Towards a Better Understanding of Regional Variation in Standard Australian English: Analysis and Comparison of Tasmanian English Monophthongs

Rael Stanley
University of Melbourne
raels@student.unimelb.edu.au

Abstract

Using phonetic analysis, this investigation looks at the acoustic properties of Tasmanian English vowels, as produced by speakers of that variety of English from the Austalk corpus. It compares the formant values of monophthongal vowel targets to published formant values Melbourne and Sydney vowels. The aim of the study is to give a first outline of the vowel space of Tasmanian English, to determine whether there is any regional variation between Tasmanian and mainland vowel realisation, and to compare what differences there are in vowel realisations for older and younger speakers of Tasmanian English.

Index Terms: Regional variation, Tasmanian English, vowels

1. Introduction

This study is looking at the accent produced by speakers of Tasmanian English, in comparison to varieties of Australian English spoken in other Australian states. As vowels are the phonemes most responsible for accent variation [1], it will be focussing on how production of them is similar to or different from vowels produced elsewhere.

1.1 Research Questions

The bulk of work done on regional accent variation for Australian English has focussed on the larger population centres in the country, such as Sydney, Melbourne, Adelaide, and Perth. However, there is a paucity of data for smaller areas, particularly the capital of Tasmania: Hobart.

Separated from the mainland of Australia by the waters of Bass Strait, Tasmania is a mountainous island that was, for much of its history post-British-colonisation, isolated from the rest of Australia's population by more than simply the great distances found between populations centres on the mainland but also the broad and treacherous sea.

As physically isolating barriers are a common factor in regional variation of languages and dialects [2], it is somewhat surprising that there has been so little research into differences between Tasmanian English and the other varieties spoken in Australia, and this study seeks to redress this, with the following research questions:

1. What are the acoustic properties of Australian English short and long monophthongs as spoken by Tasmanians?
2. Are there differences in these acoustic properties that are present according to age categories?
3. Is there regional variation present between the vowels analysed in this study, and those for Melbourne and Sydney, in studies by Cox and Billington [3] & [4] respectively?

2. Method

2.1 Data Collection and Participants

21 male and 18 female speakers of Hobart English produced vowels in citation form (/hVd/), and were extracted from the list of Tasmanian speakers, who had completed all their schooling in Tasmania, from the AusTalk corpus [5]. A total of 1,096 vowel tokens were downloaded for analysis via Alveo online [6].

The speech data for each group, male and female, was separated into younger and older speakers, with younger speakers being aged between 20 and 39 years, and the older speakers aged 60 years and over, excluding those speakers aged 40 to 59 years in order to more clearly see what effects age have on the Tasmanian English accent. Table 1, below, shows the distribution of speakers across age categories and gender.

Table 1. *Showing number of speakers of each gender, according to age category*

Gender	Number of Younger Speakers	Number of Older Speakers
Female	11	7
Male	13	8

2.2 Data Labelling

The vowels chosen for analysis were the short and long monophthongs of Australian English, because these are the vowels shared by the analyses Performed by Cox and Billington [3] & [4] that I am comparing my data with.

Segments for each repetition of each cited form were automatically labelled through use of the application WebMAUS Basic [7].

2.3 Analysis

The open-source data manipulation program RStudio [8] was used to automatically identify the formant values for F1 and F2 at the vowel midpoints and map them to ellipse plots for comparison between the different groups by both age and gender of the speakers. Any outliers in the data sets were identified visually from these plots, and had their formants manually checked and adjusted, where necessary, as suggested by Harrington [9] using Praat [10].

Linear Mixed Model (LMM) tests were run, using the packages lme4 [11] and multcomp [12] to provide statistical significance data on the differences in these values. The LMM tests were run on both F1 and F2 values, using age category and gender as fixed effects, with speaker as a random effect for both.

Mean formant data collected for each vowel for male and female groups of the younger speakers was compared to mean formant data for the same monophthongal vowels collected in [3] and [4].

3. Results

Running LMM tests for age category as a fixed effect showed more sporadic statistical significance across the mean F1 and F2 data for males and females. The only vowels that showed statistically significant differences in both F1 and F2 by age category were /æ/ for both male and female speakers, and /eː/ for female speakers, only. Those vowels which displayed statistical significance in mean F1 value across age categories were female speakers' productions of /e, ɜː, oː/ and male speakers' productions of /eː, e, ɜː/, while the vowels showing differences of statistical significance in mean F2 values were female speakers' productions of /ɐː, ɔ, ʊ, ʉː/ and male speakers' productions of /ɐː, ɐ, ʉː/.

3.1 The Short Vowels of Tasmanian English

A pair of ellipse plots of the short vowels produced by the younger and older groups of Tasmanian females in citation forms is presented in Figures 1 and 2, below. These plots have been chosen, as they most clearly display the points of interest in these data sets.

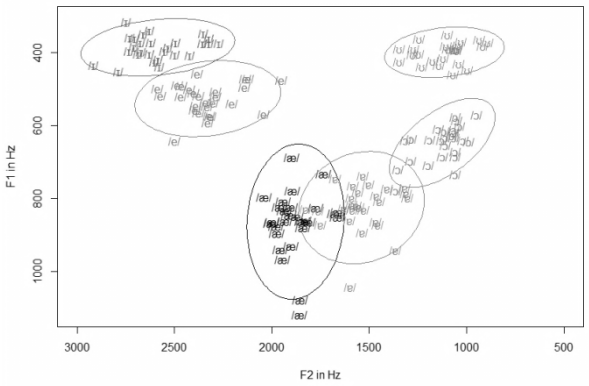

Figure 1: *Ellipse plots of the F1/F2 values of short vowels produced by younger female speakers of Tasmanian English*

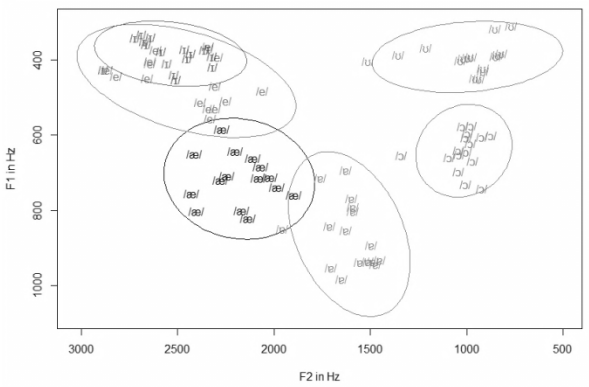

Figure 2: *Ellipse plots of the F1/F2 values of short vowels produced by older female speakers of Tasmanian English*

As can be seen in the above pairs of plots, there is a notable retraction and lowering of the /æ/ ("had" vowel) by the group of younger speakers, as compared to the older group. The mean values for F1 and F2 in the younger group are 863Hz and 1878Hz, respectively, while the same mean values for the older group are 716Hz and 2179Hz. The higher F1 (i.e. a more open vowel) values for younger speakers – a difference of 147Hz ($p \leq 0.001$) – between the two groups of speakers patterns with findings in [13], showing that short front vowels appear to be undergoing a reversal of the sound change that for a time saw the vowels raising. Further, the retraction is clear – a difference of 301Hz ($p \leq 0.001$) in the mean F2 values of the groups – also patterning with the findings [13].

Another point to note is the comparatively large overlaps shown by the ellipses for the "head" and "hid" vowels, /e/ and /ɪ/ respectively, in older speakers. The ellipse for production of /ɪ/ is almost entirely covered by the ellipse for production of /e/. However, for individual speakers there is a clear difference between vowel height in production of /e/ and /ɪ/ - /ɪ/ vowels for a speaker have a mean F1 value that's 73Hz lower than the corresponding speaker's /e/ vowel ($p \leq 0.001$).

These same patterns are seen when comparing the data for older and younger groups of male speakers

Overall, it can be seen that both genders of younger speakers appear to be reversing previously found raising and fronting of /æ/, patterning with the data found in [13]. While older speakers of both genders have /e/ and /ɪ/ productions that are very closely clustered (the females more so than the males), the individual speaker productions of these vowels are distinct from one another. And, while younger female speakers have considerably more distinct ellipse plots than their older counterparts, this is only true with regards the high front vowels for male speakers (who also a very broad range of realisations for /æ/, not seen in older speakers).

3.2 Frequency Data for the Short and Long Monophthongs of Tasmanian English for Younger Speakers

In this section, a description of the vowels of Tasmanian English is put forward. This incorporates the data shown in the previous sections, as well as the below figure (3) showing the mapped vowel spaces for both male and female younger speakers.

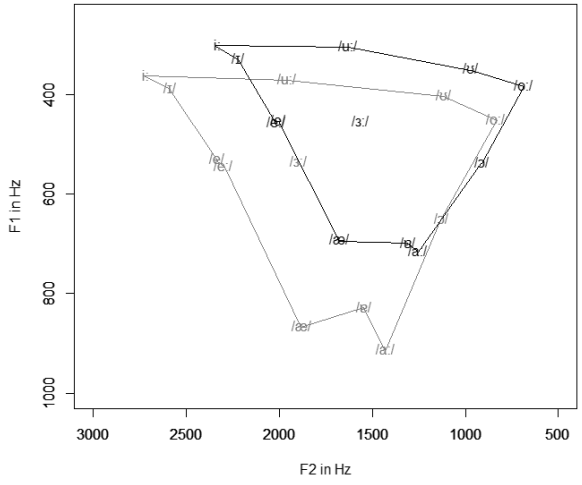

Figure 3: *A plot of the mean F1 and F2 midpoint values for the long and short vowels produced by younger female (black) and male (grey) speakers from Hobart.*

The most readily obvious gender difference seen in this figure is the difference in relative position for the low vowels: /ɐ:/ and /ɐ/ are where we see the first big differences between the two data sets. For male speakers, both these vowels are sitting very close together, with the short vowel only slightly higher and more forward than the long vowel. However, for the female speakers, the short vowel /ɐ/ is considerably higher than the long vowel /ɐ:/, being even higher than /æ/. In this way, the short vowel /ɐ/, for female speakers patterns similarly to how it does for Melbourne data in [4], while the long vowel /ɐ:/ is lower than /æ/, putting it in a relative position more similar to the Sydney data in [3].

3.3 Regional Variation

Below, in Figures 4 and 5, can be seen the comparative vowel spaces for female speakers from Hobart, Melbourne, and Sydney. Overall, the data for female speakers from Hobart have a general vowel space that appears retracted and raised, compared to the speakers from Melbourne and Sydney.

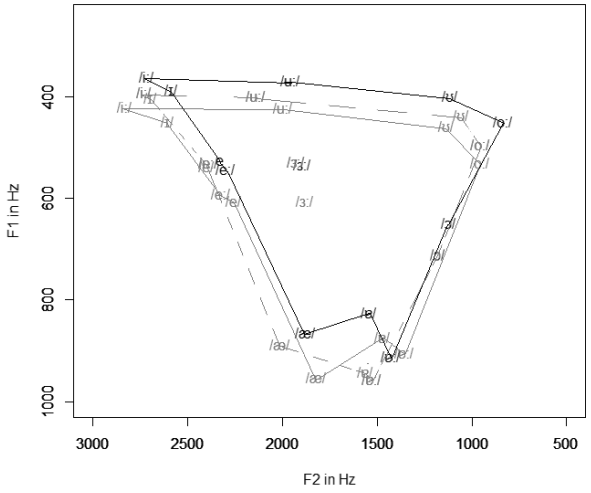

Figure 4: *Vowel spaces for Hobart female speakers (in black), Melbourne female speakers (in grey), and Sydney female speakers (the broken line)*

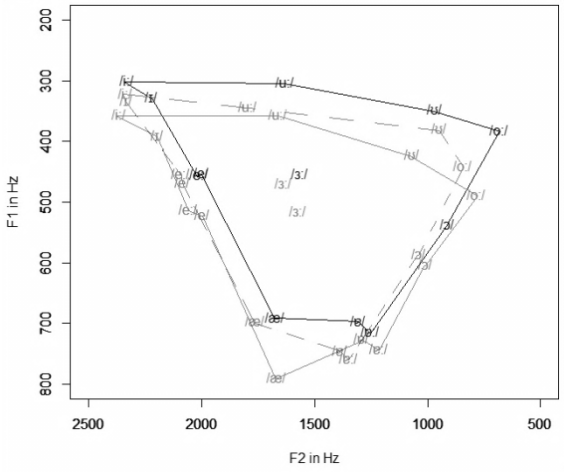

Figure 5: *Vowel spaces for Hobart male speakers (in black), Melbourne female speakers (in grey), and Sydney female speakers (the broken line)*

3.3.1 "Had" /æ/

The open front vowel /æ/ shows quite noticeable variation between the three states. The difference between Hobart and Melbourne is greater than that between Hobart and Sydney. Compared to speakers from Sydney, the speakers from Hobart show retraction and very slight raising in this vowel, with an F1 frequency difference of 23Hz and an F2 frequency difference of 135Hz. Compared to Melbourne data, /æ/ produced by speakers from Hobart is higher in the vowel space, the difference in F1 frequency between the two being 88Hz.

3.3.2"Hard" /ɐ:/ and "Hud" /ɐ/

These two vowels show a very similar pattern in their F1 and F2 frequencies between Hobart and Melbourne data sets. Both these vowels are almost plotted on top of one another for the speakers from Sydney. However, there is a clear difference in both the Hobart and Melbourne productions of these vowels, with the short vowel /ɐ/ being higher and further forward in the vowel space than the long vowel /ɐ:/. Both Hobart and Melbourne-based speakers have very similar targets for /ɐ:/ but Hobart speakers appear to produce an /ɐ/ that is higher and slightly further forward in the vowel space than speakers from Melbourne. The difference in F1 values for this vowel is 48Hz, and the difference in F2 values is 72Hz.

3.3.3 "Who'd" /ʉ/

Realisations of this vowel share a similar relationship between speakers from Hobart and speakers from Melbourne, as the vowel in "Hood". The difference isn't particularly great but the Hobart data set shows a lower mean F1 value for speakers from Hobart than is seen for speakers from Melbourne. The Sydney data, however sits roughly at the midpoint between Hobart and Melbourne, in F1 frequency value but is further forward in the vowel space, with a higher F2 value than either of the others. This pattern is repeated for male speakers.

4. Discussion

This study analysed variability in Standard Australian English spoken in Tasmania. In bringing Tasmania into the analysis, there were four research questions posed. This section examines the findings surrounding each of those questions.

4.1 A Description of the Vowel Space of Hobart English

The results of the acoustic analysis of the vowels of English as spoken in Hobart, showed vowel spaces shaped rather typically for Australian English, although there was some variability for some sounds. For example he "Had" vowel /æ/ is less open than that produced in Sydney or Melbourne (in particular), however it still shows patterning similar to that found in [13], in reversing the raising and fronting movement previously observed. This is a trend that is clearer in the F1/F2 frequency means for female speakers than it is for the male speakers, a point that is to be expected, considering that females have a tendency to lead males with regards to linguistic changes [14]. There is also a distinctly higher production of /ɐ/ as compared to /æ/ for female speakers than there is for male speakers.

4.2 Difference in Age Category

As discussed throughout the results, age differences occur for many of the vowels, indicating that the accent changes observed in [13] are, indeed, also occurring in a similar

manner in Tasmania as in other regions. Most vowels show differences in the mean formant values for one or both of F1 and F2 of their targets between younger and older groups, for both males and females. Overall, where the values show statistically significant differences, the younger speakers have higher mean formant frequency values than the older speakers, resulting in a lower and more front set of vowel realisations.

4.3 Regional Variations

There is some visible variation in the overall vowel plots between Tasmania, Victoria, and New South Wales, for both males and females, with what appears to be a general trend of a compressed vowel space for Tasmanian speakers, compared to their mainland counterparts. While this is not very great in extent, there are some larger differences to be seen in some of the low vowel targets, specifically the realisations of /æ/ show large variance between Tasmanian and Victorian female speakers of both genders, and there is a similarly large gap between production of /ɐ/between female Tasmanians and females from New South wales. There is also a clear difference in the data for the production of /oː/ between younger speakers from Tasmania and Victoria, with that vowel being produced noticeably higher and further back in the vowel space of Tasmanians, and speakers from New South Wales occupying a space in between the two. Conversely, the Tasmanian production of /ʉː/ patterns similarly to Victorian production. That is, it's still quite a fronted vowel but not nearly to the same extent as that seen in New South Wales.

5. Conclusion

This study has added to the current knowledge on variation in Standard Australian English, by adding acoustic data for the vowels of Tasmanian English to the discussion, displaying vowel spaces for both male and female speakers. The study has shown evidence for some regional variation between reports on Standard Australian English as spoken in Sydney and Melbourne in some vowels, as well as variation between older speakers of this variety of Standard Australian English.

Being that this study was a one of the monophthongs, it would make sense that further study could be made into how the diphthongs of Tasmanian English pattern. Also, since vowel targets were analysed at a fixed point, a dynamic analysis of the vowel formants would likely be enlightening on this topic, in future.

6. References

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