# The change in Australian English vowels over three generations.

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## Abstract

Australian English, like all languages, is in a constant state of change. The change in Australian English vowels was investigated by means of a cross-sectional *apparent time* study of 54 subjects covering three generations of speakers, taken from the Australian National Database of Spoken Language. It was hypothesised that there would be a significant change in pronunciation of some, but not all vowels, that there would be differential change between different vowels, that diphthongal change would mirror monophthongal change and that there would be differential change between female and male speakers. Results indicated that all these hypotheses were supported.

## 1. Introduction

### 1.1. Background

Languages tend to have symmetrical vowel systems to maximise perceptual difference (Trask, 1996; Lindblom, 1986). When vowels move in the vowel space, others also shift to maintain symmetry, a process known as 'chain shift' (Trask, 1996).

After an extensive study of languages and dialects, Labov (1994) defined the principles of vowel shift as:
(1) – tense vowels rise and/or move forward along peripheral tracks and
(2) – lax vowels fall and/or retract along non-peripheral tracks.

Goldstein (1983) postulates that, due to the non-linear relationship that exists between articulatory and acoustic occurrences, the acoustic results of articulatory change will be predictable. Studies by Henton, (1983) and Bauer (1985) on British English, generally support the principles set forth by Labov (1994) regarding chain shift.

With this in mind, the present study examined the change in Australian English over three generations. This took the form of a cross-sectional or *apparent time* study, with data being gathered from speakers from different age groups at one point in time, rather than a longitudinal survey with data being gathered from a group of speakers over a 50 to 60 year period.

The (2000) acoustic analysis by Harrington, Palethorpe and Watson of the change in monophthongal vowels in the Queen's Christmas speeches from the 1950s to the 1980s indicates that an individual's accent can change over time. This does not mean, however, that an *apparent time* study is unsuitable, as Wells (1982) claims that there is very little accent change in a speaker after she or he passes puberty. In fact, Labov (1994) suggests that *apparent time* studies would tend to underestimate the rate of sound change, thus making any findings of such a study more significant.

### 1.2. Australian English vowels

Given the apparent similarity between Australian English consonants and those of some other Englishes (notably London English), it is vowels which are the most defining aspect of spoken Australian English. Studies have revealed that Australian English is similar to London English and Wells (1982) tabulated a series of long, closing vowels across three London sociolects, which bear a striking resemblance to the *Broad*, *General* and *Cultivated* Australian sociolects.

#### *1.2.1. Social variables*

One of the first major studies of the Australian English accent was conducted by Mitchell and Delbridge (1965), following work done by Mitchell (1946). After a substantial nation-wide survey of 9000 speakers, they held that there were socio-economic and educational rather than geographical differences in the Australian English accent. Mitchell and Delbridge felt that there were three sociolects of Australian English – *Broad*, accounting for some 34% of speakers, *General*, covering 55% of speakers and *Cultivated*, accounting for the final 11%. They found the *Cultivated* accent to be in the minority, especially among males. These results were confirmed in a subsequent study by Harrington, Cox and Evans (1997) wherein it was shown that the differences between the *Broad*, *General*, and *Cultivated* sociolects were found mainly in the rising diphthongs and the onglide of /i/.

#### *1.2.2. The current study*

This study follows several previous surveys, notably those by Cox (1999) and Cox and Palethorpe (2001), which were wide ranging in that they took account of chain and parallel shifts as well as the isolated shifts of individual vowels. They also examined the relationship between monophthongal and diphthongal shifts. The monophthongs /i/, /ɪ/, /e/ (/ɛ/ in this study), /æ/, /a/, /ʌ/,

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/ɒ/, /ɔ/, /u/, /ʊ/, and /ɜ/ were examined, as were the diphthongs /ɪə/ (/iə/ in this study), /ɛə/, /eɪ/ (/ɛɪ/ in this study), /aɪ/, /ɔɪ/, /aʊ/ and /oʊ/ (/əʊ/ in this study). The current study also examined the diphthong /uə/, which was omitted from the Cox and Cox and Palethorpe surveys. The vowel realisations for Australian English are taken from the work of Cochrane (1989) and Horvath (1985).

The present study partially replicates and extends and also develops on the findings of Bernard (1967), Cox (1999) and Cox and Palethorpe (2001) with a view to testing the hypotheses that: 1) There would be a significant change in pronunciation of some, but not all vowels; 2) That diphthongal change would mirror monophthongal change; 3) That there would be differential change between different vowels and 4) That there would be differential change between female and male speakers.

## 2. Methodology

### 2.1. Participants

The sample consisted of 54 subjects taken from a corpus of spoken words recorded as part of the Australian National Database of Spoken Language (ANDOSL) (Millar, Harrington & Vonwiller, 1997). This consisted of 220 speakers from the Sydney area and was divided into the categories of *elderly* (46 years+), *middle-aged* (31 – 45 years) and *young* (18 – 30 years). These were in turn divided into the subcategories of *Broad*, *General*, and *Cultivated*, which were already in place along the lines of the work of Mitchell and Delbridge (1965) and Millar *et al.* (1997). Three female and three male speakers were chosen randomly from each age and sociolect group, resulting in 18 sets, each comprising three speakers. In order to minimise the chance of contiguity (for instance, comparing a 45 year-old from the middle-aged group with a 46 year-old from the elderly group), only the data from the e*lderly* and y*oung* categories were used, leaving a total of 12 groups of three speakers.

A list of elderly and young subject groups and abbreviations appears in table 1.

*Table 1*: Elderly and young subject groups and abbreviations.

| Group | Abbreviation |
|---|---|
| Female elderly broad | FEB |
| Female young broad | FYB |
| Female elderly general | FEG |
| Female young general | FYG |
| Female elderly cultivated | FEC |
| Female young cultivated | FYC |
| Male elderly broad | MEB |
| Male young broad | MYB |
| Male elderly general | MEG |
| Male young general | MYG |
| Male elderly cultivated | MEC |
| Male young cultivated | MYC |

### 2.2. Speech Data

All participants read 25 Australian English citation form words, which were either mono- or disyllabic. All vowel tokens carried nuclear stress and were presented in a fully stressed environment. All the elicitation words were proper English words and no nonsense syllables were used.

#### *2.2.1 Corpus*

The data were digitally copied from CD Rom and formants one to four were extracted using the *Entropic ESPS* package 'formant' function (www.speech.cs.cmu.edu/). The data files thus generated were then examined using *Emu Labeller* (Cassidy & Harrington, 2001) and each vowel token was labelled by hand and then examined by eye to mark the beginning and end points of the vocalic nuclei. Any discrepancies in the formant extraction process were corrected by hand at this stage. Each utterance was marked using standard phonetic labelling procedures (Croot and Taylor 1995) in *Emu Labeller* on the tiers of "Word", "Vowel" and "Target".

The *Word* tier encompassed the entire utterance, whilst the *Vowel* tier was marked out from the onset to the offset of voicing associated with the vowel. The *Target* tier was marked so as to indicate the onglide and offglide of tense vowels and diphthongs, and the 50% cut-point of lax and tense vowels. Formants one and two (hereafter, F1 and F2), the two main vocal tract resonances associated with vowel height and backness, were examined to ascertain the position of the vowel in the vowel space. The onglide and offglide measurement points were selected so as to minimise the effect of coarticulation from the surrounding word frame on the vowel under investigation.

The vowel tokens /ɪ/, /ɛ/, /æ/, /ʊ/, /ʌ/, /ɒ/, /i/, /ɛː/, /ɜ/, /u/, /ɔ/, /iə/, /uə/, /ɛə/, /ɛi/, /ai/, /ɔi/, /au/ and /əʊ/ were examined.

### 2.3 Statistical Manipulations

Results from the examination of onglides and offglides of diphthongs and tense vowels and the 50% cut-point of lax and tense vowels were considered. The data obtained from *Emu Labeller* were then analysed using the 'R' (v.1.7.1) statistical programme (Cassidy, Harrington & Vonwiller, 2003). A series of t tests was then performed on the comparison groups of interest. It was decided that t tests were the most suitable procedure for this study as it was solely concerned with sets of two comparison groups.

The resulting t tests were examined and any result with a significance value of 0.05 or less was considered significant. Any result with a significance value of above 0.05 but less than 0.07 was considered substantial enough to be regarded as a trend towards significance.

## 3. Results

### 3.1. Lax vowels

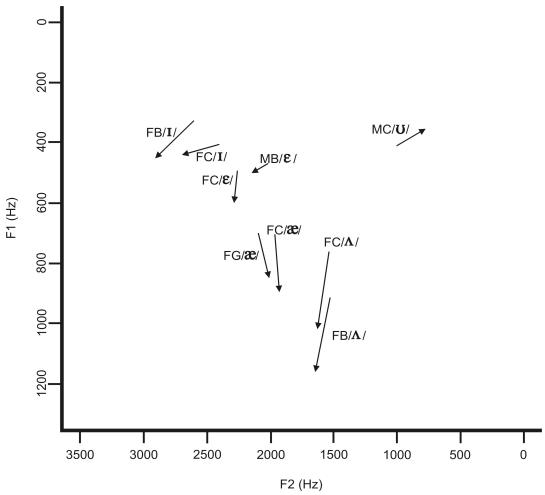
Figure 1 shows degree and direction of movement of lax vowels.

/ɪ/ demonstrated significant fronting in the FYC group (t=-3.56, *p*.<0.05) and substantial but not significant lowering in the FYB group (t=-3.01, *p*.=0.055), whilst /ɛ/ showed significant lowering in the FYC group (t=-4.40, *p*.<0.05) and considerable although not statistically significant lowering in the MYB group (t=-2.22, *p*.=0.053).

/æ/ exhibited significant lowering in the FYC group (t=-4.47, *p*.<0.05) and noticeable although not statistically significant lowering in the FYG group (t=-3.27, *p*.=0.051). /ʌ/, more properly rendered /ɐ/ in Australian English due to its more central location, displayed significant lowering in the FYB group (t=-7.03, *p*.<0.05) and in the FYC group (t=-3.06, *p*.<0.05).

/ʊ/ demonstrated a substantial, although not statistically significant, backing in the MYC group (t=3.60, *p*.=0.068), but the remaining token /ɒ/ showed neither significant nor substantial movement in either the F1 or F2 dimension (t=0.84, *p*.=0.468).

*Figure 1*: Degree and direction of movement of lax vowels.




### 3.2. Tense vowels

Figure 2 shows the degree and direction of movement of tense vowels.

The onglide of /i/ showed significant lowering in the FYB group (t=-4.11, *p*.<0.05) and significant fronting in the FYG group (t=-3.35, *p*.<0.05). Strong but not significantly significant fronting was observed in the FYC group (t=-2.37, *p*.=0.065).

The onglide of /u/, showed significant lowering in the FYB group (t=-3.79, *p*.<0.05). In addition, the 50% target exhibited substantial, although not statistically significant fronting in the MYB group (t=-2.82, *p*.=0.058). Significant lowering was observed in the MYG group (t=-3.86, *p*.<0.05) and significant raising was seen in the MYC group (t=3.43, *p*.<0.05).

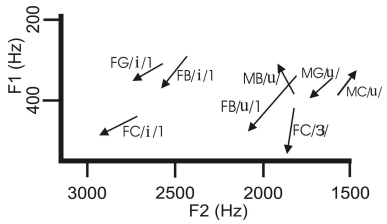
/ɜ/ showed significant lowering at the mid-point target in the FYC group (t=-3.79, *p*.<0.05), although neither the onglide nor offglide showed any significant or substantial movement.

/ɛː/ was unable to be compared due to its not appearing in the utterances of any elderly sociolect, wherein it was universally produced as the diphthong /ɛə/.

The remaining tokens, /ɔ/ and /a/ showed neither significant nor substantial movement of onset, offset or target in either the F1 or F2 dimension (t=2.51,*p*.=0.117; t=-2.67, *p*.=0.116).

*Figure 2*: Degree and direction of movement of tense vowels.

Range restricted for clarity.




### 3.3. Diphthongs

Figure 3 shows degree and direction of movement of diphthongs.

The onglide of /ɛɪ/ showed significant lowering in the FYB group (t=-2.24, *p*.<0.05) and noticeable but not statistically significant fronting in the FYC group (t=-2.28, *p*=0.064). The onglide of /ɔɪ/ exhibited significant lowering in the MYC group (t=-3.14, *p*.<0.05) and the FYC group (t=-5.49, *p*.<0.05) as well as a strong but not statistically significant fronting (t=-2.17, *p*.=0.056) in the FYC group. There was also an observable but not statistically significant lowering of the offglide in the FYC group (t=-2.10, *p* =0.069), as well as a considerable, although again, not statistically significant lowering of the offglide in the FYB group (t=-2.27, *p*.=0.056), and the MYB group (t=-2.22, *p*.=0.051),

The onglide of /əʊ/ exhibited significant backing in the MYC group (t=3.11, *p*.<0.05) and the FYC group (t=3.95, *p*.<0.05). The offglide of /iə/ was significantly lowered in the FYB group (t=-13.54, *p*.<0.05) and significant fronting was observed in the MYB group (t=-4.52, *p*.<0.05).

It was not possible to test for movement of this diphthong between the FEG and FYG groups as this token had disappeared altogether in all but one of the speakers in the FYG group, being replaced by the tense monophthong /i/ in all occurrences in the utterances of the other speakers.

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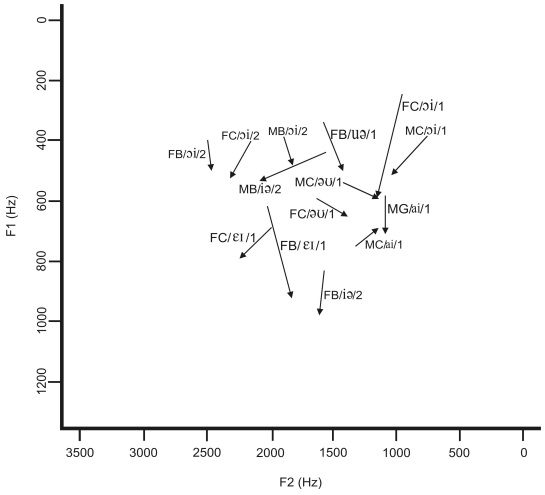
/uə/ displayed significant lowering of the onglide in the FYB group (t=-3.58, *p*.<0.05), however, there was no other significant movement. The onglide of /ai/ displayed significant lowering in the MYG group (t=-4.13, *p*.<0.05). There was also significant retraction in the MYC group (t=3.07, *p*.<0.05).

It was not possible to measure the movement of either the onglide or offglide of the diphthong /ɛə/ as it had been replaced with the tense monophthong /ɛː/ in all of the young sociolect groups (see results for /ɛː/ above). No significant or substantial movement was observed in either dimension of the onglide or offglide for /aʊ/ amongst any of the comparison groups (t=-1.52, *p*.=0.165).

*Figure 3*: Degree and direction of movement of diphthongs.




## 4. Discussion

The results of this study support the first hypothesis, in that there was significant movement in the onglides, offglides and targets of many, but not all, of the vowels under consideration. The parallel shift found in the study, between diphthongs and their monophthongal vowel components supports the second hypothesis. The fact that there was not uniform movement found in all vowel tokens supports the third hypothesis in that the vowels /ɪ/, /ɛ/, /æ/, /ʌ/, /ə/, /i/, /u/, /ɜ/, /ai/, /ɛi/, /ɔi/, /əʊ/, /uə/, /iə/ and /ʊ/ showed substantial or significant movement whilst /ɒ/, /a/, /ɔ/ and /aʊ/ did not. The fourth hypothesis, that there would be differential shifts in vowel targets between males and females was supported as there were a total of 13 vowel tokens, /ɪ/, /ɛ/, /æ/, /ʌ/, /ə/, /i/, /u/, /ɜ/, /ɛi/, /ɔi/, /əʊ/, /uə/ and /iə/ which showed either substantial or statistically significant movement amongst female speakers and only seven, /ɛ/, /ʊ/, /u/, /ai/, /ɔi/, /əʊ/ and /iə/, which showed substantial of significant movement amongst male speakers.

There were significant methodological differences between this and previous studies. Whereas prior studies utilised longitudinal models and only took account of male speakers, the current study used a cross-sectional or *apparent time* model and took into account not only both males and females, but speakers from the three sociolects of Australian English, *Broad*, *General* and *Cultivated* as described by Mitchell and Delbridge (1965). Another study by Horvath (1985), used principal components analysis in a cross-sectional study, but again, the statistical methodology differed.

The Cox (1999) study was the most similar in character to the present review and another by Cox and Palethorpe (2001), which took account of female data, was also comparable and, whilst there were similarities in the results, there were differences as well.

Whereas the present study found fronting of /ɪ/ in the FYC and MYB groups, Cox found it to be raising across the board. The lowering of /æ/ found in FYC and FYG groups in this study was mirrored to an extent by Cox, who found the onset lowering and retracting and by Cox and Palethorpe, who found it lowering amongst both female and male speakers. The backing of /ʊ/ in the MYC group in this review was replaced by a lowering and fronting amongst female speakers in the Cox and Palethorpe study.

The lowering of the target of /ɜ/ found in the FYC group in the current survey was found to be an across-the-board fronting in the Cox study and /a/, which was not found to be moving in this investigation exhibited raising of the onglide and target in the Cox paper and lowering of the whole token among female speakers in the Cox and Palethorpe study. The onglide of /i/ exhibited lowering in the FYB group and fronting in the FYG and FYC groups in this study, but raising in the Cox analysis. In the Cox and Palethorpe survey, where the token was treated as monophthong, raising was found amongst female speakers. The vowel /u/, which showed lowering of the onglide in the FYB group, lowering of the target in the MYG group, raising of the target in the MYC group and fronting of the target in the MYB group in the present survey, exhibited fronting of the onglide, target and offglide in the Cox study.

The examination of diphthongs differed from that in the current study in that trajectories from onglide to target were examined, whereas this paper measured onglides and offglides as 'steady-state' occurrences, however, a comparison is still valid.

This review found lowering of the onglide of /ɛɪ/ only in the FYB group and fronting in the FYC group, whereas Cox (who treated it as /ɐi/) found no movement and Cox and Palethorpe (who treated it as /ɛɪ/) found universal lowering of the onglide.

The diphthong /ɔɪ/ was most productive in this survey, showing lowering of the onglide in the MYC group and fronting and lowering in the FYC group. It also exhibited lowering of the offglide in the FYB, FYC and MYB groups. The Cox survey found no movement of the token and the Cox and Palethorpe study found lowering and fronting of the onglide amongst female speakers only. The results for /əʊ/

(/oʊ/ in the other studies) show consistency. Whereas this investigation revealed backing of the onglide in the MYC and FYC groups, the Cox survey showed fronting of the offglide and Cox and Palethorpe found both backing of the onglide and fronting of the offglide.

The results for /iə/ were discrepant in that this examination found lowering in the offglide in the FYB group and fronting in the MYB group, whereas Cox (who treated it as /ɪə/) found raising in the onglide, target and offglide. Discrepancies also occurred in the vowel /ai/ (/aɪ/ in the Cox paper). Whereas this study found lowering of the onglide in the MYG group and backing in the MYC group, Cox found raising and backing and Cox and Palethorpe found lowering of the offglide amongst female speakers. This study found no movement for /aʊ/, the offglide of which was found to be raising in the Cox survey.

Table 2 summarises these comparative findings.

*Table 2*: Comparative findings of three studies.

Key: L = Lower, H = Higher, F = Front, B = Back.

| Vwl. | Study and findings | | |
|---|---|---|---|
| | Fricker, 2004 | Cox, 1999 | Cox & Palethorpe, 2001 |
| /ɪ/ | F- FYC, MYB | High. | - |
| /æ/ | L- FYC, FYG | L+B – Ons. | L. Male, Female |
| /ʊ/ | B- MYC | - | L+F-Female |
| /ɛ/ | L- FYC | - | - |
| /ʌ/ | L- FYB | - | - |
| /i/ | L- Ong. FYB, F- Ong. FYG & FYC | H- Ong. | F- Ong. – Female |
| /u/ | L- Ong. FYB, F- Tg. MYB, L- Tg. MYG, H- Tg. MYC | F- All | - |
| /ɜ/ | L- Tg. FYC | F- All | - |
| /ɛː/ | - | - | - |
| /ɔ/ | - | - | - |
| /a/ | - | H- Ong.+Tg. | L- Female |
| /ɛɪ/ | L- Ong. FYB, F- Ong. FYC | - | L- Ong. Male & Female |
| /iə/ | L- Offg. FYB, F- Offg. MYB | H- All | - |
| /uə/ | L- Ong. FYB | - | - |
| /əʊ/ | B- Ong. MYC, FYC | F- Offg. | B- Ong., F- Offg. Male & Female |
| /ai/ | L- Ong. MYG, B- Ong. MYC | H+B- Ong | L- Offg. Female |
| /ɛə/ | - | - | - |
| /aʊ/ | - | H- Offg. | - |

Cox and Palethorpe's finding of more age effects for females in their synchronic study was supported by the current study, and their combining of sociolects would explain their across-the-board findings for some tokens, which were restricted to certain sociolects in this study.

Notwithstanding methodological differences and differing subject pools, the Cox and Cox and Palethorpe studies and the current paper have found that there are definite and substantial changes overtaking many vowels in Australian English.

As mentioned previously, Harrington, Palethorpe and Watson's (2000) study of the Queen's Christmas messages over a period of 25 years found that adult speakers' pronunciation does change over time. This also supports the work of Wells (1982) and Labov (1994). In addition, Bauer (1985) found that speakers' vowels tended to shift in the same direction as community vowel changes and Yaeger-Dror (1994) found that this phenomenon held true for speakers into middle age.

It is both interesting and disappointing to note the lack of female subjects in previous studies, and where they were used, it is significant that Bauer, for instance, normalised his findings of female speakers to correspond with male speakers for the purposes of analysis. Not only has this made any comparison with data from the present study dubious, but also it has arguably distorted Bauer's findings to the extent that he might have missed some of the more subtle results. This also ignores the findings of such notable linguists as Labov and Horvath, who have determined repeatedly that females are in the vanguard of most changes to language.

## 5. Conclusions

In conclusion, this study has found that the sociolects of Australian English are all changing, with both monophthongs and diphthongs shifting in parallel, that is, as the monophthongs that make up the onglide and offglide of a given diphthong shift, then the diphthong as a whole tends to shift in the same direction. This shift is largely downwards and forwards in the vowel space and the fact that most of the tokens seem to be moving in similar directions points to the likelihood of chain shift, as discussed by Horvath (1985). Whether, however, the tokens are falling or being pushed down is beyond the scope of this paper.

In accordance with the findings of Labov (1974), this shift is being generally led by female speakers, with male speakers accounting for only a small proportion, and most of that along side the female speakers. As expected from the work of Bauer (1985) and Wells (1982), it was found that not all vowels showed significant or substantial shifting, and those that did, did not shift, or shift to the same degree, in every sociolect. Examination of the figures supports Labov's (1994) findings regarding the direction of shift of both tense and lax vowels, with substantial fronting of tense vowels and lowering of lax vowels being apparent.

Of the three sociolects examined in this study, the *General* sociolect seems the most 'stable' with only four substantial movements, compared to nine in the *Broad* sociolect and 11 in the *Cultivated* sociolect.

The investigation of sound change in Australian English is a vast and largely untapped field, and in-depth studies of these

essentially unexplored resources will prove to be a truly fascinating endeavour for the future.

## 6. Acknowledgements

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