Short vowels in L1 Aboriginal English spoken in Western Victoria

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Abstract

This paper analyses the short vowel system of L1 Aboriginal English speakers from Western Victoria, as well as prelateral front vowels (in light of a merger of /el/-/æl/ in the region). The aim is to describe the short vowel system of this variety, and to explain the results of an earlier perception task carried out with the same speaker-listeners. Results show that such vowels tend to be closer (higher) and this variety of Aboriginal English has a "compressed" vowel space relative to mainstream Australian English speakers in the same area, especially with a higher /æ/ (most evident for female speakers), and a more back /ʉ:/ (restricted to male speakers). Prelateral vowels in /el/-/æl/ contexts are completely merged, showing that this phenomenon is more entrenched for Aboriginal English speakers than for the mainstream Australian English speakers in the same region.

Index Terms: Aboriginal English, vowels, prelateral merger

1. Introduction

1.1. Australian Aboriginal English

Before European colonisation in 1788, a rich variety of languages and dialects were spoken by Aboriginal people. Currently only approximately 90 remain, and only 20 are regularly spoken [1]. One of the effects of the decline in Indigenous languages is the widespread use of English by Aboriginal Australians. Latest estimates are that 83% of Aboriginal people now speak only (Australian Aboriginal) English at home [2]. Compared with mainstream Australian English, Aboriginal English is described as being characterised by differences in grammar, semantics, pragmatics, phonetics and phonology. The sound system and pronunciation of Aboriginal English is known to range from very similar to the mainstream ('light / acrolectal' Aboriginal English) to very divergent ('heavy / basilectal') with the latter having a relatively different sound system. Speakers themselves can also vary their speech depending on situation and audience [3,4].

While researchers talk about Aboriginal English as a unique variety (or group of varieties), little descriptive work has been done on the phonetic and phonological differences between the lighter acrolectal L1 Aboriginal English and mainstream Australian English. The focus of our paper is to present an initial description of the L1 Aboriginal English short vowel system from one specific region of Victoria (Warrnambool and surrounds, in the west of the state).

1.2. Aboriginal English vowels

The most comprehensive account of the phonetics/phonology of Australian Aboriginal English vowels [4,5] reports that the vowel system and vowel space can be much smaller than that found in the mainstream variety, and, more generally, that differences between Aboriginal varieties and the mainstream are less evident in more acrolectal varieties. In [5], a vowel space of female L2 Aboriginal English is presented and compared to the same vowels in mainstream Australian English. For the Aboriginal English speakers in that study, all vowels are closer (higher) than the mainstream, and the space is also more compressed in the F1 / F2 dimension, resulting in a smaller space overall.

Another study which has similar findings compares the acoustics of vowels by a group of mainstream Australian English speaking females from Katherine (NT) with English source vowels of the neighbouring Gurindji Kriol, which, with respect to grammatical features, is described as a mixed language [6]. Low vowels /æ/ and /ɐ/ are relatively close (high) compared to the local mainstream variety, and /ʉ:/ is less front. In particular, the extent of /æ/ raising is of note in Gurindji Kriol, and in that variety there is some degree of overlap between /e/-/æ/. Both [5,6] compared mainstream Australian English vowels with vowels spoken by a small number of female L2 English speakers from the Northern Territory (4 speakers in [5], 5 speakers in [6]). In [5], differences between mainstream Australian English and Aboriginal English (especially /æ/ lowering and /ʉ:/ fronting in the former) are discussed and are said to be the result of relatively recent changes that have occurred only in the mainstream variety. It appears, then, that the short vowel system, as well as the long vowel /ʉ:/, could be an important source of varietal difference.

1.3. Australian English in Western Victoria: linking production and perception

The analysis of Aboriginal English vowels in Western Victoria needs to be contextualized with respect to ongoing research on English spoken in this region. It has been previously documented that there is a vowel merger in the short vowel system where /e/ -> [æ] prelaterally [7, 8, 9]. For mainstream Australian English speakers, this merger is regionally specific to southern Victoria, occurring in Melbourne and Warrnambool (and not, for example, in Albury-Wodonga in the north). Focusing on a group from Warrnambool, we have found that the merger occurs in production and perception, and that it is "incomplete" – some speaker-listeners merge /el/-/æl/, and some keep the vowels distinct [8]. This work has also shown that production and perception are linked but not perfectly aligned, with participants who merge in production more likely to do so in perception. Additionally, there is a significant difference in how people respond to the task depending on their age, which has been analysed as a result of accent changes in the short vowel system.

This merger has been previously analysed as perceptually

motivated lowering; /el/->[ɛɬ]->/æl/ [7,8]. It is phonetically interesting for many reasons, one being its relationship to the short vowel system and why it occurs in Victoria but not other regions in Australia. The decision to include Aboriginal English speakers from Warrnambool in ongoing work began in order a) to understand how other speaker groups in Victoria respond to sound changes in the mainstream accent, and b) to include Aboriginal people in the discussion of what it means to speak and perceive English in Australia. This is especially important in cases where traditional languages are no longer used, such as in Warrnambool where earlier ancestral languages have not been spoken for a number of generations, and little is known about the current speech patterns of this community.

The perception task used is a two-alternative forced-choice identification task with various 7-step vowel continua (varying in equidistant F1-F3 steps) [9]. Most important here are the control *het-hat* and *hell-Hal* conditions, which allow us to focus on how well listeners distinguish /e/-/æ/ in control and prelateral conditions. In the current study, as well as analysing the short vowel system, the production of vowels by this Aboriginal English group is investigated with a view to finding an explanation for the perceptual results reported in [9]. To date, we have seen that listeners from southern Victoria (Warrnambool, Melbourne) have trouble distinguishing /el/-/æl/ [7,8,9], while those in the northern border regions do not. The Aboriginal English listeners responded differently from mainstream Australian English listeners in the same region, with a preference for *hat* over *het* in the control condition, and a complete preference for *hell* in the merger condition [9]. While this may be in part due to lexical frequency of the items, we also need to understand the acoustics of the vowels for these speakers in production. Therefore, the aims of this paper are:

1. To describe the short vowel system of Australian Aboriginal English spoken in Western Victoria (/hVt/ vowels); and,
2. To determine whether these speakers merge /el/-/æl/ in production (/hVl/ vowels).

2. Method and Materials

2.1. Speakers and data.

Speech and perceptual data were collected by the first author in 2015 in Warrnambool and surrounding regions. 22 speakers (12 males, 10 females) with a mean age of 34 (range 19 – 65, *sd* 14.3) took part in the study. All participants in the study self-identified as Aboriginal and recognised that the study was about Aboriginal English. Speakers were sourced from two locations in Warrnambool – in the central township as well as Framlingham, which is an Aboriginal trust (once a mission) approximately 30 km from the Warrnambool city centre. Some speakers were also sourced from Heywood which is 95 km from Warrnambool city centre and approximately the same distance from Mt. Gambier. Participants included both Gunditjmara people (Warrnambool, Framlingham) and Gunditj Miring people (Heywood). Recordings were made in public spaces in the Aboriginal co-operatives in Warrnambool and Heywood, and in the health centre at Framlingham.

In all, the participants took part in a number of experimental tasks which involved questionnaires, a perception experiment (described fully in [8]) and speech recordings (wordlist and semi-spontaneous). Speech was recorded using a Zoom Handy Recorder H4n. This study focuses on the wordlist, which contained 6 repetitions of each vowel in various /hVt/ contexts (the *control* condition) and /hVl/ (the *merger* condition), and here we analyse /ɪ e æ ɐ ɔ ʊ ʉ:/ for the control, and the front vowels /ɪ e æ/ prelaterally. We also include the long vowel /ʉ:/ in our analysis because it is a key variable in varieties of Australian English (as discussed in 1.2). Its position in the vowel space of L1 Aboriginal English, relative to /ʊ/, is accordingly of interest. We note that the variety of Aboriginal English spoken by the participants in this study sounds (largely) impressionistically not the same as mainstream Australian English, although there is of course variation depending on the speaker.

2.2. Analysis procedure.

Data were transcribed orthographically by the fifth author. Sound and text files were automatically segmented using WebMAUS Multiple for Australian English, and a database was built for analysis in EMU/RStudio [10, 11].

In this first description of vowels by this group of speakers a static as opposed to dynamic analysis measure was used to enable comparison with earlier research on vowel spaces in Aboriginal English [5,6]. Static formant measurements at vowel targets were extracted, and the data were modelled using linear mixed effects structures in the *lme4* package in the *R* statistical environment, with separate models built for F1 and F2 per sex. For each model, we set speaker and repetition as random intercept factors. After building a maximally specified model, with PHONEME, following consonant (POSTC), AGE, and education level (EDU) as fixed factors (including all possible interactions), backward elimination of non-significant effects was performed using the R package *lmerTest*.

3. Results

3.1. Vowels in control /hVt/ context

The short vowel spaces, showing centroids derived from the mean F1/F2 measurements for the short vowels (and /ʉ:/), are shown in Figures 1 (female) and 2 (male).

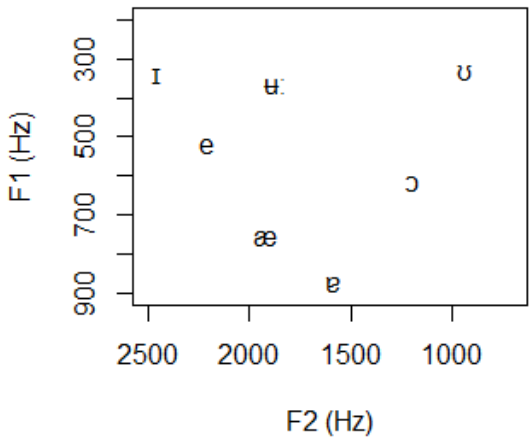

Figure 1. *Vowel targets (control, /hVt/): female speakers*

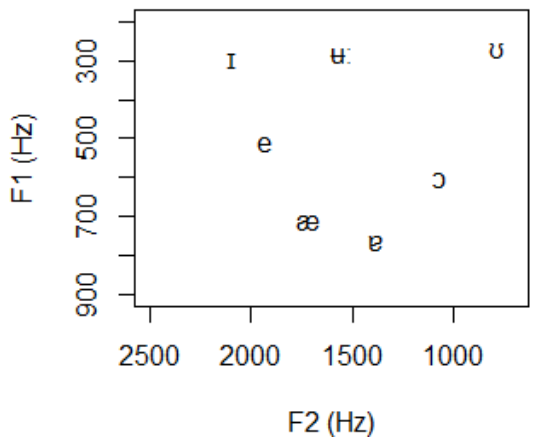

Figure 2. *Vowel targets (control, /hVt/): male speakers*

3.2. Prelateral short front /hVl/ vowels

For prelateral vowels, results are shown in Figure 3 for the female speakers, and in Figure 4 for male speakers, with ellipses for /ɪl/, /el/ and /æl/ overlaid on the centroids shown previously in Figure 1. The centroids for the prelateral words are written orthographically to better show how they correspond with the relevant control vowel.

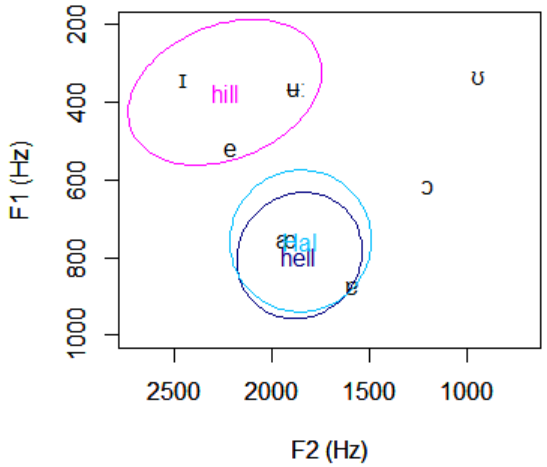

Figure 3. *Vowel targets (control) vs. front vowel targets and ellipses (prelateral): female speakers*

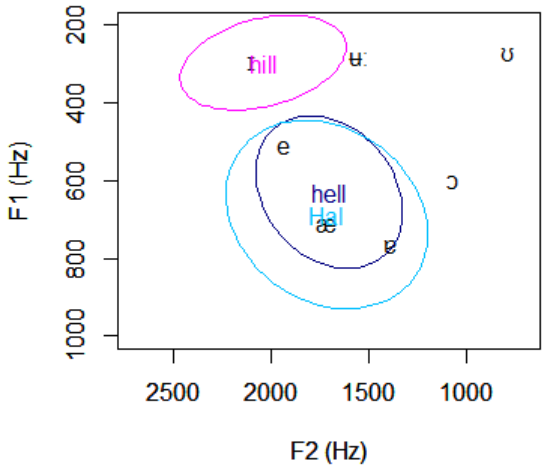

Figure 4. *Vowel targets (control) vs. front vowel targets and ellipses (prelateral): male speakers*

3.3. Data modeling.

The results of the linear mixed effects regression analyses described in § 2.2 show that the vowel phoneme, following consonant and age of the speaker were significant predictors of F1 and F2 patterns in the data. For F1 for both males and females the best fitted model had PHONEME, POSTC, and AGE as main fixed effects, with various interaction effects between: POSTC and PHONEME; POSTC and AGE; PHONEME and AGE and POSTC, PHONEME and AGE. For F2 in both sexes, the best fitting model had PHONEME, POSTC,and AGE, as main fixed effects, with interaction effects between: POSTC and PHONEME; POSTC and AGE; and POSTC, PHONEME, and AGE.

These models show an overall trend which reflect the graphical representations of the data shown in Figures 3 and 4. That is, for both males and females, there is a trend wherein vowels occurring before /l/ have higher F1 and a lower F2 than those before /t/. In other words, vowels are lowered and retracted before /l/. Confirming the visual presentation of the data (seen in 3.2), post hoc tests using a Bonferroni correction for multiple comparisons demonstrate the difference between /æ/ and /e/ prelaterally is small for males (but statistically significant, $p < .05$), and for females, prelateral /e/ has a higher F1 (is lower), than prelateral /æ/, $p < .01$.

4. Discussion and Conclusion

This paper has presented vowel spaces of a group of L1 Aboriginal English speakers in Western Victoria, with vowels in /hVt/ and /hVl/ environments. As reported for L2 Aboriginal English varieties [5,6], the L1 Aboriginal English described here also has a compressed vowel space with respect to mainstream Australian English, and most notably a higher /æ/ vowel. Compared with the most recently reported vowel spaces for mainstream Australian English [12,13], the female speakers' vowels in particular are especially compressed in the F1 dimension. For example, recent work [12,13] has shown that female speakers of mainstream Australian English tend to have a very open /æ/ vowel, with an average F1 of around 950-1100 Hz. While there is a high degree of variability for mainstream speakers, this is still a comparatively large difference when we consider the mean of around 800 Hz for Aboriginal English females (Figure 1). The Aboriginal English data also differs from recent studies with respect to the alignment of /æ-ɐ/. Because of the higher /æ/ for these

Aboriginal English speakers, the /ɐ/ vowel is at the bottom of the vowel space, rather than /æ/, which is the pattern seen for the most recent mainstream Australian English spaces [12,13]. This is in fact reminiscent of results for female speakers of the mainstream variety recorded in 1990 [14], but for both vowels those data are acoustically more open than seen for these Aboriginal English speakers by at least 100 Hz. Interestingly, F2 is less remarkable for these vowels, comparing well with [12,13].

The height of the female speakers' /e/ and /ɔ/ vowels are both acoustically similar to the Aboriginal English vowel space shown in [5], being higher than those in the mainstream variety [12,13,14]. The female Aboriginal English close vowels /ɪ ʊ ʉː/ are all (essentially) aligned in F1 (all approx 400 Hz) - which is also fairly typical for mainstream female speakers of Australian English [12]. In F2, the high vowel /ʉː/ is also practically in line with the recent data presented in [12] for Melbourne speakers. This result differs though, from Western Sydney English [13] which has a more open and more fronted realisation.

The acoustic space in Figure 3 (males) cannot be compared to other data for Aboriginal English which have focused on female speakers only, but it can still be compared with mainstream Australian English data for males [12,13,14] and considered with respect to the female speakers. In this case, the vowel space is only slightly compressed compared to mainstream Australian English. In the F1 dimension, /æ/ produced by the Aboriginal English speakers is only slightly higher than seen in other recent work [12,13] and is very close to the data presented in [14] (recorded in the 1990s). Like for the female Aboriginal English speakers, the F2 values for /æ-ɐ/ are within the range for the mainstream accent [12,13] and are reminiscent of F1 values reported in [14]. Additionally, each of /ɪ e ɔ ʊ/ fall within the range shown in [12,13] for the mainstream accent, in both F1 and F2; /ʉː/ however, is more back than any of the reports on mainstream Australian English [12,13,14]. This backed /ʉː/ mirrors what other researchers comparing Aboriginal English with mainstream Australian English have found for female speakers [5,6], but is different from what we observed for the female speakers in the same region whose /ʉː/ patterns with results observed for mainstream speakers from Melbourne ([12] as discussed above).

For the prelateral context (Figure 3, 4), it is clear that /e/ is most affected by coarticulation. This is also evident when looking at the centroids; while /ɪ/ and /æ/ are essentially the same in /hVt/ and /hVl/ environments, there is a complete merger of F1 and F2 for *hell-Hal*, so that the centroids (and ellipses in the case of the female speakers) are entirely overlapping. While there are trends in the data as far as this overlap of *hell* and *hat* is concerned, it is (as discussed in 3.3) only significant for males in F1, and females in F2.

Comparing these new production results with what we know about perception from the same participants [9], the reasons for particular responses are more clear. In particular, Aboriginal English listeners chose /æ/ quite "early" in the *het-hat* continuum (at Step 2 of 7), which is not surprising given we now know they also have an especially high /e/ and /æ/ in their own production (esp. females). This is similar to some findings for (primarily older) listeners of mainstream Australian English from the same region [8] who also tend to choose /æ/ relatively early in the continuum. We know now, too, that the Aboriginal English speakers overlap (merge) prelateral /el/ with /æl/ in production. This is different from mainstream Australian English listeners, who have a wider variety of production behaviour. Some mainstream speakers merge and some do not, and there is therefore greater variability in ellipses, and also in patterns of responses in perception [8,9]. In listening, the Aboriginal English participants always preferred *hell* across the continuum (there was no crossover from *Hal->hell* at all for these listeners). Given what we know about production from the current study, we might infer that prelateral /el/-/æl/ stimuli would be completely ambiguous in perception for these listeners and, along with *hell* being lexically more frequent than the competing *Hal*, it is understandable why /el/ was preferred across the board.

This study has gone some of the way towards understanding how L1 Aboriginal English speakers produce short vowels (plus /ʉː/), and why they respond in unique ways in perception. Future work will focus on vowel trajectories, in /hVl/ environments, to better understand coarticulation in this context. We are also interested in sociophonetic patterning of vowels for this group, especially in light of the differing behaviour for males and females where /ʉː/ and /æ/ are concerned.

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