University of Pennsylvania Working Papers in Linguistics

Volume 19
Issue 2 *Selected Papers from NWAV 41*

Article 15

10-17-2013

A Study of Variation in the BATH Vowel among White Speakers of South African English in Five Cities

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Abstract

This paper is part of a larger project covering South African English dialectology via five cities (Cape Town, Port Elizabeth, Kimberley, Johannesburg and Durban) and four ethnicities (Whites, Black, Coloured and Indian), using a single vowel to explore and exemplify regional and ethnic similarities and differences. For reasons of space only the White speakers are analysed in this paper. BATH was chosen as exemplar since it is known to vary in the White communities between an RP-oriented central to back variant, a fully back variant with weak lip rounding and a raised and rounded variant. BATH tokens arising from interviews with 50 speakers were subjected to acoustic analysis via PRAAT and statistical analysis via ANOVA. The results show a diversity of means per city and gender for Whites: in general females show means closer to the older prestige RP norm; while Kimberley the smallest city shows the broadest realisations of BATH (as superback and raised).

A Study of Variation in the BATH Vowel among White Speakers of South African English in Five Cities

Rajend Mesthrie, Alida Chevalier and Timothy Dunne*

1 Introduction

This paper focuses on a particular vowel variable of English in South Africa, the BATH vowel (Wells 1982), also known as long /a:/, cardinal 5 in the Daniel Jones system (1962[1918]), written as /ahr/ in one notation system for North American sociolinguistics. In the USA, where rhoticity plays an important role, the BATH superset (as we would like to call it) is redistributed over BATH proper (with [æ:] before voiceless fricatives as in *bath, fast, task, class*), [ɑ:r] in the START subset (before /r/ as in *far, sharp, heart* - hence Labov's /ahr/ notation), and [ɑ:] in the PALM subset, as well as in a few open monosyllables like *ah, ma* and *pa*. In southern British English and its South African offshoot, all these subsets are however relevant, and BATH in this study must be taken to refer to the whole superset (with the caveat that [æ:] realisations of North America do not apply). The vowel is a particularly good diagnostic of the many criss-crossing currents that make up English in a complex multilingual and multicultural society. We will use the label SAE as a cover term for 'South African English', and preface it with more specific descriptors, as necessary, notably 'White South African English'. The main relationship of social significance concerns a centralised BATH vowel (like traditional RP [ɑ̈:]) and other variants that are backed (as [ɑ:]) or backed and (weakly) rounded as [ɒ:], or backed and raised, with concomitant rounding as [ɔ:]. Gimson (1970:112) describes a range within RP that includes [a:] at one end to a realisation 'retracted near to the quality of Cardinal [ɑ:] ... typical of some advanced (refined) RP speakers'. But the RP variant which has prestige internationally is the centralised one described earlier by Daniel Jones (1962 [1918]). The original backing of /a:/ is an innovation of southern British English dating to the early 1800s (Wells 1982:234), with Northern English retaining the older norm till today. On the basis of observations by scholars of the late 18th and early 19th C McMahon (1994:455-6) deduces that backing was initially associated with the lower classes while a front or front-to-centralised realisation occurred with others. Backing (or a central-to-back realisation) only became socially acceptable by the late 1860s - see also Trudgill (2004:59-67). In some varieties /a:/ was retracted even further as a fully back vowel. Ida Ward (1944:92[1929]) writes that "In London a very retracted [A] used to be common, though at present a common forward [a] (fa:Δə) is frequently heard". This "very retracted [ɑ:]" might well be termed a super-back variant, and is the central focus of this paper. Historically the RP variant had overt prestige in South Africa, in contrast to the super-back one which carried more localised, social, vernacular meanings, as Lass (1995:99) makes clear:

> The quality of this vowel is socially important. In conservative SAE it tends to be centralised back [ɑ̈:], in posher styles even central [ɐ:]; in both Respectable and Extreme it is backer, even fully back [ɑ:] (generally in Respectable backer for men and younger speakers). It becomes acutely significant when, as in Extreme SAE, it may round to [ɒ:], and even raise toward [ɔ:]…[1]

*The research for this paper was funded by an NRF (National Research Foundation) grant in South Africa, under the SARCHI research chair of R. Mesthrie (grant no. 64805, Migration, Language and Social Change). We thank all the participants in the study who gave generously of their time. Earlier versions of the paper were given at the Linguistics Society meetings at Rhodes University (2011), UCT Postgraduate workshop (2011), University of the Free State (2012) and NWAV (Indiana University, 2012). We thank participants who gave valuable feedback from the floor. Above all we are grateful to Erik Thomas for his comments on the paper, and Tyler Kendall for additional guidance re the NORM website.

[1]In descriptions of White SAE starting with Lanham (1967:61) 'Extreme' refers to broader varieties associated with working class (= essentially upper-working class) Whites, or varieties influenced by Afrikaans, or associated with small towns and country districts. 'Conservative' applies to RP-oriented SAE, while 'Re-

Lanham (1978:153) describes the last variant 'backed, raised aa' as a stigmatised feature of Extreme SAE that is subject to correction to front [a:] in certain monitored styles. Lanham and Macdonald (1979:39) quote an early 20th CE source, M.C. Bruce (1919) who writes caustically of being introduced to a 'Mr. Morton – and it took me five days to find out his name was really "Martin"'. Likewise the British phonetician David Hopwood (1928:12) - the first to describe SAE in detail - cites the surname *Larsen* ([lɑ:s(ə)n]) being pronounced in the eastern part of the Cape Province as *Lawson* (['lɒ:ʊv].[2]

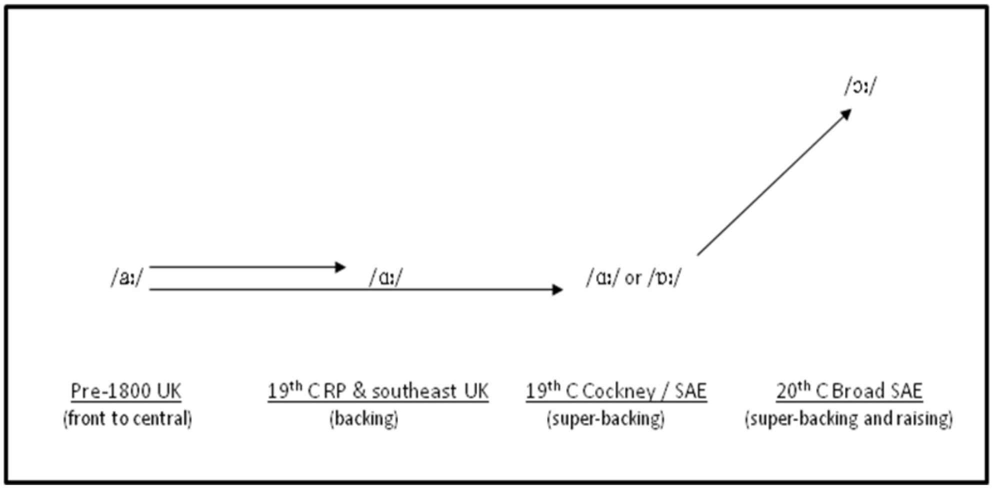


Figure 1: Shifts involving /ɑ:/ in South African English (SAE) and its antecedents.

Such super-backing can be heard in some UK and US dialects. The *Atlas of North American English* (Labov, Boberg & Ash 2006:111) shows the most retracted variants of /ahr/ to occur in the Midlands and the South. They note further that the height of /ahr/ does not play as great a role in dialect differentiation, except in eastern New England and the Great Lakes region, where much lower variants occur. Elsewhere (Labov 2010:41) describes a chain shift that has been completed in Philadelphia "with no significant variation by social class, gender or age": /ahr/ shifts to mid-back position, taking the place of /ohr/, which moves to high back position in a merger or near-merger with /uhr/. In SAE the backing and raising of BATH results in THOUGHT being raised (to cardinal 7, [o]), but not generally beyond.

2 The Constructed Sample and Methods

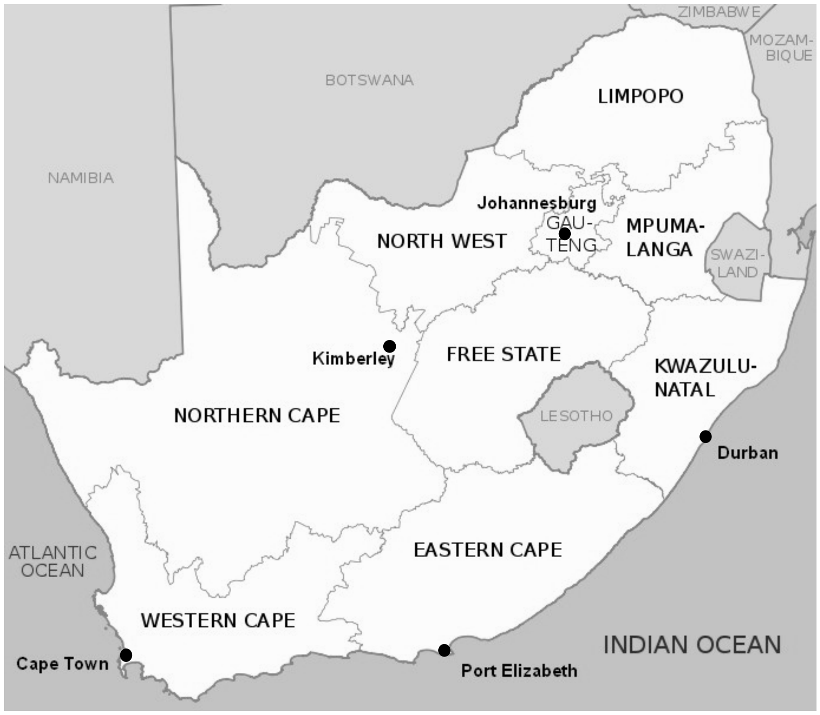
The current project data base comprises over 250 interviews undertaken in five cities: Johannesburg (JHB), Durban (DBN), Cape Town (CPT), Port Elizabeth (PE) and Kimberley (KBY). These cities represent the geographical spread of English in five of the country's nine provinces (respectively Gauteng, KwaZulu-Natal, Western Cape, Eastern Cape and Northern Cape. The first four cities are the largest of the country, with the fifth, Kimberley chosen not so much for its size, as for its historical importance as an English-speaking centre of the 19th C. The survey also covers four of the country's five ethnicities (White L1 speakers of English, Blacks, Coloureds and Indians) and two genders, but for reasons of space we report only on White speakers here.

Further characteristics of the constructed sample follow. Speakers had to be born in their city of residence or have lived there from age three onwards. Short periods of residence of up to a year in other areas or abroad were not excluded, as some parts of the population are fairly mobile. The criterion of fluency in English meant that the survey reached largely middle- and upper-working-class people. The interest in comparing speakers across cities meant that class and age differences

spectable' refers to middle-class prestige varieties less oriented to RP.

[2]This part of the province was frequently referred to as the Eastern Cape, which is now the official name of this new province.

had to be minimised. In each city two older speakers (over 50 years) were interviewed per ethnicity, around six younger people (of 18 to 30 years), and the rest (usually two) between 30 and 50 years. The samples were thus by design roughly comparable across the cities.



Map 1: South Africa's 9 provinces and the 5 cities studied. [3]

In terms of data gathering the now standard method in urban dialectology was followed; viz. a Labovian interview undertaken mainly by the lead author in peoples' homes in the five cities. In a few cases (n = 12) graduate students undertook interviews as part of their training on the project. Interviews of 40 to 60 minutes duration focussed on speakers' backgrounds and interests, their schooling, recollection of childhood games, discussion of local words and local crime stories, including the all-too-frequent personal experience of mugging. [4] Thereafter each interviewee read out a list of words adapted from Wells' (1982) lexical sets. The well-known reading-passage option was not undertaken, as experience had shown that some speakers struggle with reading.

3 Analysis

Acoustic analysis of as many tokens per speaker as possible was undertaken via PRAAT to give objective evidence of patterns hypothesised by the authors, based on aural training. As is now well known in the literature, F1 Hertz readings correspond inversely to vowel height and F2 readings inversely to vowel advancement (or degree of backness). We have not analysed rounding in this paper. For speakers whose facial gestures we casually inspected at WL stage, it appears that rounding is a weak secondary articulation, consequent on tongue retraction. But this observation has to be corroborated by more rigorous future studies.

Certain environments had to be excluded for reasons of acoustic clarity: it is held by most acousticians that vowel tokens in the environment of /l m n r/ are distorted by these sonorants (Di

[3]http://www.kidsmaps.com/geography/images/fullsized/provinces-south-africa.png

[4]The discussion of dialect lexis will form the basis for a mini dialectological atlas focussing on the five cities.

Paolo et al. 2011:88). Then there is the question of possible structural conditioning. Previous studies of BATH give no suggestion of any influence from adjacent segments, with Lanham & Macdonald (1979:39) explicitly stating that "variants are not conditioned by phonological conditioning". Nevertheless, words in which the BATH vowel was preceded by the palatal /j/ were separated from the other BATH tokens in our study, on the expectation that /j/ induces considerable fronting. The number of types in this set was very small (*yard, yardstick*, and the South African affirmative *ja* [ja:], borrowed from Afrikaans), but the number of tokens are large, because of the ubiquity of *ja*. The latter in fact comprised an extra few thousand tokens, and will be analysed in detail as a follow-up study. Only a brief indication of the differences will be given here, from two young, White, female speakers, as Table 1. For speaker AT of Cape Town the difference in F2 between the BATH vowel in *ja* versus preceding environments other than /j/ or /l m n r/ is just over 200 Hz. For speaker KJ of Durban the difference for F2 in these two environments is smaller – *ja* is fronter by 72 Hz.

Speaker	**After /j/**			**Other BATH Vowel**		
	F1	*F2*	*n*	*F1*	*F2*	*n*
AT	735	1528	31	764	1323	51
KJ	794	1460	67	793	1388	70

Table 1: A preliminary comparison between BATH after /j/ and in other environments among two young, White female speakers.

The ten most frequent words in the data base were: *are* (n = 553), *father* (507), *after* (483), *car* (325), *part* (245), *hard* (233), *half* (212), *far* (180), *ask* (179), and *start* (172). The bulk of the tokens by far were monosyllables, though disyllables and trisyllables were not excluded, provided [ɑ:] was clearly articulated. Words of more than three syllables were excluded. We checked that the number of syllables in the word did not affect the quality of /ɑ:/. Words which had more than 20 tokens overall were chosen for this purpose. There were 38 of these words accounting for 4814 tokens - the bulk of the data base. Table 2 provides the means and standard deviations and pairwise t-tests, indicating that there is insufficient evidence to argue for statistically discernible differences for BATH means associated with number of syllables per word.

	F1		**F2**		
Word type	***Means***	***SD***	***Means***	***SD***	***n***
Monosyllables (23)	8.24	0.26	4.72	0.33	3187
Disyllables (9)	8.29	0.35	4.63	0.40	1281
Trisyllables (6)	8.32	0.35	4.84	0.18	346
Pairwise t-tests	F1		F2		
Monosyllables – Disyllables	p = 0.48		p = 0.29		
Monosyllables – Trisyllables	p = 0.45		p = 0.13		
Disyllables – Trisyllables	p = 0.44		p = 0.11		

Table 2: Comparison of F1 and F2 means by number of syllables. (n = 4814 tokens)

In contrast to assertions in previous studies cited above that there was no phonological conditioning for BATH in SAE, laboratory phoneticians further advocate teasing out possible effects of velars (Bauer 2012). We therefore checked velar effects (in words like *bark, garden*) for possible differences from the rest of the BATH set, even though (unlike for palatal /j/) no such effect was apparent to us by ear or by casual inspection of the Hertz scores for F1 and F2. We performed this check on the same subset of words described above, heeding the advice of laboratory phoneticians to test voiced and voiceless velars separately. We tested for velar and glottal effects after /k/, /g/ and /h/ and for velar effects before /k/. (No vowels are followed by /h/ in English and there were no common words with the BATH vowel followed by /g/, with items like *arg(ue)* occurring infrequently in our data base). Table 3 gives the result of the t-tests in BARK units which are discussed below. 'After other' denotes initial BATH vowels and those after non-velars and glottals, excluding /l m n r/:

BARK Means	F1	SD	F2	SD	n
After k	8.13	0.23	4.35	0.50	376
After g	8.33	0.19	4.77	0.07	78
After h	8.16	0.21	4.61	0.29	530
After 'other'	8.33	0.32	4.76	0.35	3830

Table 3: A comparison of BATH frequencies after velars, glottals and other segments (n = 4814 tokens).

Table 3 shows the closer overall means for all environments checked, indicating that velars and glottals average out similarly as preceding environments for BATH. Table 4 examines the effect of following voiceless velar environments. Here the F2 means for BATH are indeed backer before /k/ by 0.3 BARK units. This order of difference does not seem large enough to suggest a special structural condition or allophony or to be perceptually salient. For this reason we did not separate BATH tokens before /k/ as a special set in our analysis.

BARK Means	F1	Std Dev	F2	Std Dev	n
Before k	8.15	0.28	4.99	0.43	201
Before 'other'	8.31	0.31	4.69	0.33	5404

Table 4: A comparison of BATH frequencies before /k/ versus other segments amongst the 38 most frequently occurring words in the sample.

In order to facilitate comparisons beyond the physiological constraints of variations in vocal tract sizes normalisation of vowels is obligatory. Of the variety of techniques available we settled on the BARK scale, which may be described as a vowel-intrinsic, formant-extrinsic and speaker-intrinsic method of measurement.[5] The reason for choosing BARK is that it is one of the few viable options for analysis when only a few vowels have been studied in detail, as in the early stages of dialect description such as this one.[6] That BARK is vowel- intrinsic confers the further advantage of its being less susceptible to the phonological differences between dialects than vowel-extrinsic methods (Thomas 2011:165). The BARK method subjects the F1, F2 and F3 formant values to a series of mathematical transformations to give normalised values for F1 and F2 (Thomas 2011:57-8). One drawback of this normalisation is a warping of the vowel space that does not accord with traditional notions of the vowel quadrilateral, especially in the low back area, which is empty. To show this warping, we reproduce as figure 2 Erik Thomas' (2011:146) diagram for Daniel Jones' recorded cardinal vowel demonstrations of the 1950s, with F1 and F2 plots in Hz. We went a step further and converted the figures given by Thomas into the BARK scale (via the NORM website of Kendall and Thomas), which will form a basis for interpreting the graphs provided in this paper. Despite the non-traditional vowel charts in figures 2 and 3 we

[5] The method is formant-extrinsic since it uses F3 as part of the calculations for deriving normalised F1 and F2.

[6] Because of the labour-intensive method of logging formants via PRAAT, we had not analysed enough tokens of vowels beyond BATH (and Word List monophthongs) to allow for optimal vowel extrinsic normalisation of the kind offered by the Lobanov or Neary method. In future work we hope to remedy this limitation via Forced Alignment methods so as to check the results with other normalisation methods such as Watt-Fabricius or Lobanov.

deemed BARK normalisation the currently most effective way of analysing our data, and demonstrating variation.

The data was run through SPSS routines for two univariate ANOVA procedures for the transformed response variables. The purpose of these ANOVA runs was to elicit insights into which of the two factors of city and gender dominated the variation exhibited by observations in the 10 separate groups of Whites. This univariate information led to an attempt to suggest crude but meaningful judgements about the separability or similarity of the locations of the 10 averages. For White speakers these judgements permitted the identification of 6 plausible main clusters, generally with some minor overlaps with adjacent clusters, as shown in figure 4.[7]

Figure 5 shows the envelope of variation for BATH within the frame of figure 2, with [a], [ɑ], [ɒ], [ɔ], [ʌ] and [o] as guiding points. In particular cardinal 14, [ʌ] proved a useful peg in partitioning the scatterplot and its data into four quadrants, as shown in figure 6. The purpose of this particular partition was to suggest a substantively meaningful sociophonetic description of the patterns suggested in the ANOVA run.

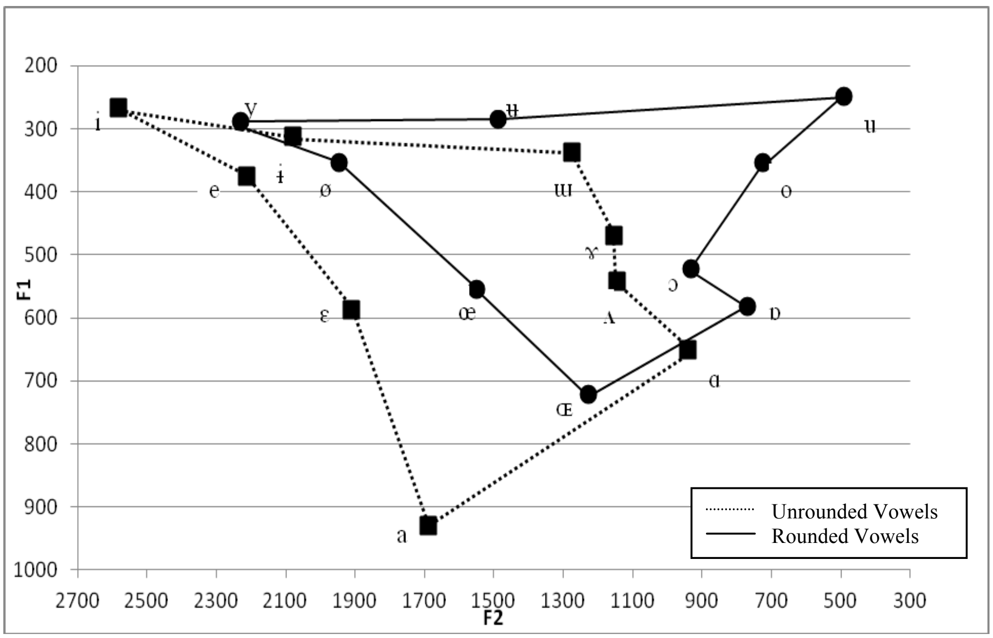


Figure 2: *Daniel Jones' Cardinal vowels in Hz* (from Thomas 2011:146)

Quadrant 1 of figure 6 has BATH means higher and backer than CV [ʌ]; quadrant 2 has BATH means lower and backer than CV [ʌ]; quadrant 3 has BATH means lower and fronter than CV [ʌ]; and quadrant 4 has BATH means higher and fronter than CV [ʌ]. As figure 6 shows, cluster 1 falls into quadrant 3; clusters 2, 3 and 4 fall into quadrant 2 and clusters 5 and 6 fall into quadrant 1.

[7] The gaps in some sections of these clusters are filled with groupings from the 4 ethnicities in the full study.

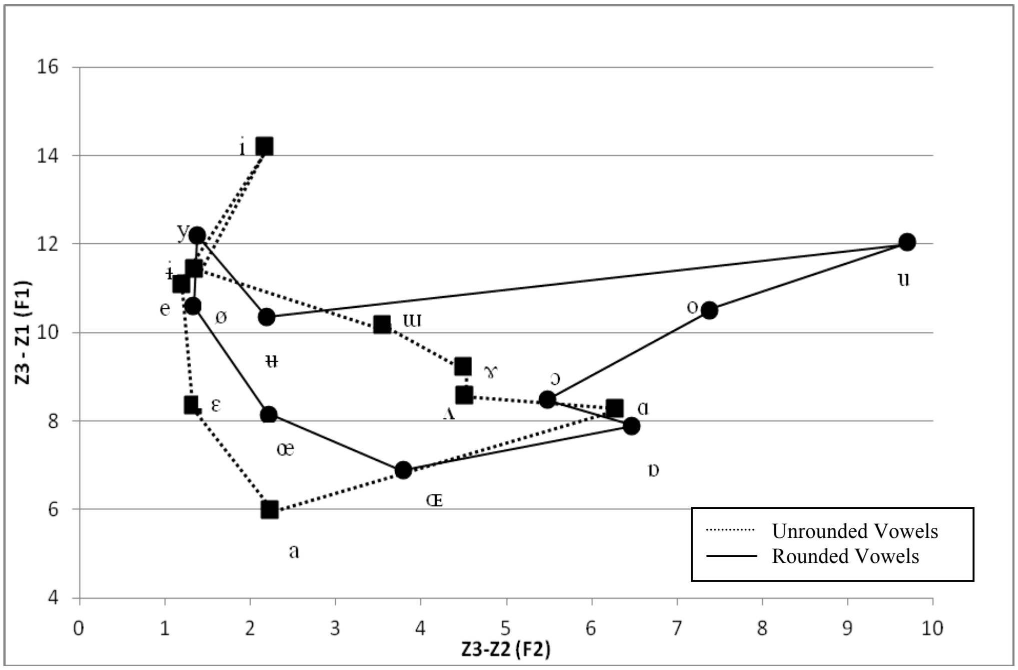


Figure 3: BARK scale graph for Daniel Jones' Cardinal vowels.

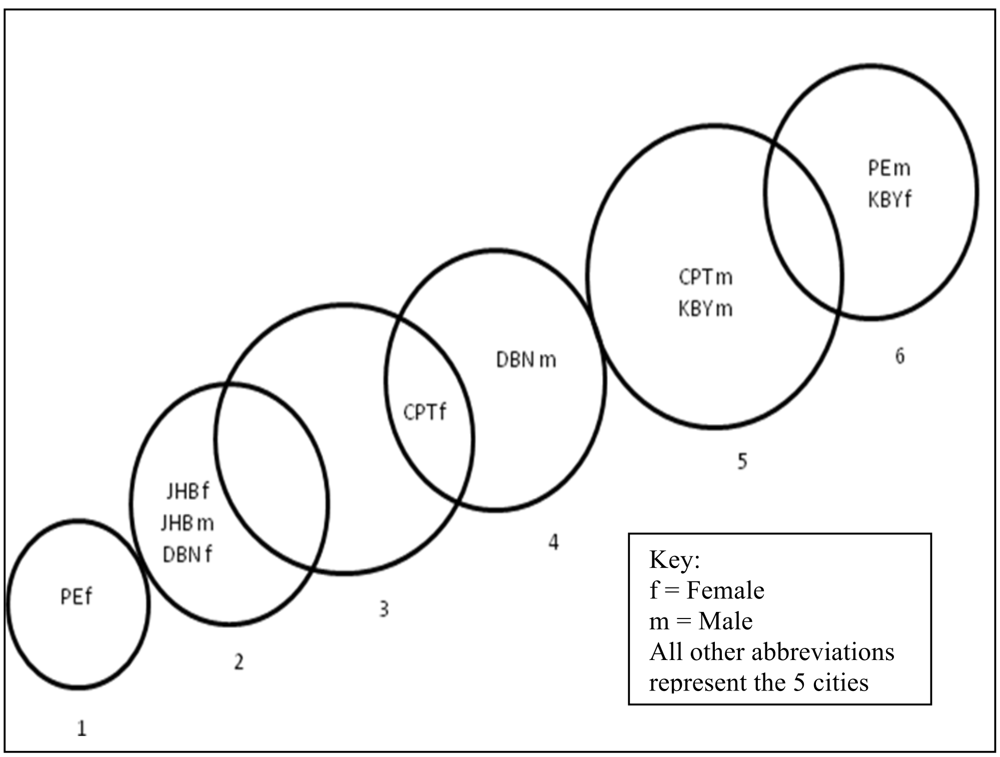


Figure 4: The 6 main clusters showings results for Whites by city and gender.

4 Results

In three cities females show a lower and fronter BATH mean than males (except in JHB where they are essentially the same). Figure 6 shows that PE females are at one extreme, with a mean in quadrant 3 (cluster 1), suggesting a vowel that is relatively low and central - i.e. [ä:] in the (traditional) RP range. At the other extreme in quadrant 1 are KBY (both genders) and PE and CPT males, having a mean that suggests a raised and backed [ɔ:].[8] All the other sub-groups are intermediate as follows. JHB and DBN (both genders) fall in quadrant 2 (showing slightly raised and backed means). CPT females fall into quadrant 3 (cluster 3), thus slightly raised and central; and overall fronter than their counterparts in all cities but PE. The polarisation of males and females in our PE results is quite stark; though this result should be tested against a larger constructed sample than our 10 speakers in the future. The pattern is matched by CPT, for whom females (as we have seen) fall into quadrant 3 (cluster 3), whereas males fall into quadrant 1 (cluster 5). It is also matched by DBN where males and females fall into the same quadrant (2), showing back and slightly raised means. However, the female means fall into cluster 2 whereas males are in the slightly higher and backer cluster 4. For KBY the gender pattern is reversed. While both males and females fall into the same quadrant (1), with males in cluster 5 (raised and backed) the female means are in cluster 6, showing even greater raised and backed means.

This observation suggests another facet of small city/ town effects worthy of future studies: women having, on average, broader variants. In JHB males and females are close together in quadrant 2 and cluster 2 (unraised and back), thus showing less backing and rounding compared to some other cities, though we caution that the sub-sample is small and entirely middle-class (see Bekker 2012 on the significance of BATH backing in JHB).

BATH is thus a good diagnostic vowel in characterising sociolinguistic and regional differentiation in White SAE. Some differentiation occurs amongst Whites, in terms of gender mainly. Backing is no longer an "extreme" working-class feature as suggested by Lanham (1978:153), since middle-class males in all cities, and women in three cities do exhibit backed variants. In terms of regional distribution it is notable that in KBY White speakers show considerably greater backing and raising than in the other cities.[9] This sharing of norms is suggestive of a small town and country district effect which is a desideratum for future research.

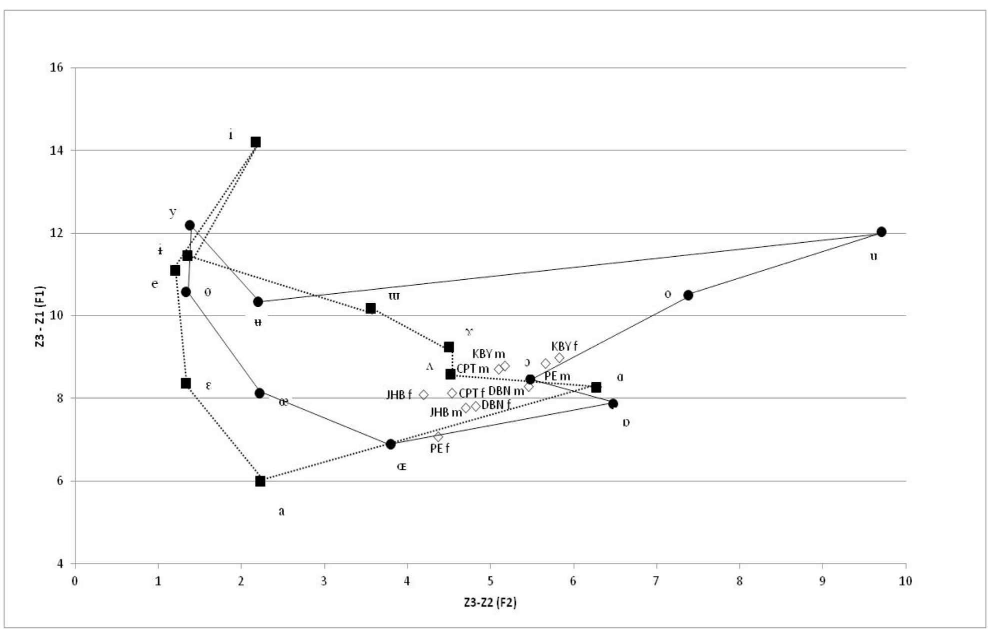


Figure 5: The 6 main clusters showing results for whites by city and gender

[8] This is usually accompanied by weak rounding.
[9] The pattern also applies to Whites with Afrikaans as L1 in KBY, who are not included in this paper.

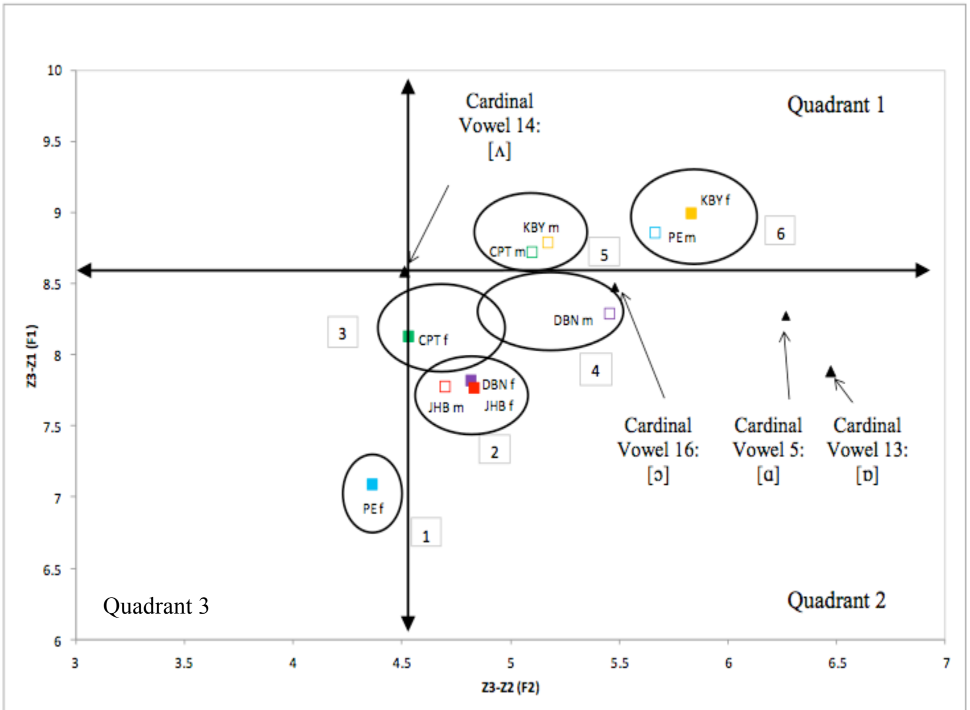


Figure 6: The four quadrants with [ʌ] as dividing point for White South African English.

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