A SOCIOPHONETIC ANALYSIS OF VOWELS PRODUCED BY FEMALE IRISH MIGRANTS: INVESTIGATING SECOND DIALECT CONTACT IN MELBOURNE

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ABSTRACT

We present preliminary results of an acoustic analysis of monophthongal vowels produced by five female Irish migrants in Melbourne, with lengths of residence in Australia between 1.5 and 9.5 years. This sample is compared with five female Australian English (AusE) participants. Results show greater overall variability within the Irish group compared to the AusE group for the majority of vowels. Sociophonetic variability also emerged, for example with only two migrants producing an expected Irish English FOOT-STRUT merger. One 'non-merger' with the longest length of residence, and a social network comprised exclusively of Australians, also displayed initial signs of movement towards other AusE vowel targets, such as a fronted /ʉː/. This research contributes to our understanding of the dynamics of dialect contact, indicating movement in the direction of AusE after approximately ten years of exposure.

Keywords: vowels, Irish English, Australian English, sociophonetics, second dialect contact.

1. INTRODUCTION

There is a long history of Irish migration to Australia, with a recent 39% increase in Irish-born people between 2006 and 2014 [1]. While the sound systems of both Irish English (IrE) and Australian English (AusE) have been well described (see [17] for an auditory description of IrE; [7, 9] for acoustic phonetic descriptions of AusE), little is known about sociophonetic outcomes of contact between these dialects. This is despite the fact that Second Dialect Acquisition (see e.g. [22, 26]) has been found to occur among children [27], adolescents [4, 25] and adults [10, 23] in other cross-dialect situations.

Vowel mergers have been shown to be a compelling point of investigation in second dialect contact, which is the focus of our study. Whether or not vowel mergers can be 'split' following sustained exposure to a dialect that maintains a contrast can reflect "complex interactions of linguistic, social, and developmental factors" [22]. Nycz [23] examined the capability of Canadians in New York City to split LOT and THOUGHT (lexical sets will be used henceforth in this paper for comparability across varieties), showing length of residence (LoR, i.e. exposure) to be a significant predictor of unmerging. However, findings showed extensive individual variability: not all speakers made categorical shifts, and could exploit merged or unmerged variants for stylistic purposes. Sankoff [25] found that Northern British English speakers who moved to the south of Britain exhibited unmerging of their native FOOT-STRUT merger after a number of years, but their realisations of these vowels were not identical to that of Southerners.

IrE typically exhibits a merger between FOOT and STRUT (see [11] for Republic of Ireland (RoI); [19, 20] for Dublin English), with some exceptions reported only for older, working class Dubliners [16]. Despite little acoustic phonetic work on IrE, recent work shows entrenchment of the FOOT-STRUT merger among younger populations in Dublin [20], and the variety there is reported to have a 'supralocalising' effect on younger speakers across RoI [17]. Thus, it can be more or less reliably stated that the merger is a feature of present-day IrE, and that presence of a contrast among Irish migrants exposed to AusE, which has a robust FOOT-STRUT distinction [6], could be taken as an outcome of second dialect contact.

The present study investigates whether Irish migrants (native speakers of IrE) begin to unmerge FOOT and STRUT following AusE exposure. By investigating F1/F2 vowel spaces, the study also describes other vowel realisations among these speakers that could be due to second dialect influence. These include the fronting of NURSE and GOOSE (AusE has a fronted GOOSE compared to other English varieties, including RoI [7]); and unmerging of TRAP and BATH. The study is part of a wider project with a range of participants and data types.

2. METHOD AND ANALYSIS

2.1. Participants

There were ten participants in the present study: five female Irish migrants residing in Melbourne; and five female native AusE speakers, born and raised in

Melbourne (average age 31; *SD*=5). The Irish migrants came from small towns and villages across different counties in RoI (see Table 1). One speaker (IE_012) was bilingual in Irish (Gaelic) and English.

Table 1: Irish participants by county, age, LoR.

Participant	County of origin	Age	LoR (yrs;mths)
IE_001	Wicklow	34	9;6
IE_010	Louth	29	4;5
IE_012	Galway	31	4;0
IE_013	Westmeath	31	1;8
IE_009	Limerick	33	1;6

Among the AusE speakers, one (AU_025) had Irish parents (one from RoI, one from Northern Ireland–NI). Her data was retained for comparative purposes in the study. The remaining four AusE participants reported Australian lineage with an "Australian accent" for both parents. A background questionnaire also asked respondents about the composition of their social networks (following [19]), instructing them to list the six people they see most on a daily basis, with their respective places of origin.

2.2. Materials and procedures

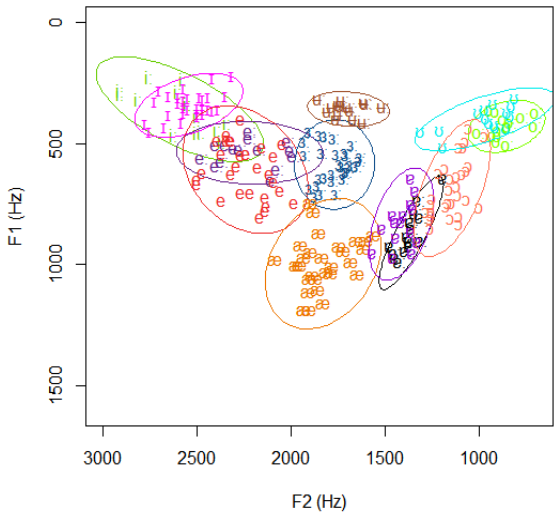
A wordlist of 54 items containing AusE monophthongs was elicited from speakers via a laboratory-based recording with three repetitions. From this, 17 words in /hVd/, /hVt/, /bVd/ and /bVt/ contexts were extracted, resulting in 51 tokens per speaker, and a total of 510 tokens in the present analysis, across both speaker groups. Wordlist recordings were automatically segmented via WebMAUS [18], using the AusE model. Phonemic segment boundaries in the output TextGrids were checked and manually corrected in Praat [3]. Any rhotic realisations from the IrE speakers were also treated manually, using auditory and acoustic measures to best estimate the segment boundaries. F1 and F2 formant data were extracted and plotted using the emuR [32] package in RStudio [24], with formant tracking errors manually corrected in the Emu WebApp [31]. Vowel targets were calculated by finding the point at which either F1 or F2 was highest or lowest (depending on the most relevant feature of each vowel—see [13]), then matching the other formant's data to that point, limiting this process to the first half of each segment. Only static measurements were taken; dynamic measures will be used in future research. Descriptive statistics (due to the small size of the dataset), specifically Euclidean distances, were used to determine distance between speakers' FOOT vowels, using the *euclidean* function in emuR [32].

3. RESULTS

3.1. Acoustic results: AusE participants

Fig. 1 shows an F1/F2 vowel space for all five AusE participants (the acoustic data henceforth has not been normalised to emphasise inter-speaker variability). The vowel space shows relatively little variability, in the sense that the ellipses are relatively small and not overlapping in unexpected ways for AusE. This is unsurprising considering the homogeneity of the grouping, and was an intentional part of the research design, in the sense that these speakers should provide a benchmark against which the IrE speakers could be compared. However, it is worth noting that the GOOSE vowel is more central than what has been found in previous studies from Sydney [5, 9], where GOOSE is more front, but aligns with findings from Melbourne [2]. The visible variation in the centroids of the FOOT target are due to AU_025 (who had Irish parents—see §2.1), with a FOOT that was more central than the other AusE speakers, resembling the FOOT of the IrE speakers in Fig. 2. She also exhibited rhoticity in certain contexts, suggesting further IrE influence, although her STRUT and FOOT were not merged, as is typical for AusE [5, 9]. Otherwise, Fig. 1 represents a relatively expected, unremarkable AusE vowel space.

Figure 1: AusE female F1/F2 vowel space: all points with ellipses.

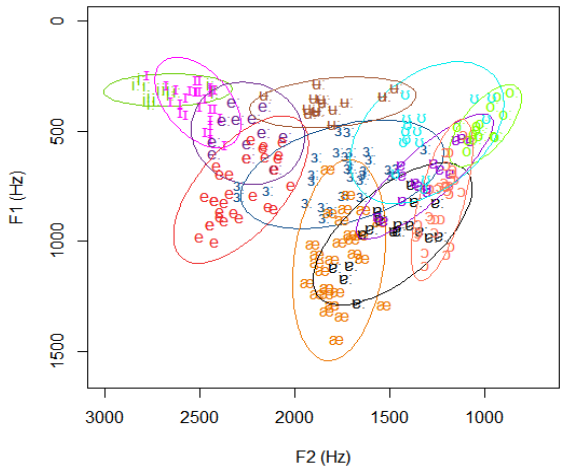


3.2. Acoustic results: IrE participants

Fig. 2 shows an F1/F2 vowel space for all Irish participants. It shows considerable variability with relatively large and overlapping ellipses. However, as compared to Fig. 1, there is less variability for

FLEECE; this could be due to the fact that IrE FLEECE is monophthongal; whereas FLEECE in AusE is highly variable, with varying degrees of onglide and in many cases a diphthongal quality [8, 9, 12, 30]. Despite the fact that only targets were extracted for the vowels (see §2.2), the diphthongal nature of the vowel dynamics for AusE FLEECE affects the target: for some speakers, a centring quality is evident (Fig. 1).

Figure 2: IrE female F1/F2 vowel space: all points with ellipses.



With respect to GOOSE, Fig. 2 shows that for the Irish participants, the variant is not fully back, with some evidence of centralisation, reflecting what has been reported for IrE's "conservative" behaviour with respect to GOOSE fronting [11]. However, there is one highly fronted participant (IE_001), and two speakers who have non-centralised realisations, e.g. IE_009 whose FOOT and GOOSE are very close in acoustic space, but auditorily clearly distinct. GOOSE is typically not front for speakers from IE_009's region of origin in Ireland (south-west), in contrast with what is known for speakers from NI, or the NI-RoI border [14], which was the case for IE_010, who had a more front GOOSE as compared to three of the other participants (009, 012, 013).

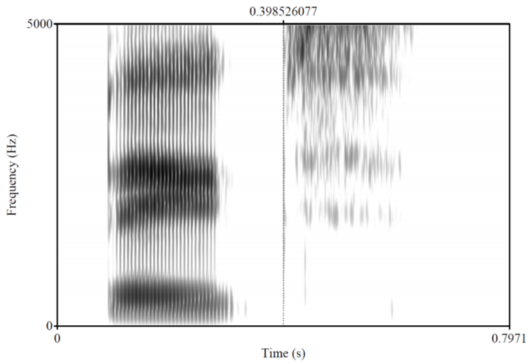
The NURSE vowel is clearly traversing the vowel space in Fig. 2, with variability in the height of NURSE, and a number of tokens are quite fronted, especially for IE_010. This could be an influence of AusE, with some similarity to be observed with Fig. 1, where NURSE is more front; however, this same participant had a high degree of similarity between her NURSE and SQUARE vowels, which is potentially a reflection of the NURSE-SQUARE merger in Northern IrE [21], bearing in mind that she originates from a border area. Other participants, such as IE_001 and IE_009, have more back realisations of NURSE. It should also be noted that some participants have a distinction between their TRAP and BATH vowels, which could be an influence of AusE, but could also reflect the fact this distinction is itself regionally variable in IrE [15].

3.3. The FOOT-STRUT merger

Initial auditory impressions (video data was not recorded) of FOOT and STRUT revealed that IrE FOOT was less rounded than in the AusE dataset, but had a more rounded STRUT. Fig. 2 exhibits no consistent FOOT-STRUT merging, with only two participants (IE_010; IE_013) merging acoustically and auditorily. Their merger behaviour was also not identical. IE_010's FOOT was lowered and centralised, and auditorily less rounded than for other participants, contributing to lower formant values. IE_013's STRUT was rounder and backer than that of IE_010, but she also had a central FOOT. Among the non-mergers, IE_009 had overlap between FOOT and GOOSE, and along with IE_012, had a STRUT closer to LOT. IE_001 also had no merger evident acoustically. Auditory analyses for IE_012 and IE_001 indicate their vowels were kept distinct due to unrounding, and potential backing and fronting, of FOOT (see [28] on unrounding in English varieties). FOOT unrounding was also observed among AU_007.

Regarding dynamics, two of the non- FOOT-STRUT mergers (IE_012; IE_001) had an onglide for GOOSE, with a diphthongal quality. Fig. 3 shows IE_001's third of three realisations of *boot*.

Figure 3: Spectrogram (Praat) of production of *boot* (IE_001). Dynamically moving formants (F2, F3) at the onset of the vowel show a clear onglide.



The consonants are unremarkable in the sense that a phonetically voiceless /b/, and a heavily affricated /t/ both occur in IrE [17] and AusE [6]. The vowel /u/ shows a relatively strong onglide in F2, which is most likely not a feature transferred from AusE, where it has been reported to occur only in broader varieties (see e.g. [12]). In more mainstream AusE, and in more recent research on vowel dynamics, relatively little F2 movement is seen in vowel trajectories for AusE /u/ ([9]. This indicates further nuanced differences between the groups beyond

acoustics, illustrating the importance of incorporating dynamics into future research.

Overall, IE_001 appeared to be the participant with the most influence from AusE. This is evident in Fig. 4, showing her vowel space overlaid with the mean AusE vowel centroids from the present study. Her raised STRUT remains typical of IrE, but her backed FOOT suggests AusE influence. Her highly fronted GOOSE (§3.2) was even fronter than the average Australian in the study. In casual conversation, she had a notable Australian influence on her accent, and commented on this overtly. Of all participants, she had spent the longest time in Australia (9;6) and reported 100% of her social and (new) familial network to be comprised of Australians.

Figure 4: F1/F2 vowel space for IE_001 (blue) overlaid with mean AusE vowel targets (black).

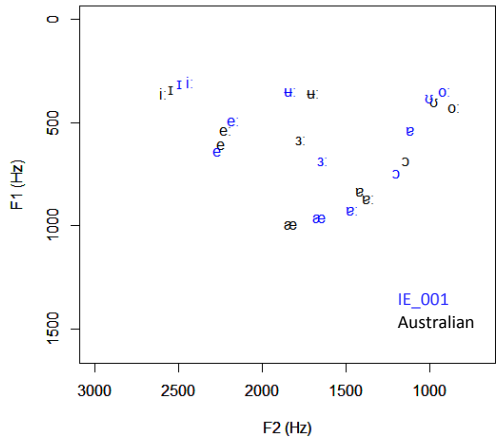


Table 2 reports Euclidean distances showing IE_001's FOOT centroid to be closest to the mean AusE group centroid (the smaller the number, the closer the centroid to the AusE centroid), resulting in her FOOT and STRUT occupying distinct positions in the vowel space. While not mirroring AusE FOOT and STRUT exactly, IE_001's FOOT is somewhat atypical of IrE, suggesting some minimal influence of AusE.

Table 2: Euclidean distances of IrE FOOT speaker centroids to AusE FOOT group centroid.

Speaker	Mean (Hz)	*SD*
IE_001	65.08	25.25
IE_009	417.81	50.97
IE_010	511.84	58.11
IE_012	442.21	40.72
IE_013	429.90	33.34

4. CONCLUDING DISCUSSION

The present study has shown greater overall variability in production of vowels by a group of Irish migrants residing in Australia as compared to an age-matched group of native AusE speakers. This was found particularly for the GOOSE, NURSE, TRAP and BATH vowels, where there were also high degrees of inter-speaker variability. This is unsurprising considering these migrants have spent a considerable amount of time away from their native dialect area, but also the fact that they come from different dialect areas in Ireland. It is challenging to disambiguate the effect of second dialect contact from native dialect variability, although it can be expected, and hypothesised in future work, that both have a combined influence.

A baseline comparison for IrE was an issue in this study due to the lack of quantitative, acoustic phonetic descriptions of IrE (with the exception of [11, 19, 20], which are relatively small scale). Changes underway for English dialects concurrently, such as unrounding of FOOT (see e.g. [28]) also present challenges in pinpointing reference points for the 'target' dialect (AusE), particularly when comparing with mobile speakers (see [23]). Further challenges emerge when variability is present in the target dialect, such as centring of /i:/ in AusE. Other effects, such as second-generation migration (AU_025), result in variable input for Irish speaker-listeners (see [29]).

To address some of these issues, future work will record a baseline sample of IrE speakers in Ireland and will also focus on Irish migrants in Australia originating from the same dialect area. Ongoing research will also incorporate dynamic analyses, and triangulate acoustic, articulatory and perceptual patterns, since the same participants in the broader study undertook a studio-recorded sociolinguistic interview, a perception task, and laboratory-based recording of a wordlist with simultaneous ultrasound tongue imaging.

This preliminary analysis suggests nonetheless that Irish migrants, particularly those with longer LoRs, may be influenced by contact with a second dialect, which is reflected in their variability in the direction of AusE. This includes movement away from established features of IrE, such as the FOOT-STRUT merger, or movement towards the fronting of GOOSE, although this study indicates that this feature may be less established for Melbourne speakers than for Sydney speakers [5, 9]. In documenting a previously undescribed cohort of speakers (Irish migrants in Australia), the present study has elucidated nuanced and complex findings warranting further investigation, so that we may better understand sociophonetic processes associated with dialect contact.

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