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The paper tests the generalisation of the curvilinear hypothesis and the tendency of females to lead linguistic change in vocalic mergers on the basis of two mergers currently in progress in Charleston, South Carolina: the low-back merger and the pin-pen merger. It is based on sociolinguistic interviews with 100 informants, aged 8-90, covering the socio-economic spectrum of the city. The speech of 90 of the informants is analysed acoustically; it is supplemented with minimal-pair tests and word list reading. F1/F2 measurements and minimal-pair test results are subjected to a series of multiple linear regression analyses, with social class, gender, age, and style as independent variables. While the low-back merger is a change from below showing a female lead and a curvilinear effect of social class, the pin-pen merger shows a decreasing monotonic relationship with social class and no female advantage. The difference is argued to be due to the two mergers being at different levels of social awareness.
INTRODUCTION

Two of the most important generalisations about the role of social factors in linguistic change that emerge from the sociolinguistic studies of speech communities conducted in the last few decades are as follows:

1. Women lead in linguistic change:
   1a. “In linguistic change from above, women adopt prestige forms at a higher rate than men.” (Labov 2001:274)
   1b. “In linguistic change from below, women use higher frequencies of innovative forms than men do.” (Labov 2001:292)

2. The curvilinear hypothesis: Linguistic changes from below originate in the interior social classes, rather than the highest or the lowest-status group (Labov 2001).

There is substantial evidence for the first generalisation, both for changes from above and for changes from below. Labov (1990, 2001) summarises the evidence supporting the generalisation from numerous studies conducted in the 20th century. Although there are exceptions, e.g. the raising of /ay/ before voiceless consonants in Philadelphia led by men (Conn 2002), the majority tendency, i.e. the female lead, is clear. In addition, the male-led changes that have been found tend to be isolated shifts of individual sounds, as opposed to changes involving groups of sounds, as in chain shifts or parallel shifts. A recent example

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2 Above or below the level of social awareness.
of a female-lead sound change in progress is the fronting of /ow/\(^3\), as in *goat* and *so*, in Charleston, South Carolina (Fig. 1).

**Figure 1.** Fronting of /ow/ in checked position (goat, boat, etc.) in apparent time by decade in Charleston, SC, based on separate multiple regression analyses for women (48) and men (42); expected $F2 = $ regression constant + coefficient for each decade

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\(^3\) This paper adopts the phonemic notation of the *Atlas of North American English* [henceforth: ANAE] (Labov, Ash, & Boberg 2006: ch. 2). Short vowels are identified by a single symbol, e.g. /i/ as in KIT, /e/, as in DRESS, or /o/, as in LOT, whereas long vowels are identified by two symbols, the first identifying the nucleus and the second identifying the direction of the glide: /y/ for front upglides, /w/ for back upglides, and /h/ for inglides, e.g. /iy/, as in FLEECE, /ey/, as in FACE, /ay/, as in PRICE, /ow/, as in GOAT, and /oh/, as in THOUGHT.
There is less evidence supporting the second generalisation. There are relatively few studies showing a curvilinear effect of social class, as there are relatively few large-scale sociolinguistic studies covering the entire socio-economic range of a city. In addition, some recent studies use a binary division of social class into lower vs. higher, working vs. middle, etc., which precludes the testing of the curvilinear hypothesis. Nonetheless, there are studies supporting the curvilinear hypothesis, such as the early exploration of Northern Cities Shift vowels in Detroit (Shuy, Wolfram, & Riley 1967; Fasold 1969), Labov’s (2006) NYC study showing a curvilinear effect in the raising of /oh/, as in caught, Trudgill’s (1974) study of Norwich English showing a curvilinear effect in the centralisation of /e/ and backing of /ay/, and Cedergren’s (1973) study of lenition of (ch) in Panama City. The most robust evidence comes from Labov’s study of Philadelphia, based on 112 speakers analysed acoustically, showing a curvilinear effect of social class in a number of vowel shifts, e.g. the fronting and raising of /aw/, as in house and down, and the fronting and raising of /ey/ in checked position, as in gate and take; the evidence is summarised in Fig. 5.7 of Labov’s (2001:171) volume.

One question that arises given the evidence mentioned above is whether these two generalisations apply to mergers as well as sound shifts. Interestingly, almost all of the evidence for these two tendencies comes from the study of vowel shifts and lenition processes. Or put differently, whenever these generalisations are reported, as in, e.g., Ash (2013), the evidence presented in their support comes from vowel shifts or lenition processes, but never from mergers. In general, the evidence for the role of social factors in mergers is much less robust than in the case of vowel shifts and lenition processes. There
have been quite a few studies of the low-back merger in North American English, for instance, but none report any robust evidence for the effect of social class. This includes Baranowski (2007), which, based on the acoustic analysis of 43 speakers, reports no significant social class effect for the cot-caught merger in Charleston, South Carolina.

The goal of this study is to investigate the role of social factors in vowel mergers by providing robust quantitative evidence on the basis of a larger dataset, with a view to answering the question of whether mergers, like other changes from below, show a curvilinear effect of social class and a female advantage. The dialect of Charleston is undergoing six vocalic mergers (Baranowski 2007) and is therefore particularly suitable for testing the two generalisations. This study looks at the two most vigorous mergers in progress in the dialect: the low-back merger and the pin-pen merger.

The low-back merger, also referred to as the cot-caught merger, is an unconditioned merger of the two low back vowels, /o/ and /oh/, as in cot-caught, Don-dawn, sod-sawed, etc. It is traditionally found in most of the West, Canada, Western Pennsylvania, and Eastern New England (ANAE; Johnson 2009), and has been expanding into other areas, e.g. eastern Pennsylvania (Herold 1997), Missouri (Majors 2005; Gordon 2006), San Francisco (Hall-Lew 2009) and Charleston, SC. The expansion of the merger into new dialect areas is in line with the generalisation known as Herzog’s (1965) principle, whereby mergers expand at the expense of distinctions, which, in turn, follows from Garde’s (1961) principle, whereby mergers cannot be unmerged by linguistic means (Labov 1994:311-313).

In the Inland South, the merger has generally been inhibited by the presence of a back upglide on /oh/, as in caught, saw, etc. (Thomas 2001; ANAE), preventing the loss of the phonemic distinction despite possible F1-F2 overlap of the nuclei. When the upglide is
lost, the low back merger may occur even in the South, as found by Irons (2007) in Kentucky. It should be noted that Charleston, a marginally Southern dialect, does not share this feature with the Inland South, i.e., there is usually no back upglide following the nucleus of /oh/ in Charleston (Baranowski 2007).

The pin-pen merger is a conditioned merger of /i/ and /e/ before front nasals, as in *pin-pen, him-hem, sinned-send*, etc. It is found throughout the South (Brown 1991; Montgomery & Elbe 2004; Tillery & Bailey 2004), though it is also present at scattered points across the US (Metcalf 1972; Bigham 2005; ANAE). In the South, it has been found to be receding recently in large urban centres such as Houston (Koops, Gentry, & Pantos 2008), Dallas, and Atlanta (Tillery & Bailey 2004), likely due to a large influx of non-Southerners in the last few decades (Thomas 1997, 2004).

2 Methods
The study investigates the progress of the low-back merger and the *pin-pen* merger in apparent time in Charleston, South Carolina. It is based on a sample of 100 European-American speakers recorded during sociolinguistic interviews, stratified by age (8-90), gender, and socio-economic status. Five socio-economic levels are distinguished, ranging from working to upper class. Occupation was the primary indicator of socio-economic status for levels 1-4, i.e. working to upper middle. The upper class of Charleston, following McDavid (1955: 273), is defined primarily on the basis of ancestry and connections, and only then on wealth. The speakers representing this group all come from old Charleston

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4 The *pin-pen* merger is also a feature of African American English throughout the US.
families; they grew up in the historic part of downtown Charleston south of Broad Street, or on plantations owned by their families, had full-time maids and nannies when growing up, and attended private, often single-sex, schools (see Baranowski 2007, 2008 for a more detailed discussion of this social group).

The speech of 90 of the speakers has been analysed acoustically in Praat (Boersma and Weenink 2008), with F1-F2 measurements of the speakers’ complete vowel systems, i.e. including all phonemes in different phonological environments (Baranowski 2013; ANAE: ch. 5). The measurements include spontaneous speech produced during sociolinguistic interviews, minimal-pair tests, and word list tokens. The F1/F2 values have been normalised (Nearey 1977). The vowel plots below are produced with Plotnik 9.3 (Labov 2010).

In addition, minimal-pairs tests were conducted with 97 of the speakers, using Don-dawn and cot-caught pairs for the low-back merger, and pin-pen and him-hem pairs for the pen-pin merger. The speakers read out each pair and said whether in their speech the two words sounded the same, close but slightly different, or different. The speakers’ judgments of each pair, i.e. their perception, were scored as 0, 1, or 2, respectively. Their actual production was scored (by the author) in the same way.

The results of the minimal-pair tests and the acoustic measurements are entered as dependent variables in a series of linear multiple-regression analyses in DataDesk 6.2.1, with gender, social class, and age as independent variables. Social class is entered either as a continuous variable (1-5), or as factors representing five levels: working, lower middle, middle middle, upper middle, and upper class; those are also grouped into three major
classes, i.e. working, middle, and upper. The tables below report the factors that have come out as significant.

3 RESULTS AND DISCUSSION

3.1 Low-back merger

Figure 2 shows the progress of the low-back merger in Charleston in apparent time on the basis of minimal-pair tests. Speakers aged 50 and over are largely distinct, whereas for younger speakers there is a smooth progression towards merger, with children and teenagers being largely merged. There are no significant differences between the speakers’ production and their perception of the two vowels in minimal-pair tests.

Figure 2. Merger of cot and caught in production in apparent time by decade; minimal-pair test (0=merged, 2=distinct) mean values for 97 speakers.
Social class plays a role, but it does not come out as significant when entered as a single continuous variable, indicating that the relationship may not be linear. Indeed, when social class is entered as three separate variables representing three major social class categories (working, middle, and upper class as the residual category\(^5\)), a curvilinear pattern emerges, with the class in the middle of the scale leading the change (Table 1). The lowest value of the regression coefficient for the middle class, -0.41, indicates that this group is expected to be 0.41 lower than the upper class (the residual category in the regression) on the distinction scale between 2 and 0, where lower values indicate less phonemic distinction, i.e. more merger. At the same time, Table 1 also shows that the difference between the upper class (the residual category in the regression) and the working class is not statistically significant. The curvilinear effect is shown graphically for five social classes in Figure 3\(^6\).

The lower the value of the coefficient, the less distinction there is between the two vowels for a particular social class, that is, the more advanced the merger.

\(^5\) The term *residual category* refers to the factor to which other factors constituting an independent variable, such as social class or age, are compared. In this particular case, the upper class was selected as the one to which the two other social classes are compared, but the choice is arbitrary in that any of the other two could have been selected as the residual category, i.e. the basis for the comparison.

\(^6\) With five socio-economic levels (as opposed to three in Table 1), the differences between individual classes do not quite reach significance because the number of speakers per class becomes rather small. Nonetheless, the direction of the differences is consistent with the pattern shown for the three major social classes in Table 1.
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<td>WC</td>
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<td>0.2072</td>
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<td>MC</td>
<td>-0.41</td>
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*Table 1. Multiple regression of cot-caught merger in minimal-pair tests; production; 97 speakers; $R^2$ (adjusted) = 42.0%*

*Figure 3. Curvilinear pattern in cot-caught merger in minimal-pair tests; regression coefficients for five social classes (97 speakers)*

When the position of the two vowels is studied acoustically in apparent time, two changes emerge: the backing of /o/, as in cot, and the lowering of /oh/, as in caught, leading to what appears to be a merger by approximation (Trudgill & Foxcroft 1978; Labov 1994:321). The start and end points of the changes are illustrated in the next two figures, showing the position of the two low back vowels for an 82-year-old upper-class Charlestonian, Elizabeth O., 82 (Fig. 4), and her 15-year-old grandson (Fig. 5). The two phonemes show clear phonetic separation for Elizabeth O., with the means being
significantly different in both F1 and F2 (confirmed by a t-test), and they show complete overlap for her grandson. Speakers in between these two generations show increasing acoustic approximation with decreasing age.

Figure 4. Elizabeth O., b. 1922, Charleston, SC, Upper Class (grandmother of Peter O. in Fig. 5)
Figure 5. Peter O., b. 1989, Charleston, SC, Upper Class (grandson of Elizabeth O. in Fig. 4)
Figure 6. Backing of /o/ (cot, top, etc.) in apparent time by gender (90 speakers); Females: crosses, Males: circles
Figure 7. Lowering of /oh/ (caught, thought, etc.) in apparent time by gender (90 speakers); Females: crosses, Males: circles
The change in the acoustic position of the two vowels is illustrated in Figures 6 and 7, showing mean formant values for 90 speakers aged 8 to 90. F2 of /o/ is decreasing in apparent time (Fig. 6), and F1 of /oh/ is increasing in apparent time, i.e., the vowel is lowering (Fig. 7). Figure 8 combines the two shifts by showing the Cartesian distance between the two vowels decreasing in apparent time.

Figures 6-8 also show that both shifts are led by women, i.e., women are ahead of men in the acoustic approximation between the two phonemes. The female lead in the backing of /o/ is confirmed in a multiple-regression analysis reported in Table 2, showing a significant female advantage. The negative value of the Female coefficient in Table 2
indicates that the expected F2 of /o/ for women is lower (by 66 Hz) than for men, i.e. the vowel is more retracted.

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<tr>
<td>Upper Class</td>
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Table 2. Backing of /o/ (cot, top, etc.); multiple regression of F2 of /o/ (90 speakers); age coefficient for each generation of 25 years; R² (adjusted) = 39.0%

Table 2 also shows a strong effect of social class, displaying a curvilinear pattern with the class in the middle of the scale having the lowest expected F2, that is, leading the backing of the vowel. The curvilinear effect is presented graphically in Figure 9, showing F2 coefficients for five social classes, with the middle-middle class as the residual category. The class in the middle of the social scale has the lowest expected F2, i.e. is leading the change. This is the same curvilinear pattern as the one seen above in the minimal-pair test results in Figure 3. This time, however, the evidence is of a different kind—it is based on the acoustic shift of one of the vowels towards the other rather than on minimal-pair tests. The result is consistent: the social class in the middle is ahead in the acquisition of the merger. This gives us added confidence that this result, though subtle, as is often the case in changes from below which are still in progress, is nevertheless real.
Interestingly, the group leading the change in Charleston appears to be slightly higher on the socio-economic scale than the ones identified in studies of vowel shifts showing a curvilinear pattern, e.g. the upper working class in Philadelphia (Labov 2001) or the lower-middle class as in Norwich (Trudgill 1974). This is likely due to differences between the social structures of these communities, rather than differences between the types of changes, i.e. mergers vs. vowel shifts. In contrast to most US cities today, Charleston has a distinctive high-status group that could be referred to as the upper class. Its distinctiveness is readily recognised both by members of the group itself and by other Charlestonians. As mentioned above, this group has traditionally lived in the historic downtown section of Charleston south of Broad Street, and is often referred to in the interviews as *south of Broad* or sometimes as *bluebloods* (see Baranowski 2008). It could be argued, therefore, that Charleston’s class structure is extended upwards in comparison...
with most other US cities, and, as a result, the group in the middle of the social scale leading changes from below appears to be somewhat higher on the socio-economic scale than the groups responsible for the curvilinear effect in other communities.

3.2 Pin-pen merger

Figure 10 shows the acquisition of the merger in Charleston in apparent time on the basis of minimal-pair tests. Most speakers in their 70s and older have a distinction, whereas most younger speakers are largely merged, with children and teenagers completely merged. Although there is a clear progression towards merger in apparent time, it is not as smooth as in the case of the low-back merger (cf. Fig. 2). There is more variation, which turns out to be largely due to the effect of social class.

![Figure 10. Merger of him and hem in production by decade; minimal-pair test (0=merged, 2=distinct) mean values for 96 speakers.](image-url)
It is worth noting that the social class effect is different from that found in the low-back merger in the same community. A regression analysis reveals that the social class pattern is not curvilinear (Table 3). Rather, it is a decreasing monotonic relationship, i.e., the higher the social class, the lower the degree of merger. In other words, the change is led by the lowest-status group rather than by a group in the middle of the social scale. This social class effect is significant in both perception and production, but the differences between the social classes are greater in the informants’ perception than in their actual production. Perception lags behind production in the *pin-pen* merger in Charleston, especially for the highest social class, which can be seen in Figures 11 and 12.

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*Table 3. Multiple regression of him-hem merger in minimal pairs in perception and production*
Figure 11. Him-hem merger in apparent time by social class; perception of minimal pairs (96 speakers)

Figure 12. Him-hem merger in apparent time by social class; production of minimal pairs (96 speakers)
The lag of speakers’ perception behind their production in the *pin-pen* minimal pairs is intriguing in that it goes against the generalisation that in mergers in progress, perception tends to precede production. This tendency is likely due to the mechanism by which speakers, while maintaining a difference in their pronunciation, stop relying on the phonemic contrast for the interpretation of meaning when faced with large numbers of speakers with no phonemic distinction (Di Paolo 1988; Herold 1990). The ANAE reports, for example, that for the *cot-caught* merger across all North American dialects, perception precedes production in minimal pair tests for 109 informants, whereas the reverse is true for only 51 informants (p. 62). In the *pin-pen* merger, 90 ANAE informants show the merger to be more advanced in their perception than in their production, with only 43 informants showing the opposite pattern (p. 67). In the *pin-pen* merger in Charleston, however, there is a slight lead of production over perception, that is, some speakers identify the minimal pairs as sounding different even though they pronounce them as either close or identical (Table 3; Figs. 11-12). The reason for this may be that, as opposed to most other mergers in progress, the *pin-pen* merger in Charleston (though not necessarily in other dialect areas) is likely above the level of social awareness, and may be subject to some negative social evaluation, a point we shall return to below.

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7 It should be noted, however, that for the majority of speakers in the areas with the *pin-pen* merger, there is no difference between perception and production, that is, for 183 ANAE informants the vowels are merged in both perception and production (p. 67). Furthermore, while more speakers show the precedence of perception over production than the reverse, there are quite a few speakers (43) for whom their production of the merger indeed precedes their perception, so this generalisation is not absolute and operates on a larger scale of dialects rather than necessarily individual speakers.
As regards the position of the nasal allophones of /ɪ/ and /ɛ/ in acoustic space, only speakers in their 70s and older show clear phonetic separation between the two sounds; some tokens overlap but the means are clearly separated, as in the speech of John E. (Fig. 13). Most speakers below the age of 70 show considerable phonetic overlap, with the youngest generation being completely merged, as in the speech of Lisa A. (Fig. 14). Although the merged vowel can be perceived as being closer to [ɪ] than to [ɛ], it is in fact intermediate acoustically. The progress of the phonetic approximation between the two vowels can be seen in Figure 15, showing decreasing Cartesian distance in apparent time for a sample of 90 speakers.

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8 While both vowels are fairly monophthongal in connected speech, they can become diphthongal, i.e. ingliding (with an offglide towards the centre of the vowel space), for some speakers in heavily stressed minimal pair tokens. When this happens, it affects both vowels and does not seem to interact with the merger.
Figure 13. John E., b. 1924, Charleston, SC; Middle Class: /ɪ/ and /ɛ/ (highlighted tokens and means before nasals)
Figure 14. Lisa A., b. 1983, Charleston, SC; Middle Class: /ɪ/ and /ɛ/ (highlighted tokens and means before nasals)

Figure 15 also indicates that there are social class differences in the degree of the phonetic distance between the two vowels. While the community as a whole is going in the same direction, i.e. towards merger, there is subtle social stratification, with higher classes showing more phonetic separation. This relationship between social class and the degree of merger becomes clearer when we look at the difference in height, rather than Cartesian
distance, between the two vowels in minimal-pair tokens (Fig. 16)\(^9\). What emerges is a monotonic decreasing relationship between social class and the advancement of the merger, with higher social classes lagging behind. The monotonic social stratification pattern is confirmed in a multiple-regression analysis reported in Table 4, where the expected phonetic distance between the vowels decreases with decreasing socioeconomic levels. Importantly, this is different from the curvilinear pattern seen in the low-back merger advancing in the same community at the same time (cf. Table 2, Figure 5).

\[\text{Figure 15. Cartesian distance between } /iN/ \text{ and } /eN/ \text{ in apparent time by social class (90 speakers); Upper Class: rectangles, Middle Class: crosses, Working Class: circles}\]

\(^9\) The F1 difference is a more reliable measure than Cartesian distance in this case, as heavy stress in minimal-pair tokens causes vowels to approach the margin of their envelope more closely, resulting in considerable fronting affecting F2.
Figure 16. $F1(\epsilon N) - F1(\iota N)$ in apparent time by social class in minimal pairs (90 speakers);
Upper Class: rectangles, Middle Class: crosses, Working Class: circles

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<tr>
<td>UC</td>
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Table 4. Multiple regression of $F1(\epsilon N) - F1(\iota N)$ in minimal pairs (90 speakers); age coefficient for each generation of 25 years; $R^2$ (adjusted) = 27.0%

The fact that the social class differences are amplified in formal elicitations, i.e. minimal pairs, combined with the fact that the speakers’ perception (their judgements) of the merger lags behind their actual production, suggests that the pin-pen merger, as opposed to the low-back merger, is above the level of conscious awareness and carries some negative social affect. It may be, at least for some Charlestonians, associated with
speakers from the Inland South (as opposed to the coastal South or the Low-Country) and its other marked features, such as the Southern Shift (ANAE: ch. 18; Feagin 2003); this is not unlike the association made by Houstonians between the degree of the *pin*-pen merger and the perceived dialect and age of the speaker\(^{10}\), as reported by Koops et al. (2008), or the social indexing of the *near-square* merger in New Zealand English, as reported by Hay, Warren, and Drager (2006). This awareness is confirmed in the overt comments offered by a number of informants during their minimal-pair tests, four of whom are quoted below.

Matthew R., 60, Upper Middle Class: “Pin, pen [sounds high], uh, pin, uh, and I th- I think they sound different. I probably… People often misunderstand when I use those words so probably… uh they sound more the same than I realize. Pin is something you stick with, and pen is what you write with.”

David B., 82, Upper Class: “In Charleston you’ll get a difference between pin and pen. In Columbia [South Carolina] you might not. In Charleston it would be different. Pin and pen. And the same thing for him and hem.”

Cathy O., 57, Upper Class: “Pin and pen. Now, to me they sound differently but I hear an awful lot of people who pronounce them the same. Pin, obviously, is a sharp needle-like instrument, and pen [sounds high, close to *pin*] is a writing instrument.”

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\(^{10}\) Though in Houston the relationship is reversed, as the merger has been receding there recently (Koops et al. 2008)
Walter B., 66, Middle Class: “Pin and pen. [laughter] They never sound the same to me except when other people say ‘em. I think they always say pin. But uh, but we… Pin is something you get stuck with and pen is something you write with. [laughter] I’m sorry, I get very tickled about that.”

These comments suggest that the *pin*-pen merger in Charleston is indeed above the level of conscious awareness, at least for some speakers\(^{11}\). What is particularly striking is the contrast with the low-back merger operating in the same community—no such comments were volunteered for the low-back merger minimal pairs, and no one seems to get tickled about it\(^{12}\).

It is worth noting that Table 4 shows no significant gender effect, i.e. there is no female lead in the *pin*-pen merger, as opposed to the low-back merger. This is what one might expect if the merger is indeed above the level of conscious awareness. Women would not be expected to lead a change which was above the level of awareness and at the same time showed negative social evaluation. This is essentially the same mechanism by which women, all other things being equal, tend to use variants which are considered more

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\(^{11}\) This awareness may be even higher in the Inland South, where the merger has been present longer than in Charleston and where it has been subject to some stigmatisation at schools (Thomas 2004).

\(^{12}\) At the same time, as Labov (1994: 344) suggests, it is not clear that this awareness or social affect, though higher than in the case of the low-back merger, goes much beyond the pronunciation of particular lexical items—in this case the use of [ɪ] for [ɛ] in *pen, hem, send*, etc.—and that it indicates some deeper awareness of a change in the phonological relationship between the two sounds.
standard or prestigious at higher rates than men (Labov 1990, 2001). Therefore it is not surprising to see no female lead in a change which is, however mildly, negatively perceived. The low-back merger, on the other hand, appears to be below the level of conscious awareness and to show no social affect.

3.3 Charleston Chain Shift

Another reason why a female lead in the low-back merger, but in not the pin-pen merger, is not unexpected is a structural one. If the low-back merger in Charleston is looked at in the context of the whole vowel system, rather than as a single isolated change, the shifts of the two low back vowels can be seen as part of a larger change in progress in the dialect. It turns out that not only is there backing of /o/, as in cot, but there is also backing of short-a before non-nasals, as in cat, and lowering of /ɛ/, as in pet (Fig. 17). There is likely a chain shift in progress in Charleston, akin to the Canadian Shift (Boberg 2005) and similar chain shifts found in California (Eckert 2004), Columbus, Ohio (Durian 2008), and Illinois (Bigham 2009).

The important point here is that this chain shift is led by women (Figures 19, 20). Each of the component vowel shifts shows a statistically significant female advantage, as seen in the regression analyses for the shifts of /æ/ (Table 5) and /ɛ/ (Table 7); Tables 6 & 8

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13 Commenting on the careful linguistic behaviour of women, Labov (2001) suggests that, rather than an aspect of social insecurity, it is a reflection of social mobility and the responsibility that women assume for the upward mobility of their children. He also cautions, however, that “the social interpretation of gender differentiation inevitably engages speculation on attitudes and motivations, cultures and ideologies, where a linguist is no better able to resolve the alternatives than anyone else” (p. 275).
report the apparent time slopes, i.e. the age effects, for the two vowels based on regression analyses conducted separately for men and for women. As mentioned above, the exceptions to the majority tendency, i.e. the female lead, tend to be isolated shifts, not connected to the rest of the vowel system. Sound changes involving groups of sounds connected with each other, as in chain shifts, have generally been found to be led by women (Labov 2001). Given this generalisation, it is not surprising to see a female advantage in the low-back merger, part of a larger chain shift, and no female lead in the pin-pen merger, an isolated change. This is not unlike the situation in New Zealand English, where the near-square merger, also showing a female lead, has been linked to the larger chain shift of the front vowels (Maclagan & Gordon 1996).

Figure 17. Charleston Chain Shift
Figure 19. Backing of /æ/ before non-nasals (cat, sad, back, etc.) in apparent time by gender (90 speakers); Females: crosses, Males: circles
Figure 20. Lowering of /ɛ/ (pet, dead, etc.) in apparent by gender (90 speakers); Females: crosses, Males: circles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1765.80</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Age x25</td>
<td>74 Hz</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Female</td>
<td>-62 Hz</td>
<td>0.0139</td>
</tr>
</tbody>
</table>

Table 5. Multiple regression of F2 of /æ/ before non-nasals (cat, sad, back, etc.), 90 speakers; R² (adjusted) = 29.0%; age coefficient for each generation of 25 years

<table>
<thead>
<tr>
<th>Females (N=48)</th>
<th>Males (N=42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R² (adjusted) = 29.3%</td>
<td>R² (adjusted) = 15.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1669.93</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Age x25</td>
<td>96 Hz</td>
<td>≤ 0.0001</td>
</tr>
</tbody>
</table>

Table 6. Separate regression analyses of F2 of /æ/ before non-nasals (cat, sad, back, etc.) for females and males

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>679.925</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Age x25</td>
<td>-32 Hz</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Female</td>
<td>29 Hz</td>
<td>0.0008</td>
</tr>
<tr>
<td>Social class</td>
<td>10 Hz</td>
<td>0.0013</td>
</tr>
</tbody>
</table>

Table 7. Multiple regression of F1 of /ɛ/ (pet, get, etc.), 90 speakers; age coefficient for each generation of 25 years; R² (adjusted) = 43.1%

<table>
<thead>
<tr>
<th>Females (N=48)</th>
<th>Males (N=42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R² (adjusted) = 48.3%</td>
<td>R² (adjusted) = 18.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>711.490</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Age x25</td>
<td>-41 Hz</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Social class</td>
<td>14 Hz</td>
<td>0.0023</td>
</tr>
</tbody>
</table>

Table 8. Separate regression analyses of F1 of /ɛ/ (pet, get, etc.) for females and males
4 Conclusions

The differences between the two mergers in Charleston (Table 9) suggest these two changes, advancing in the community at the same time, are rather different as far as the role of social factors is concerned. One, the low back merger, conforms to the generalisation of the curvilinear hypothesis and shows a female lead. The other, the pin-pen merger, shows no gender effect and instead of a curvilinear effect, displays a pattern of social stratification reminiscent of stable sociolinguistic variables such as (ing) and (th, dh) (Labov 2006). The differences seem to stem from the different social perceptions of the two mergers in the community, i.e., the low back merger is a change from below the level of conscious awareness, whereas the pin-pen merger in Charleston appears to be a change that, at least at this point, may be above the level of conscious awareness.

<table>
<thead>
<tr>
<th>cot-caught merger</th>
<th>pin-pen merger</th>
</tr>
</thead>
<tbody>
<tr>
<td>female lead</td>
<td>no gender difference</td>
</tr>
<tr>
<td>curvilinear pattern for social class</td>
<td>monotonic (decreasing) social stratification</td>
</tr>
<tr>
<td>no significant difference between production and perception</td>
<td>production precedes perception</td>
</tr>
<tr>
<td>no overt comments - below the level of conscious awareness</td>
<td>overt comments - above the level of conscious awareness</td>
</tr>
<tr>
<td>embedded in the larger context of connected changes in the vowel system - chain shift</td>
<td>isolated change</td>
</tr>
</tbody>
</table>

Table 9. Summary of the differences between the low back merger and the pin-pen merger in Charleston.

The question is whether it is the same as a change from above in the sense that this term has come to function in the literature. The answer partly depends on the exact definition of change from above. Labov (2001:272-4) says that such changes
may take the form of the importation of a new prestige feature from outside the speech community, or the re-distribution of forms with known prestige values within the community. Changes from above take place at a relatively high level of social consciousness, show a higher rate of occurrence in formal styles, are often subject to hypercorrection, and sometimes form overt stereotypes similar to stable sociolinguistic variables.

There are then two elements here: the level of the social awareness of the incoming form on the one hand and, on the other, the status of the group advancing it, that is, the direction within the socio-economic hierarchy. If we define changes from above in terms of prestige and the direction within the socio-economic hierarchy, then the pin-pen merger in Charleston is clearly not a change from above in that sense; it is being resisted, rather than promoted, by the highest-status group. At the same time, it seems to be slightly above the level of social consciousness in the community. One possibility is that this is a change that may have been below the level of social awareness in the beginning but has now crossed that threshold and, because of its association (or social indexing in the sense of Hay et al. 2006) with low-status groups, it has acquired some negative social affect.

Alternatively, it is arguably a rare, but not impossible, example of a change from above, defined by the level of social consciousness, led by lower-status groups. Although many, if not most, definitions of change from above found in the literature seem to focus on the direction of the change in terms of the social hierarchy, Labov (p.c.) points out that the defining element in change from above or below is the level of social awareness and not the direction of the change in terms of social groups. In other words, above or below refers primarily to the level of conscious awareness and not to socio-economic levels.

It seems to me that the classification of changes into changes from above and below can indeed be more useful, that is, offer us better insight into the nature of linguistic change,
if we focus on the level of awareness, with the prestige of linguistic forms falling out of the
association of those forms with the social groups advancing them. If a change is above the
level of social awareness and is associated with a low-status group, then it is likely to be
resisted by the rest of the community (particularly by the higher classes) and inhibited,
though how successful that resistance may be is another question. If, on the other hand, a
change is above the level of awareness and is associated with a high-status group and
therefore considered prestigious, then it is more likely to be successful, i.e. likely to be
adopted by the rest of the community; then we may see groups in the middle overshooting
the target in formal styles, resulting in the cross-over pattern of the groups in the middle,
e.g. the lower middle class (Labov 2006). Therefore, it is not surprising to see changes from
above the level of awareness usually led by a high-status, rather than a low-status, social
group.

However, the resistance to changes brought about by lower-status groups may not
always be very effective, which is what seems to be happening in Charleston. The *pin-pen*
merger is likely a change brought into Charleston through contact with the Inland South, in
line with Garde’s (1961) and Herzog’s (1965) principles, and is expanding in spite of the
social pressures against it. It should be pointed out, though, that these social pressures are
not particularly strong, that is, while the *pin-pen* merger in Charleston is clearly at a higher
level of awareness than the low-back merger, it does not seem to be subject to the same
stigmatisation or even stereotyping as some other marked features of the Inland South, such
as the quality of the vowels affected by the Southern Shift (ANAE: ch. 18; Feagin 2003).

To return to the main question posed at the beginning, i.e. whether mergers, just like
vowel shifts or lenition processes, show a curvilinear effect of social class and a female
advantage, the answer is a qualified ‘yes’. As long as mergers are indeed below the level of social awareness, they can be expected to follow the same patterns of propagation throughout the community as other changes from below\textsuperscript{14}. Mergers are said to be generally invisible to social evaluation—devoid of social affect (Labov 1994)—and the low back merger in Charleston conforms to this generalisation; it appears to be below the social radar. However, there may be exceptions to this generalisation, such as the *pin-pen* merger in Charleston, i.e. mergers above the level of awareness, led by lower-status groups and associated with those groups in the community, and, as a result, subject to negative social evaluation\textsuperscript{15}. In such cases, we may see monotonic social stratification, rather than a curvilinear pattern, and no significant female advantage.

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\textit{Author’s address:}

\textit{Linguistics & English Language}

\textit{University of Manchester}

\textit{Samuel Alexander Building}

\textit{Manchester M13 9PL}

\textit{UK}

\textit{maciej.baranowski@manchester.ac.uk}

\textsuperscript{14} At the same time, these effects can be relatively subtle and, consequently, may only be observed in studies based on fairly large samples.

\textsuperscript{15} One obvious difference between the low-back merger and the *pin-pen* merger is that the first is an unconditioned merger and the second is a conditioned merger. Although it has been suggested that conditioned mergers, as opposed to unconditioned mergers, are generally above the level of conscious awareness, I am not sure that there is enough evidence at this point to warrant this generalisation.
REFERENCES


Durian, David. 2008. A new perspective on vowel variation throughout the 20th Century in Columbus, OH. Paper presented at NWAV 37, Houston, TX.


