (88%)	dropped 15 (12%)	χ^2= .123, *p*= .726
(ing)	[ɪŋ] 2 (7%)	[ɪn] 25 (93%)	[ɪŋ] 11 (58%)	[ɪn] 8 (42%)	*χ^2= 14.021, *p*<.001
SUPRASEGMENTAL					
articulation rate	4.31 syll/ s (SD: 0.52)		4.01 syll/s (SD: 0.58)		*t*(46)= -1.899, *p*=.064
f0 (min)	*Women*: 157.39 Hz (SD: 45.43)		*Women*: 141.28 Hz (SD: 38.97)		*Women*: *t*(112)= 1.8, *p*=.074
	Men: 87.79 Hz (SD: 11.76)		*Men*: 83.93 Hz (18.36)		*Men*: *t*(83.24)= 1.24, *p*=.22
f0 (max)	*Women*: 295.61 Hz (SD: 38.37)		*Women*: 281.02 Hz (SD: 28.95)		*Women*: **t*(112)= 1.99, *p*= .049
	Men: 116.59 Hz (SD: 12.33)		*Men*: 160.18 Hz (42.66)		*Men:* **t*(84.67)= -7.63, *p*<.001
pitch span	*Women*: 7.45 ST (SD: 2.66)		*Women*: 7.89 ST (SD: 2.67)		*Women*: *t*(112)= -.78, *p*=.438
	Men: 4.85 ST (SD: 0.58)		*Men*: 7.32 ST (SD: 3.01)		*Men*: **t*(75)= -6.41, *p*<.001

Note: WM= word-medial; WF= word-final.

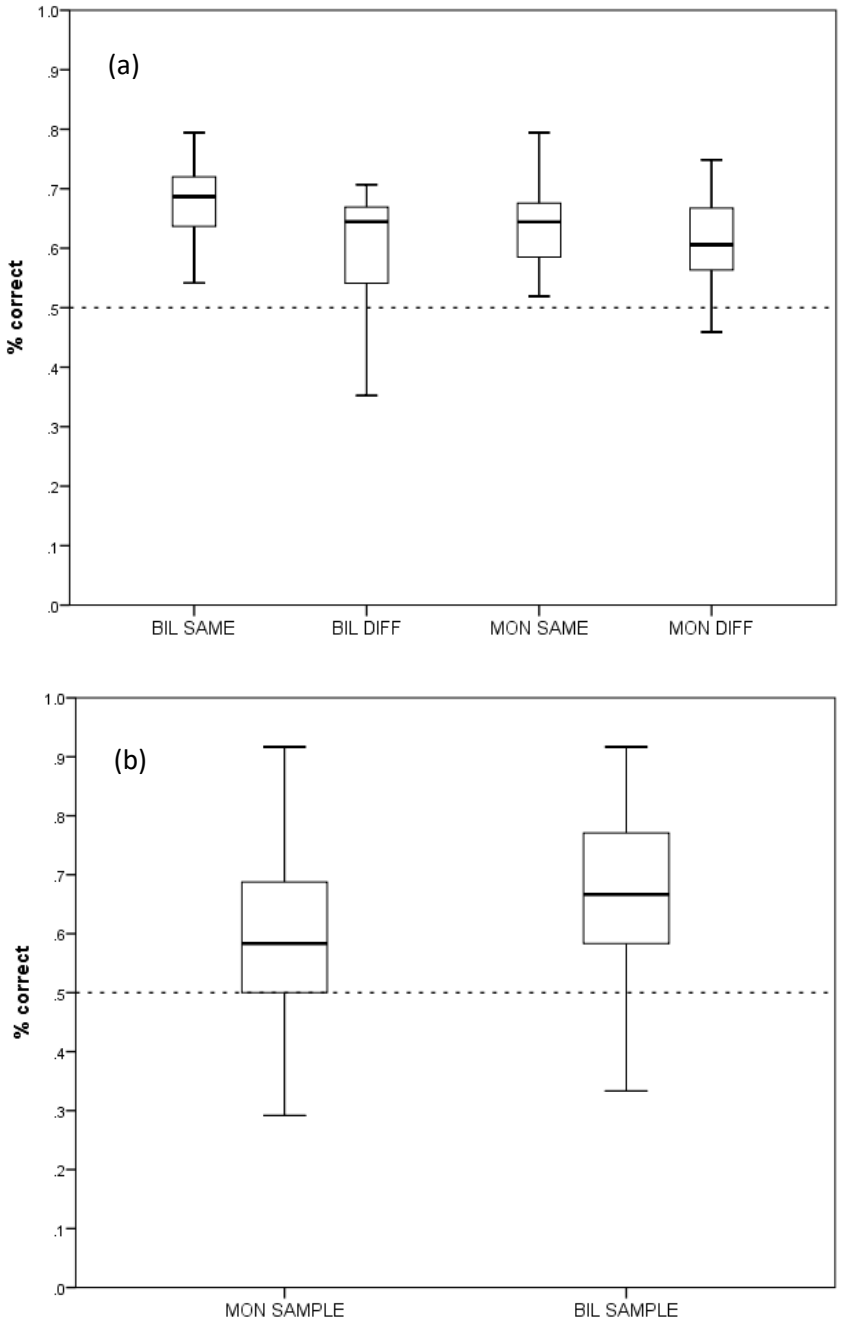

Figure 1. *Percent accuracy by group (a) and sample (b); broken line denotes 50% chance level.*

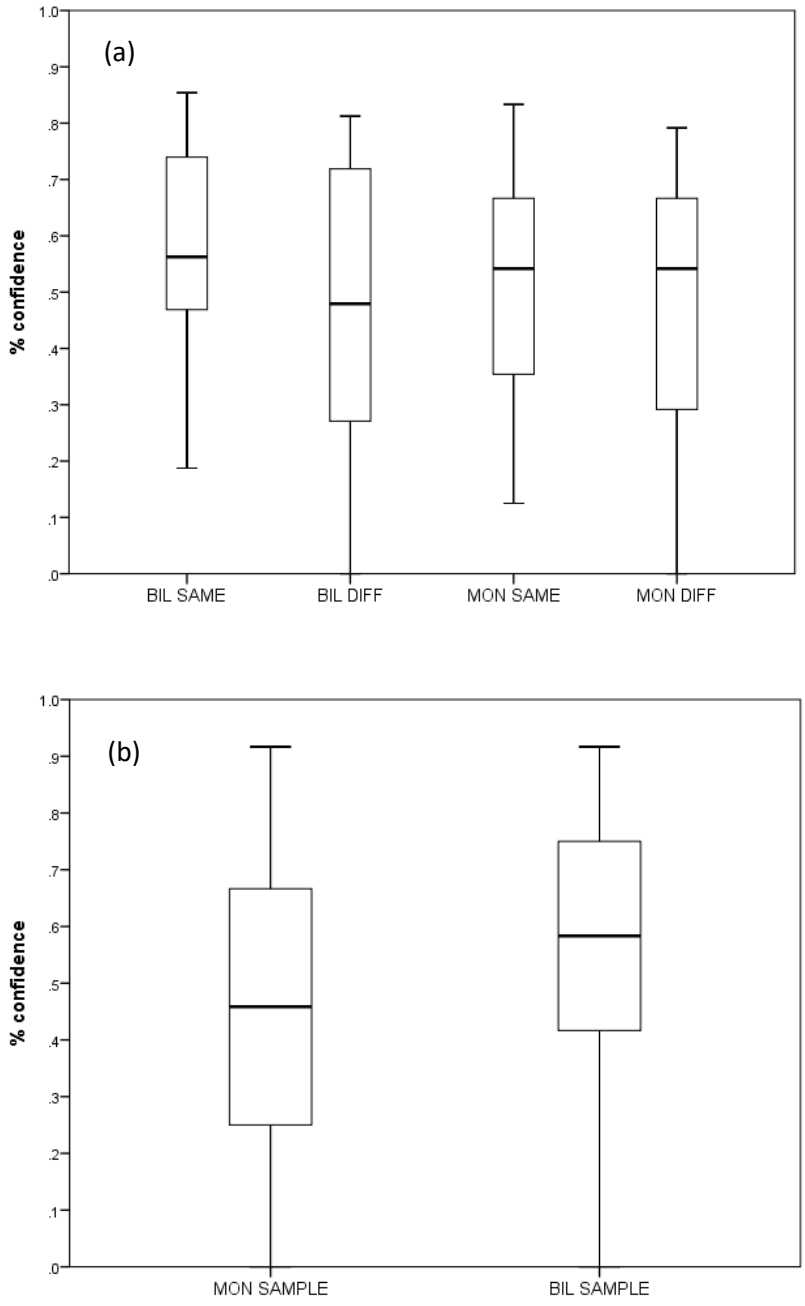

Figure 2. *Percent confidence by group (a) and sample (b).*

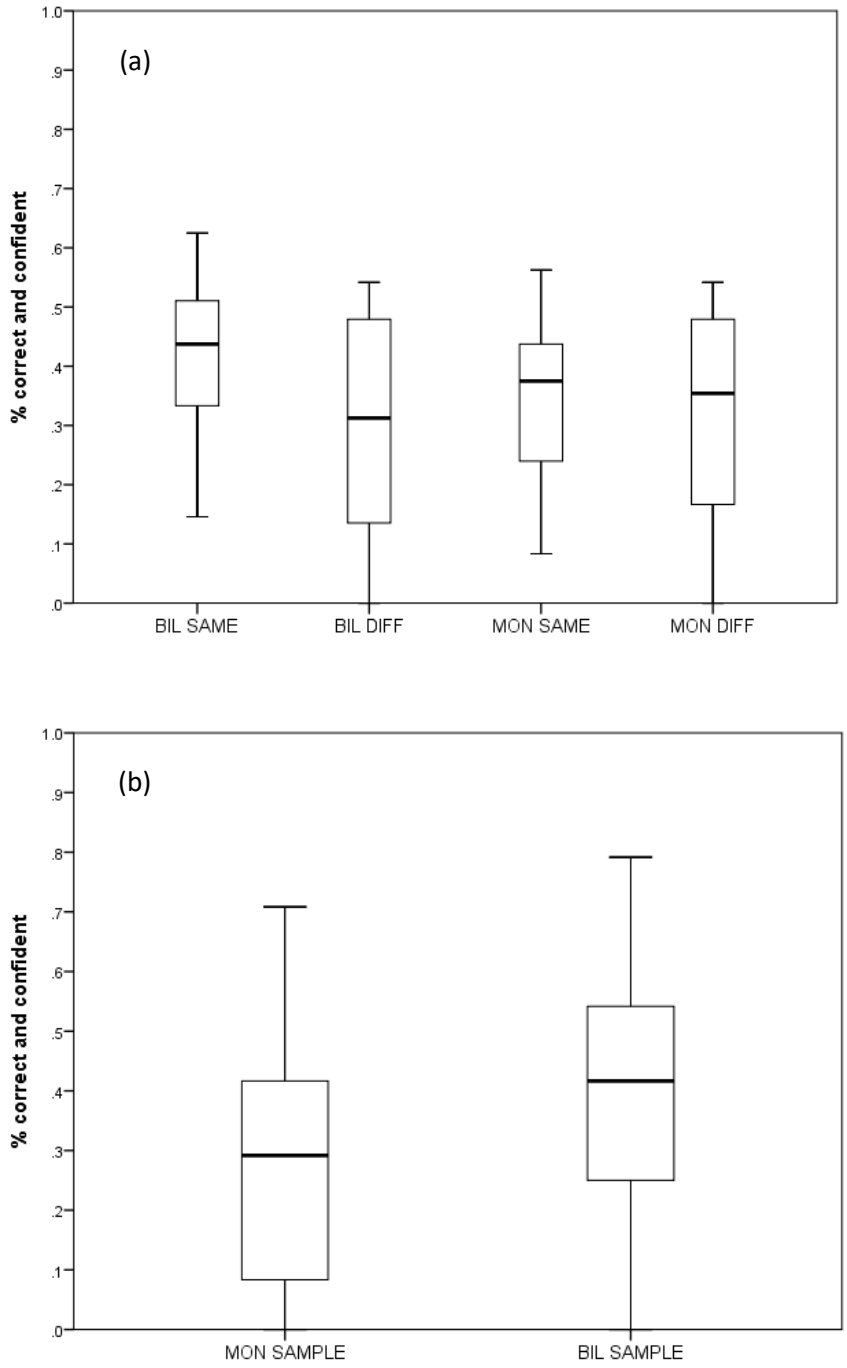

Figure 3. *Percent accuracy with confidence by group (a) and sample (b).*