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Retreat from the Southern Vowel Shift in Raleigh, NC: Social Factors

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Abstract
New automated methods for large-scale acoustic analysis bring expanded opportunities for investigating social factors influencing variation and change in vowel systems. This paper explores social factors in a 108-speaker subset of a 250-speaker conversational corpus from Raleigh, North Carolina, where the community has shifted in nearly uniform fashion from a Southern vowel system to an aregional standard system. Age, occupation, parents' occupation, sex, and neighborhood are evaluated using linear mixed-effects models, with Z2-Z1 for each of the 5 front vowels as a separate dependent variable. While there are some significant occupational effects, year of birth is the strongest and most consistent social factor, indicating considerable uniformity during the course of change. Adding more speakers from the corpus will facilitate the use of other socioeconomic variables such as education level as well as finer-grained occupation variables, which may provide insight as to the mechanisms by which professional speakers lead the shift.

Retreat from the Southern Vowel Shift in Raleigh, NC: Social Factors

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1 Introduction

New automated methods for large-scale acoustic analysis bring expanded opportunities for investigating social factors influencing variation and change in vowel systems. While many previous studies of vowel change have found significant effects of not only age, but also sex, social class, or local social group membership (e.g., Baranowski 2008, Eckert 2000, Trudgill 1974), this paper takes the perspective that the most puzzling fact about language change in a community is its eventual *uniformity* across social groups. Some social groups — e.g., upper working class females — lead and others lag, but they all, in the aggregate, transition from the older to the newer linguistic variant over time. Labov (2010) argues that face-to-face interaction cannot explain this community-wide uniformity:

> Whatever forces are driving sound change in Philadelphia, they are operating in the same way on both genders and on all social classes. If the 'social meaning' that drives sound change were transmitted by intimate face-to-face interaction, the rate of change should diminish as the change spreads from the generating source. (Labov 2010:202)

In Labov's apparent-time analysis of several vowel changes in Philadelphia, different social classes show very similar rates of change over time. The social mechanisms that underlie linguistic uniformity within the community remain largely unknown, but the recent availability of large-scale data is promising (Labov, Rosenfelder, and Fruehwald 2013).

This paper explores social factors in a 108-speaker subset of a conversational corpus from Raleigh, North Carolina, where the community has shifted in nearly uniform fashion from a Southern vowel system to an aregional standard system.

2 The Dialect Contact Setting of Raleigh, North Carolina

During the second half of the 20th century, Raleigh, North Carolina experienced rapid population growth due in part to migration from outside the South. The local dialect shifted from a predominantly Southern vowel system to one that lacks distinctive regional features (Dodsworth and Kohn 2012). The retreat from the Southern Vowel Shift (SVS; Labov, Ash, and Boberg 2006), involves two types of movement in the front vowel system:

(1) In the Southern system, the nuclei of the front tense vowels /i/ and /e/ were backed and lowered. During the reversal of the SVS, these vowels return to the higher, fronter positions that they occupy in many other American English dialects.
(2) The nuclei of the front lax vowels /ɪ/, /ɛ/, and /æ/ were raised and fronted in the Southern system. In the reversal of the SVS, they return to their less peripheral positions.

Figure 1 shows contrasting front vowel systems for a Southern-shifted male speaker born in 1943 (left) and a non-Southern-shifted male speaker born in 1986 (right), both lifelong residents of Raleigh. The older speaker on the left represents the older Raleigh system wherein /e/ and /ɛ/ are not distinct at the nucleus; some speakers of the same generation have these vowels fully reversed, but most have very widely dispersed, heavily overlapping categories. This speaker also illustrates his generation's overlapping but not reversed distribution of the high front vowels, /i/ and /ɪ/. Finally, /æ/ is highly variable, extending well into mid-vowel territory with respect to both F1 and F2.

The younger speaker, in the right panel of Figure 1, has none of these SVS features. /i/ and /ɪ/ barely overlap, and /e/ is reliably higher and fronter than /ɛ/. /æ/ is much less variable compared to

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the older speaker, and it is consistently lower and not fronter than /ɛ/. In short, SVS features were common in Raleigh during the 1940s, but they disappeared almost entirely by the mid-1980s.

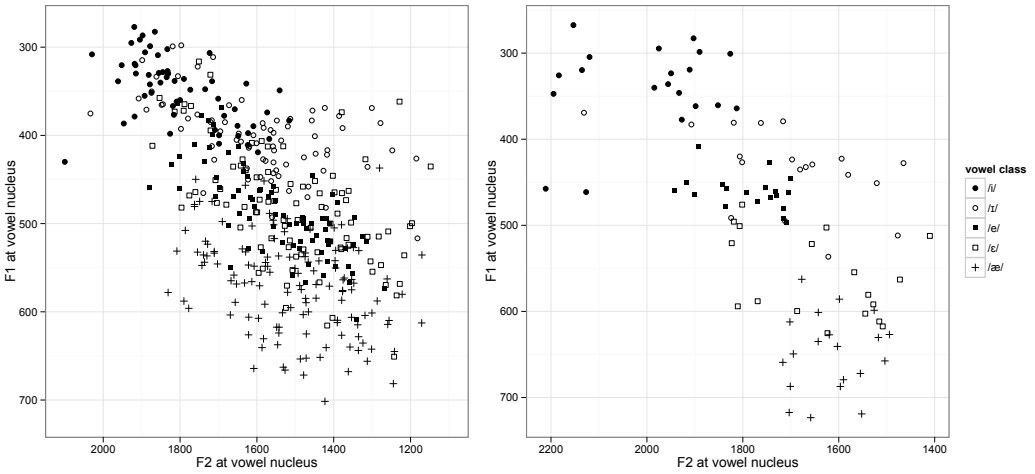

Figure 1: Front vowel system for male Raleigh speakers born in 1943 (left) and 1986 (right). The speaker born in 1943 is Southern-shifted, while the speaker born in 1986 illustrates the newer, non-Southern community system.

The Southern Vowel Shift involves several other elements, including the stereotypical /ai/ ungliding in open syllables and before voiced obstruents as in *high* and *tide*, respectively. In fact, Labov et al. (2006) postulate /ai/ ungliding as the triggering event for the SVS, leading to the retraction of /e/. The current study, however, focuses on the five front vowels. As discussed further in Dodsworth and Kohn 2012, many Southern urban areas are showing rapid reversal of the SVS as the result of post-WWII migration from outside the South. In Raleigh, migration and the resulting urban growth were catalyzed by the development of Research Triangle Park (RTP), a technology industry hub that has attracted thousands of professionals from the Northern U.S. since the early 1960s. Contact between Southern and non-Southern dialects in Raleigh has led to the gradual but quick elimination of Southern variants. In this context, the current article investigates the social factors that shaped the retreat from the SVS during the first and second generations of dialect contact.

As a site of large-scale dialect contact, Raleigh offers a useful setting in which to explore the social factors shaping language change. Contact-induced change generally has an obvious motivating force: interaction between groups that were previously isolated from one another. In Trudgill's (1986, 1998) models, dialect contact settings give rise to new dialect formation within just one or two generations; therefore, change over time is easy to discern. Most importantly, contact-induced changes offer the chance to test whether degree of exposure to the in-migrating group is a significant factor in the loss of regionally distinctive linguistic forms.

Previous variationist work on dialect contact and new dialect formation give some evidence of the effects of face-to-face interaction. As Kerswill and Williams (2000) note, the process of *focusing* — the reduction of available linguistic forms in a dialect contact setting — may take longer or remain incomplete in sparsely populated regions without regular contact among speakers. For example, Mæhlum (1997), cited in Kerswill and Trudgill 2005, finds an unfocused dialect setting in two northern Norwegian communities even 200 years after migration from the east. The reasons, Mæhlum suggests, are that speakers lived on isolated farms rather than in towns, and that some descendants of migrants maintained ties with eastern regions. Further, Trudgill's analysis of the children and grandchildren of the first European settlers in New Zealand similarly shows incomplete focusing during the first native-born generation (Trudgill 1998; Trudgill et al. 2000). Again, the lack of focusing is attributed in part to the lack of regular interaction among children, as the population was not well connected and education was not centralized. When children have more regular interaction, it is possible for leveling and focusing to occur more quickly. Kerswill and Williams (2000) find significant focusing of phonological variables within the first native-born

generation in the "new town" of Milton Keynes. The speakers in this generation, who are children at the time of recording and who live in two adjacent neighborhoods, have regular contact at school. Kerswill and Williams also find evidence that children in Milton Keynes who are more positively oriented toward their peer group are more likely to use advanced variants of regional changes in progress, as in the fronting and unrounding of /o/. In addition, Kerswill and Williams (1999) report that working class children in Milton Keynes primarily use non-standard grammatical and phonological variants, in contrast with their middle class peers.

Most of these and related studies are concerned with the speed of linguistic focusing and the uniformity of the resulting new dialect. Previous work on Raleigh (Dodsworth and Kohn 2012) shows that focusing began immediately after large-scale contact began, with the first generation of Raleigh natives to grow up after the beginning of large-scale migration from outside the South. Focusing has continued through the next generation. The present study uses a significantly larger speaker sample and additionally investigates the macrosocial factors that may have facilitated the rapid transition to a non-Southern dialect. The quantitative analysis addresses the following questions:

(1) What is the trajectory of change over time for each of the five front vowels?
(2) What are the effects of occupation and parents' occupation? Specifically, do white collar speakers in this generation lead in the reversal of the SVS relative to blue collar speakers?
(3) Within the first contact generation — speakers born between 1950 and 1970 — what are the effects of neighborhood? Do speakers who grew up in the North Raleigh suburbs, which developed in tandem with the industry-motivated migration, lead in the reversal of the SVS?

3 Data and Methods

The Raleigh corpus consists of conversational interviews, each roughly an hour long, with about 250 people who grew up in and currently live in Raleigh. Data collection began in 2008 and is ongoing. Most interviews took place in speakers' homes with just the speaker and, in some cases, a spouse or friend present. With few exceptions, all speakers were asked where they attended school from earliest to latest, where in Raleigh they grew up, whether they knew any children of migrants from outside the South while growing up, where their parents grew up, what occupations their parents had, whether their parents attended college, and what their own past and current occupations are. Most speakers discussed the rapid social and economic changes that Raleigh has undergone, in particular the loss of Southern cultural and linguistic norms. The majority of the interviews were conducted by either the author or by one of two female research assistants of similar age and dialect history.

The current paper reports data from 108 of the interviews. Formant values were measured in Praat. For 65 speakers, vowel tokens were identified by hand in the conversational interviews. Approximately 20 closed-syllable tokens per speaker of each of the five front vowels were measured, as well as 20 tokens of the 'cot' vowel to supplement the normalization process. The remaining interviews in the present sample were transcribed and aligned to the sound file using P2FA (Yuan and Liberman 2008). Vowel tokens were identified and measured automatically, then hand-corrected where necessary. These methods have dramatically increased token counts, such that each speaker now has 50 to 100 tokens per vowel. Tokens are excluded from the analysis if they meet any of the following criteria: duration under .06 seconds, unusually high pitch, breathy, adjacent to a vowel, liquid, or glide, appearing before a nasal consonant, or occurring in a function word. Lobanov normalization (Lobanov 1971) and all other analysis is implemented in R. Additional back vowels (other than 'cot') were excluded from the normalization procedure due to the highly variable occurrence of back vowel fronting in Southern dialects.

4 Results

Figure 2 shows change across apparent time for each of the five front vowels. The y-axis represents Lobanov-normalized F2 minus Lobanov-normalized F1 in order to capture movement along the front diagonal. As expected, the tense vowels (labeled in Figure 2 as *beet* and *bait*) become

higher and fronter, while the lax vowels (labeled in Figure 2 as *bit*, *bet*, and *bat*) retract. Figure 2 also shows that for speakers born before about 1950, the *bait* and *bet* nuclei are reversed, while the *beet* and *bit* nuclei were never reversed in Raleigh.

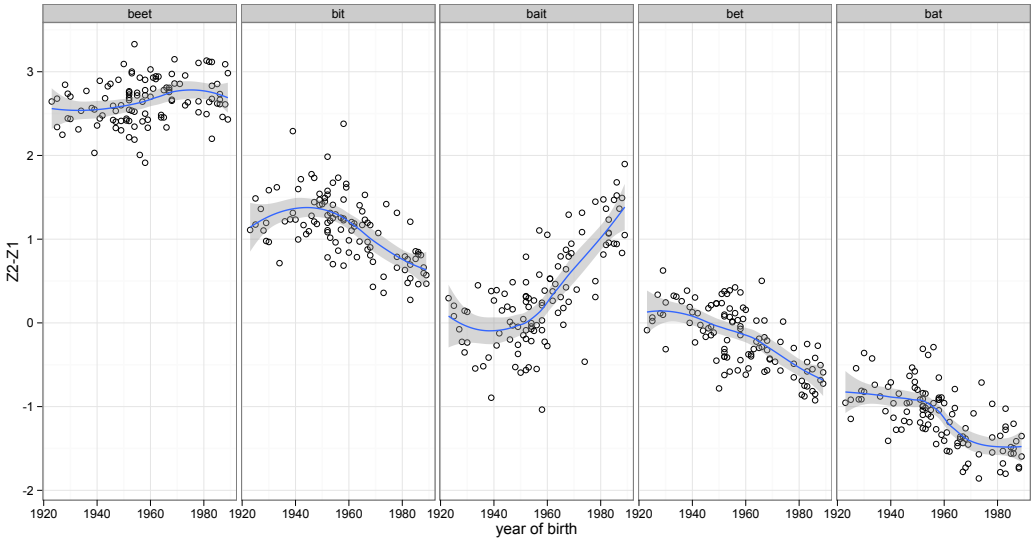

Figure 2: Change across apparent time for the five front vowels. Each circle represents one speaker's mean.

Although Figure 2 shows only speaker means, it offers an initial view of the community-wide uniformity among speakers close in age. With very few exceptions, speakers of similar age show similar degrees of participation in the SVS. Figure 3 additionally shows that females (solid lines) and males (dashed lines) are retreating from the SVS at about the same rate, and neither group has an overall lead. There are, however, a few visible male outliers who maintain Southern variants of *bit* and *bait*.

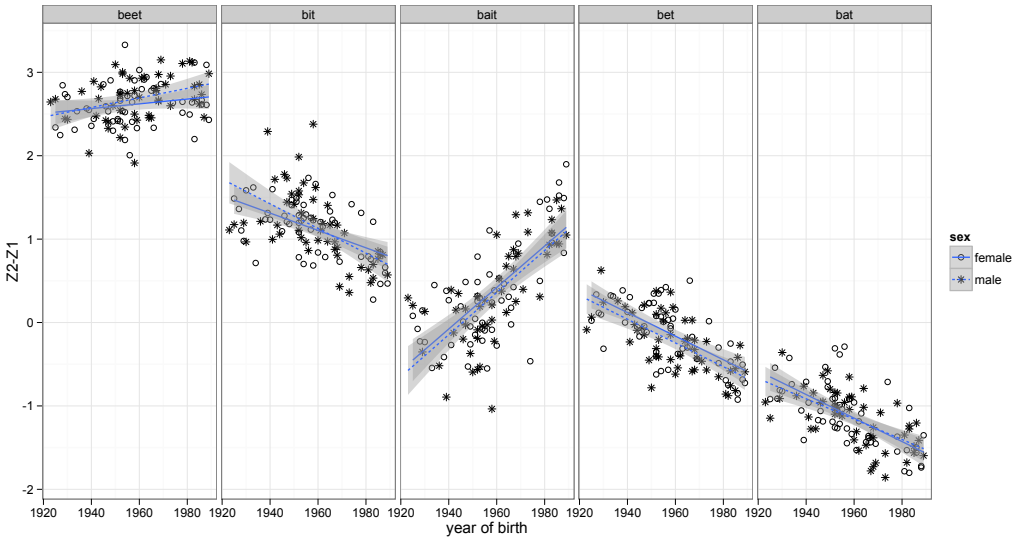

Figure 3: Females and males show nearly identical rates of change for all five vowels.

Because the SVS carries national stigma, and because non-Southern variants were imported to Raleigh largely by professional technology-sector workers from outside the South, we can reasonably expect occupation to account for some of the variation among speakers of the same age in Figure 2. Effects of occupation are difficult to assess visually because the speaker sample is unbalanced: there are 85 professional, 14 unskilled white collar, and 9 blue collar speakers. In addition, nearly all of the youngest speakers are in the professional category, and almost all of them have white collar parents. Figure 4 shows separate regression lines for blue collar, unskilled white collar, and professional groups. Professional speakers appear to lead the retreat from the SVS, and in the cases of /e/, /ɛ/, and /æ/, professionals appear to be changing at a faster rate than blue collar speakers (though the statistical analysis below revises this conclusion somewhat).

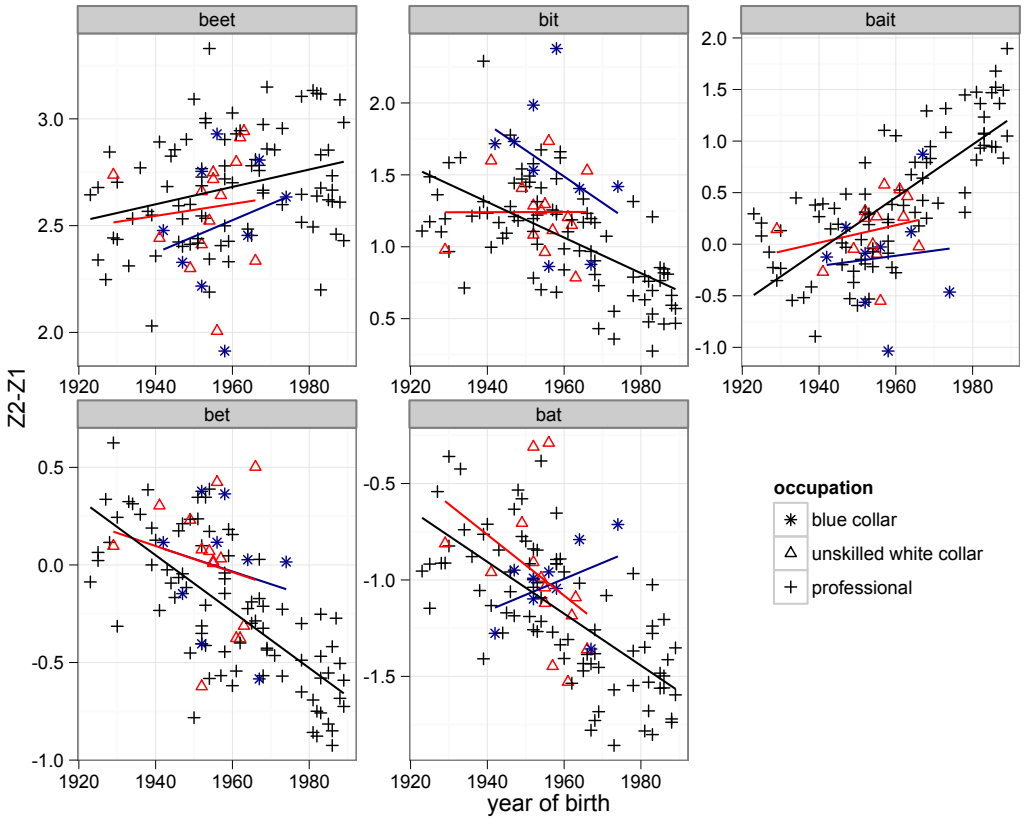

Figure 4: Effects of occupation and year of birth for the five front vowels.

Figure 5 shows the trajectories of /e/ and /ɛ/ in relation to each other for blue collar, unskilled white collar, and professional speakers, respectively. Here the regression lines are based on individual tokens rather than speaker means. Canonically in the SVS, these vowels are "reversed" such that /ɛ/ is higher and fronter. Therefore, the retreat from the SVS is expected to look like the rightmost (professional) panel in Figure 5, where /e/ gradually becomes the higher, fronter vowel. The blue collar panel shows a clear retreat from the SVS system over time, but it is happening more slowly; by about 1970 when the youngest blue collar speaker was born, the vowels were no longer reversed but had not attained distinct, non-Southern positions. The unskilled white collar panel shows, unexpectedly, that both /e/ and /ɛ/ are raising and fronting over time. Looking back at the 'bet' panel in Figure 4, unskilled white collar speakers actually show a split between very Southern and very non-Southern speakers during the 1950s and 1960s, and a similar pattern occurs in the 'bat' panel.

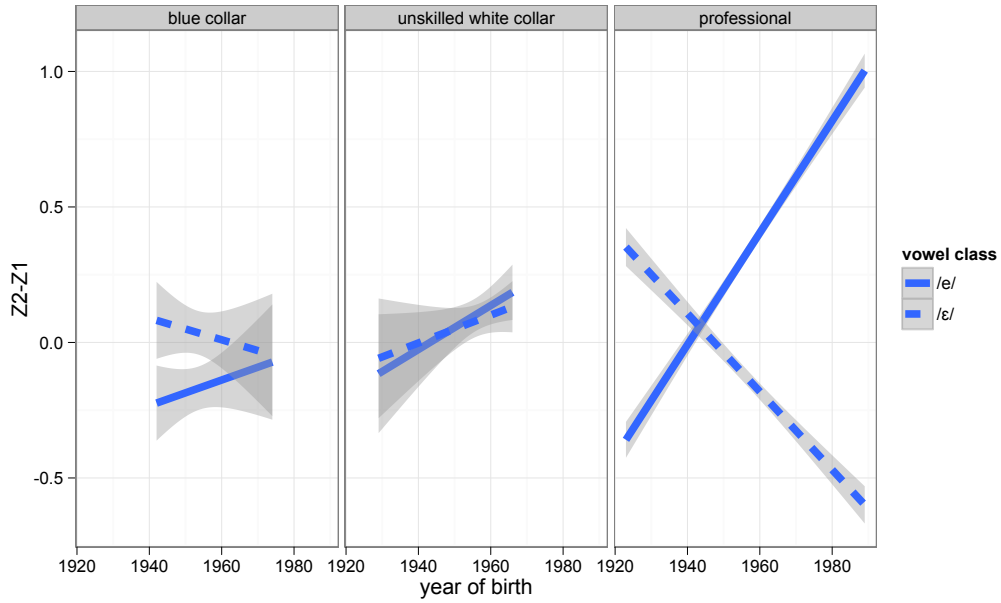

Figure 5. The relationship between /e/ and /ɛ/ across apparent time by occupation.

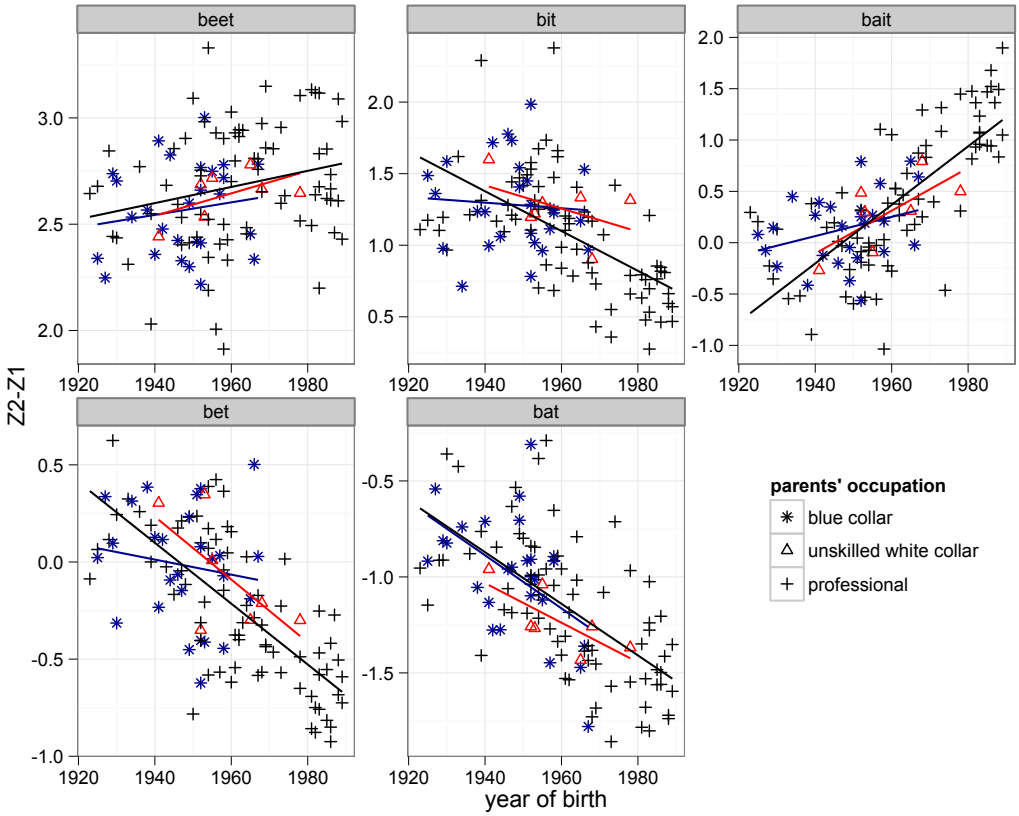

Figure 6: Effects of parents' occupation and year of birth for the five front vowels.

In Figure 6, parents' occupation shows some evidence of a professional lead, but the effects appear weaker than the occupational effects in Figure 4. The main insight gained from Figure 6 is that no speaker in this sample born after 1980 has blue collar parents, which restricts the analysis.

Figures 2–6 suggest that only year of birth and occupation significantly predict the distribution of SVS variants during the first two generations of dialect contact in Raleigh. Linear mixed-effects models were used to test this hypothesis. The dependent variable was Z2-Z1, the normalized front diagonal. Table 1 gives the independent variables in the initial model. Occupation and parents' occupation were not independent in a chi-squared test ($p < .001$), and so they were used in separate models. Token counts are shown in Table 2.

Variable	**Levels**
place of articulation of preceding consonant	coronal, /h/, labial, none, velar
place of articulation of following consonant	coronal, /h/, labial, none, velar
manner of articulation of following consonant	stop, fricative, affricate, none
voicing of following consonant	voiced, voiceless, none
duration	(continuous)
sex	male, female
year of birth	(continuous)
occupation	blue collar, unskilled white collar, professional white collar
parents' occupation	blue collar, unskilled white collar, professional white collar
random intercept for speaker	108 speakers

Table 1: Variables and levels in initial mixed-effects models for each vowel. Occupation and parents' occupation were used in separate models.

Vowel class	**N**
/i/	3857
/ɪ/	4663
/e/	5021
/ɛ/	4499
/æ/	5303

Table 2: Token counts.

Table 3 reports the social factors that were included in the best-fitting model for each vowel, as determined by the AIC. The linguistic factors — place, manner, voice, and duration — showed significant effects in all models; they are not shown here. When social factors were significant as main effects, interactions between those factors and year of birth were included, but they were never significant and never improved the model. Therefore, the results in Table 3 are from models without the interactions.

Year of birth shows the strongest social effect for each of the vowels, as expected. Professional white collar speakers lead in the retreat from the SVS for /i/, /ɪ/, and /e/, but there are no significant occupational effects for /ɛ/ or /æ/. There is a male lead only for /i/, and parents' occupation is never significant. The absence of significant occupational effects for three of the vowels seems surprising in light of Figures 4 and 5, where professional speakers apparently lead the retreat from the SVS for all five vowels. But Figure 4, which shows only mean values by speaker, collapses enormous within-speaker variability. As the community transitions from a Southern-shifted system to an aregional standard, many speakers maintain elements of both systems. Intra-speaker variability and its relation to social factors is an area for future investigation. In particular, speakers in the "professional" category have a wide range of occupations which probably differ in the opportunities they provide for hearing and using SVS variants. As Sharma (2011) has shown, speakers or groups who appear similar in the aggregate may differ in their strategic use of sociolinguistic variables.

Vowel class	Social factors	t-value
/i/	male (*v. female*)	2.1*
	year of birth	3.1**
	professional (*v. blue collar*)	2.8**
/ɪ/	year of birth	-6.8***
	unskilled white collar (*v. blue collar*)	-2.3*
	professional (*v. blue collar*)	-4.1***
/e/	year of birth	10.0***
	professional (*v. blue collar*)	3.0**
/ɛ/	year of birth	-8.6***
/æ/	year of birth	-8.0***

Table 3. Significant social factors in best-fitting linear mixed-effects models. *p < .05, **p < .01, ***p < .001.

The remaining social factor is neighborhood. In some urban sociolinguistic studies, such as Labov 2001, neighborhood is used as a categorical indicator of socioeconomic status. In Raleigh, however, neighborhood also estimates a speaker's degree of contact with non-Southerners during adolescence, especially for speakers born during the 1950s and 1960s. Raleigh speakers are categorized into four areas of the city on the basis of high school attendance (and thus adolescent peer network):

(1) *downtown*: During sociolinguistic interviews, speakers who graduated from the city (i.e., non-suburban) high schools before about 1970 report not having known many peers from outside the South. They grew up primarily with other Raleigh natives. (72 speakers)
(2) *northeast*: Neighborhoods in the northeastern edge of Raleigh, and extending into areas that were rural until recently, feed mainly into one public high school. This high school currently lies in the suburbs and draws largely from a suburban student population, but as many Raleigh speakers reported during interviews, it "used to be country". This area has been slower to urbanize than the north-central and north-western areas, which are closer to RTP and to Duke and Chapel Hill. (7 speakers)
(3) *southern suburbs*: Areas to the South of Raleigh, including neighborhoods that extend into the city of Garner, have not undergone the wholesale suburbanization visible in north Raleigh. They are locally considered more culturally Southern than the northern neighborhoods, and their average income is lower (Census 2010). While certain neighborhoods to the southeast and southwest (near the town of Cary) are now sites of suburban development, the southern neighborhoods as a group were not affected by the technology industry to the same degree as the northern neighborhoods, probably because they are further from RTP. (9 speakers)
(4) *northern suburbs*: Nearly every Raleigh interview with a speaker born before 1990 (which is to say, nearly all of them) includes a discussion of the transformation of north Raleigh. Before the 1960s, the northern edge of the city of Raleigh marked the boundary between urban and rural space. From the 1960s onward, the northern rural neighborhoods quickly became dense suburban areas, and two new public high schools emerged. Several of the Raleigh speakers born during the 1980s report having no elementary school peers who were born in Raleigh, all of them having moved as small children from northern states. North Raleigh is not locally considered culturally Southern. (14 speakers)

Speakers who went to high school in north Raleigh are likely to have had more peers who moved with their families from outside the South, relative to speakers who went to high school in the northeast or southern neighborhoods. Some children of early migrants to Raleigh attended the city high schools before the northern suburban schools were built. Therefore, with respect to the SVS, the predicted Southernness hierarchy is: southern suburbs > northeast > downtown > northern suburbs. The neighborhood variable is relevant only for speakers who grew up during or after the RTP-driven migration to Raleigh; furthermore, nearly all speakers born after 1970 report significant interaction with peers from outside the South during high school, regardless of neighbor-

hood. For these reasons, and to partly control for change over time, Figure 6 shows group differences between neighborhoods only for speakers born between 1950 and 1969. The speaker counts for the four groups are 32, 4, 6, and 6, respectively.

In Figure 7, downtown (in black) is placed at the left of each group as a benchmark because it has the most speakers. As expected, for all five vowels, northern suburban speakers show the least Southern distribution: higher on the y-axis for tense vowels, and lower for lax vowels (though the northern suburban *bat* distribution is large). The northeast and southern suburban groups are not consistently distinct from downtown, but this may result from the discrepancy in number of speakers.

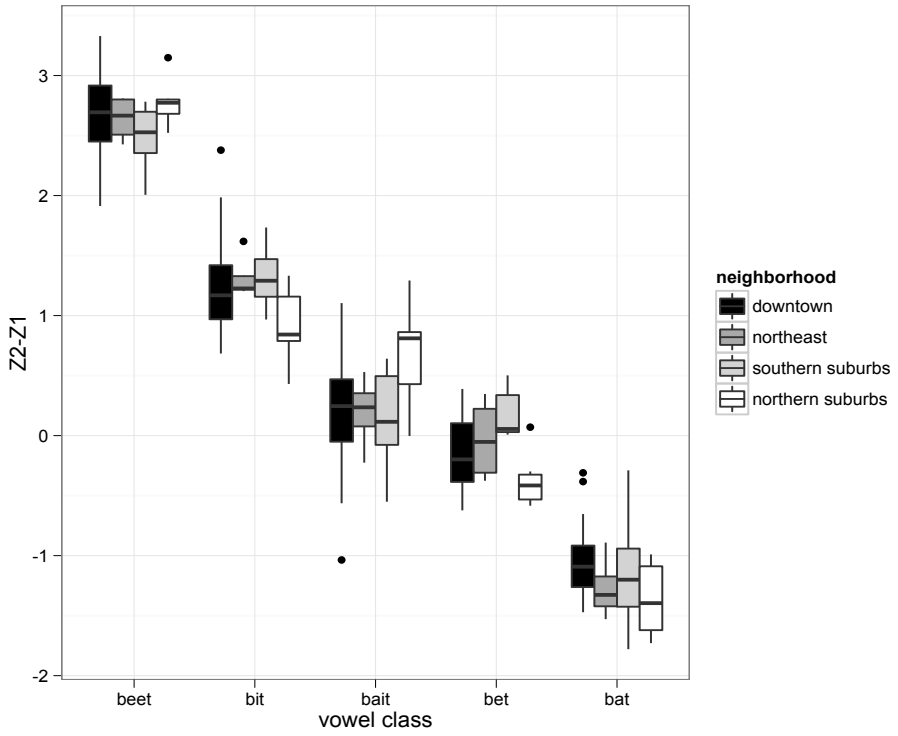

Figure 7: Distributions of speaker means for speakers born between 1950 and 1969.

The neighborhood variable was not included in the models reported in Table 3 for two reasons. First, neighborhood is irrelevant for speakers born prior to the development of the north Raleigh suburban neighborhoods. Second, neighborhood is not independent from either occupation or parents' occupation; in particular, the northern suburban speakers are predominantly professionals, and over 50% of the southern suburban speakers have unskilled white collar occupations. Neighborhood was therefore used in separate models that excluded the occupation variables and also excluded speakers born before 1950 and after 1969 (as in Figure 7). Surprisingly, neighborhood showed a significant main effect only in the case of /ɛ/, where speakers from the southern suburbs have a more Southern (raised, fronted) nucleus ($t = 2.5$, $p < .05$ for southern suburbs vs. northern suburbs). /ɛ/ is one of the two vowels that showed no significant main effects for occupation in Table 3.

5 Conclusions

In the current sample of 108 speakers in Raleigh, the strongest social factor with respect to the retreat from the SVS is year of birth, followed by occupation. Sex shows a weak main effect only in the case of /i/, and parents' occupation shows no significant effects. Neighborhood is significant only for /ɛ/, which showed no other social effects other than year of birth, and unskilled white collar speakers showed wide between-speaker variability for this vowel. Finally, there were no

significant social effects for /æ/ other than year of birth. On one hand, therefore, occupation clearly matters: professional speakers, as a group, are retreating from the SVS more quickly than other speakers. On the other hand, two of the vowels show no occupational effects, and the one neighborhood effect is surprisingly weak in view of Raleigh's recent migration history. In the context of the few significant social factors, the strong age effects indicate considerable community uniformity in the transition from one front vowel system to another.

Nevertheless, the unbalanced speaker sample prevented evaluation of the interactions between social factors, especially occupation and neighborhood, even with over 100 speakers and several thousand tokens of each phoneme. Adding more speakers from the corpus will also facilitate the use of other socioeconomic variables such as education level as well as finer-grained occupation variables, which may provide insight as to the mechanisms by which professional speakers lead the shift. As more of the data from the Raleigh corpus and other large corpora become available, we can also ask new questions (concerning the complex role of social network, for example) about the social forces behind language variation and change.

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