

12. The fronting of back upgliding vowels

The subsystem of back upgliding vowels in North American English appears in the initial position as in (1).

(1) Back upgliding vowels

	front		back	
high	<i>dew</i>	/iw/	/uw/	<i>do</i>
mid			/ow/	<i>know</i>
low			/aw/	<i>now</i>

The front member of this series, /iw/, was originally /yuw/. With the general loss of the /y/ glide after coronals in North America, the /iw/ vowel maintained a contrast of front vs. back for at least some speakers. Kenyon and Knott (1953) transcribe *dew* as **dju**, **diu**, **du** and *do* as **du**. This contrast appeared only in the limited environments of apical onsets¹ with *do* ~ *dew* as the only common minimal pair.

The vowel /aw/ is historically a back vowel – that is, with a nucleus back of center. However, the development of /aw/ from M.E. **u**: in the course of the Great Vowel Shift does not arrive at a single termination point. It is frequently realized with central [ao], but we also find back [ao] and fronted [æo]. This chapter will show that there is a clear division between back nuclei in the North and front-of-center nuclei in the Midland and the South, which might well be written as /æw./ It is quite possible that this division existed when North American English was first established, and there was no single initial position for /aw/. We also know that in a variety of southern English dialects the nucleus of /aw/ has shifted to front of center and risen to a front mid or upper-mid nucleus (Orton 1962; Labov 1994: Ch. 17).

Thomas (2000) presents acoustic analyses of speakers from several regions of North America, with a number born in the nineteenth century. The nineteenth-century vowel systems that he records for North and South Carolina (excluding the Outer Banks) include two with /aw/ and /ay/ in central position, two with /aw/ slightly fronted, and one with strong fronting. In Texas–Oklahoma, he reports a similar distribution. The three New England speakers born before 1900 include one with /aw/ back of /ay/, one with /aw/ and /ay/ the same, one with /aw/ front of /ay/. This evidence indicates that the North–South difference in the realization of /aw/ existed in the nineteenth century, but in a form much less marked than today.

12.1. The fronting of /uw/

The /uw/ class includes all descendants of M.E. **o**: that have not been shortened: *too*, *do*, *soon*, *noon*, *roof*, *move*, *boot*, *tool*, *school*. However, the class is far from homogeneous, as Figure 12.1 indicates. The left-hand diagram shows a clear bimodal distribution. The right-hand diagram shows that the lower mode, with low F2, is almost entirely composed of the sub-group before /l/. It is clear that in any analysis of the fronting of /uw/, vowels before /l/ should be placed in a separate

category. In most dialects, the vowels of *tool*, *school*, etc. occupy high back position while all other /uw/ vowels are shifted well to the center or front. However, fronting of vowels before /l/ is a hallmark of the Southern dialect region, and the end of this chapter will examine this feature as a separate variable.

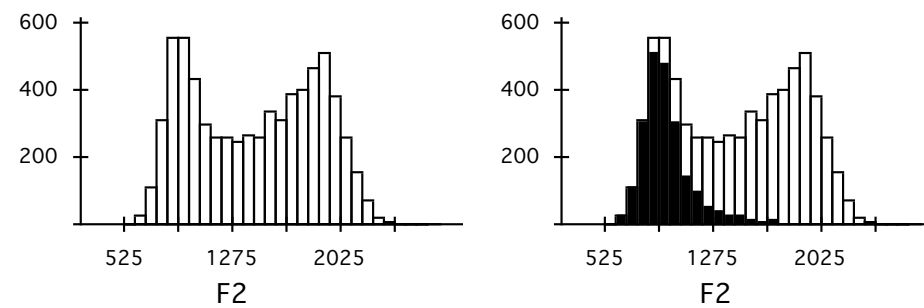


Figure 12.1. Distribution of F2 of /uw/ for all of North America. N = 7036. Left: all tokens. Right: black = tokens before /l/

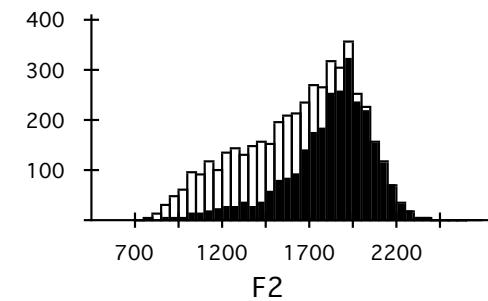


Figure 12.2. Distribution of F2 of /uw/ not before /l/ for all of North America. Black = coronal onsets [Tuw] (mean = 1811 Hz)

In Figure 12.2, vowels before /l/ are eliminated. The distribution now has a single mode, around 1950 Hz, and is heavily skewed to the left, that is, towards the lower end. The non-lateral /uw/ vowels form two sets with different distributions; those with coronal onsets (in black) are heavily concentrated at the upper end. This is an unusual situation; onsets generally have much less effect on the realization of English vowels than codas. For most of the long vowels, the major division between allophones (excluding liquids) is between word-final and non-final vowels.²

Figure 12.3 is the same distribution, but with the non-coronal onsets shown in black. Instead of the sharp peak at 1809 Hz with strong skewing to the left, there

1 Palatal onsets also produced a fronted vowel, but no contrast with a back upgliding vowel was found, so the analysis of *choose*, *chews*, *shoes*, *chute*, *juice*, etc. is ambiguous. These words may represent the extreme fronting of /uw/ or the maintenance of /iw/, even when their historical origins are clear. The history of the word *shoes* is unclear in this respect.
2 As in the study of Language Change and Variation in Philadelphia (Labov 2001), where /iy, ey, uw, ow/ were all divided into word-final and non-final allophones.

is a diffuse and symmetrical distribution around the mean of 1424 Hz. In all of the following analyses, the non-lateral tokens of /uw/ will be divided into the group with coronal onsets, notated as /Tuw/ (*two, to, do, noon, soon, soup, stoop, shoot, choose*) and non-coronal onsets (*move, movie, room, boots, food, boom, coop*).³

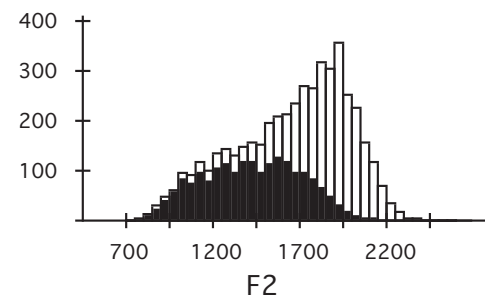


Figure 12.3. Distribution of F2 of /uw/: not before /l/ for all of North America. Black = non-coronal onsets [Kuw] (mean = 1433.Hz)

Table 1 is a regression analysis of F2 for the 4,747 tokens of /uw/ not before /l/. Among the phonetic effects on the variable, by far the strongest is coronal onset. No significant effect of word-final position appears.⁴ Word-final /uw/ is in fact strongly fronted, but there is a high degree of association between word final and coronal onset.⁵ The predominant effect of coronal onset is found in separate analyses of all regional dialects, with the exception of the South, where word-final position has a slightly higher coefficient.

Table 12.1. Regression coefficients for F2 of /uw/ for all of North America. Vowels before /l/ excluded [N = 4,747]

	Coefficient	Probability
Constant	1537	
Age * 25 yrs	-101	<.0001
Female	42	<.0001
Less than high school	-35	.0036
High school education	-45	<.0001
Some college	-64	<.0001
Onset		
Coronal	480	<.0001
Velar	181	<.0001
Liquid	151	<.0001
Obstruent+Liquid	164	<.0001
Labial	104	<.0001
Nasal	-54	.0020
Coda		
None	-	n.s.
Coronal	70	<.0001
Nasal	-193	<.0001
Fricative	-137	<.0001
Stop	-89	<.0001
Voiced	40	.0095

Table 12.1 shows many strong effects of onset features besides coronal. Velar, labial, and obstruent+liquid onsets (*coupon, boots, broom*) all have positive effects on fronting. This situation is quite different from other fronting movements, such as those affecting the second formant of /aw/ and /æ/.

Many phonologists class /r/ as [+coronal] on the basis of tongue-tip movement. But the evidence of this Atlas firmly places /r/ with the non-coronals as

far as /uw/ fronting is concerned. Words like *root, room, roost* regularly cluster with the /Kuw/ group in vowel systems where it is well separated from /Tuw/. When we add onset-*r* to the regression analysis of Table 12.1, no significant effect appears. The grooved shape of the tongue and the contact with teeth do not correspond to a definition of “coronal” that involves articulation with the blade of the tongue.

The age parameter in Table 12.1 shows a negative value, indicating a general fronting movement in apparent time (speakers of lower age have higher F2). Table 12.2 lists the mean values of F2 of /uw/ for eight regions defined in Chapter 11, along with age coefficients and the coronal onset coefficient. The Mid-Atlantic region – a relatively small one – is the only exception to the general pattern, which is replicated in Eastern New England with very conservative means of /uw/ (1584 Hz), and in the South and Midland, with very advanced forms (ca. 1700 Hz). As noted above, the South shows a considerably smaller effect of coronal onset.

Table 12.2. Regression analysis of F2 of /uw/ of vowels not before /l/ by region. All coefficients significant at .0001 level

	N	Mean F2(uw)	Age*25	Coronal Onset
Midland	580	1713	-107	442
South	1107	1703	-86	141
ENE	116	1584	-244	456
Mid-Atlantic	190	1534		
Western Pa	161	1529	-119	338
West	468	1520	-76	362
Canada	521	1492	-155	469
North	1062	1359	-83	514

The geographic reflection of the situation portrayed in the previous section appears in Map 12.1. The red circles indicate all speakers for whom /Tuw/ is front of the normalized center line of 1550 Hz. Of 439 Telsur subjects, 389 fall in this category. The blue isoglosses show the three areas where the mean value of /Tuw/ is not front of center: a North Central region covering most of Wisconsin and Minnesota; Eastern New England; and Northern New Jersey. In the Inland North, only a small section northwest of Chicago is included in this conservative domain, with a scattering of points elsewhere.

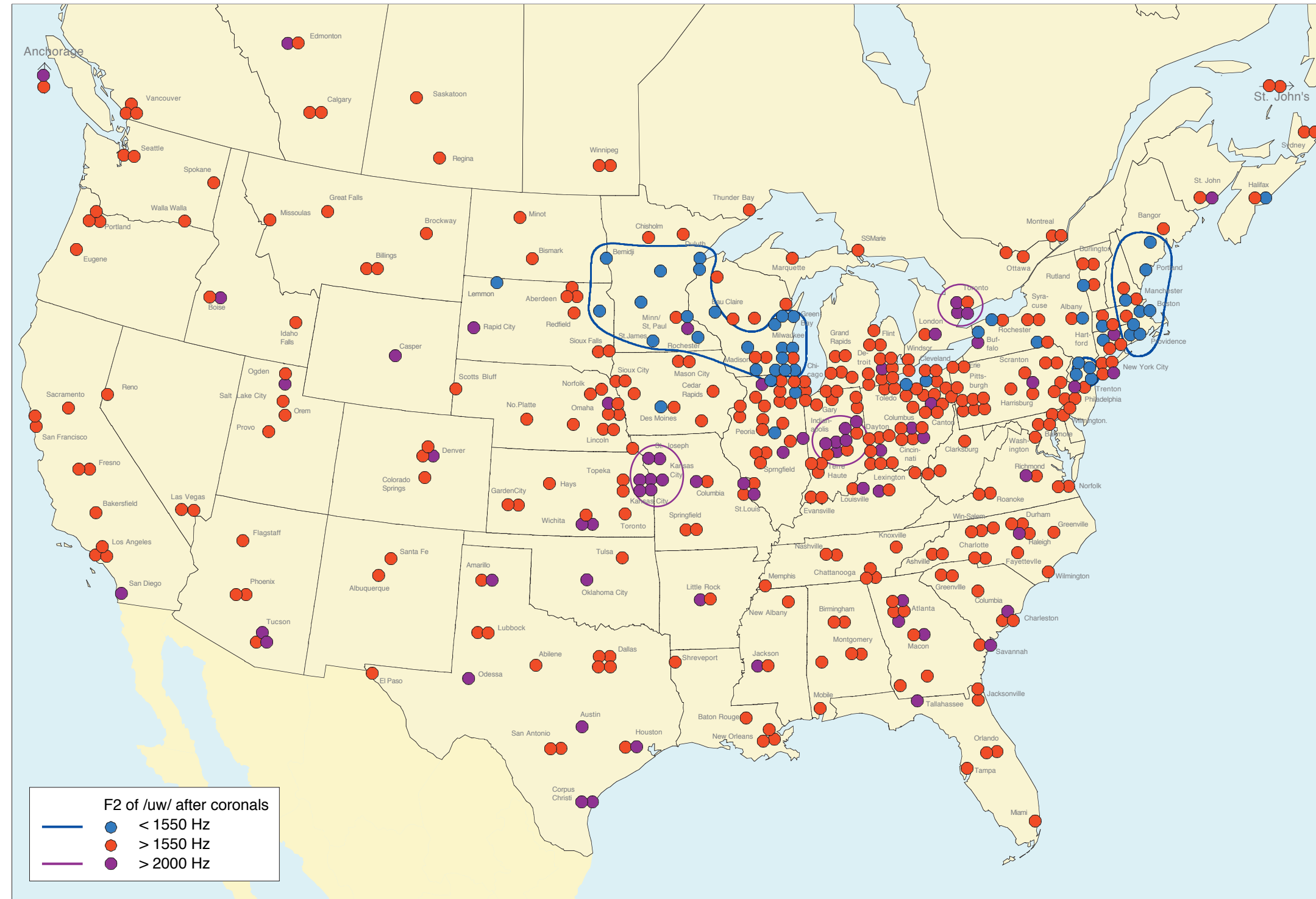


Several small regions of extreme fronting can be identified. Purple circles are drawn around four areas that are dominated by such extreme fronting, where F2 of /Tuw/ is greater than 2000 Hz. Surprisingly, these are not located in the South, but in the Midland (Kansas City, St. Louis, Indianapolis) and in Canada (Toronto). The South shows extreme fronting in two ways: fronting before /l/ codas (see below), and fronting of the glide target from high back to front rounded. The 7036 Telsur records of /uw/ include 42 tokens where such a fronted upglide was noted by the analyst; all of these are in the South.

³ For /r/ as a non-coronal, see below.

⁴ The negative coefficients for nasal, fricative and stop features of the coda reflect a relatively positive effect of word-final position. If these factors are removed, word-final position re-appears with a significant coefficient of 137; this is still only one-third of the size of the effect of coronal onset.

⁵ The first Telsur interview schedules elicited word-final words with coronal onsets (*too, do*) and checked vowels with non-coronal onsets (*roof, boots, move*). Later interview schedules and the results of spontaneous speech provide enough contrast that a multivariate analysis can weigh the independent effects of coronal onset vs. word-final position.



Map 12.1. Fronting of /uw/ after coronals (Tuw)

The fronting of /uw/ is general over almost all of North America, particularly after the coronal consonants /t, d, s, n/, as in *too, do, soon, noon*, etc. Only a few areas, shown with blue symbols, have mean values for this set lower than 1550 Hz, which is the center line in this normalized system. The conservative areas are

eastern New England and a portion of the North Central, extending to include the Chicago portion of the Inland North. Areas with extreme fronting of these vowels are mostly in the Midland: Kansas City, St. Louis, Indianapolis, and also Toronto. Here /uw/ after coronals reaches the position of French /*ü*/ in *tu*.

The geographic distribution of the more conservative allophone /Kuw/ appears in Map 12.2. The medium-blue circles indicate the speakers who are most conservative in their fronting of /Kuw/, where the mean F2 of /Kuw/ is less than 1200 Hz. The dark blue isoglosses for dialects that resist /Tuw/ fronting are retained on this map, and may be compared with the medium-blue isogloss; they are a proper subset of the /Kuw/ isogloss, which encloses them. The conservative /Kuw/ region is quite irregular; it includes all of New England, all of the Inland North, and extends westward to North Dakota and most of Montana.



The area of strong fronting of /Kuw/ is outlined by the orange isogloss, where the mean value of /Kuw/ is greater than 1550 Hz, the center value of the normalized system. This again is an irregular area. It covers roughly the region of the South (as designated by the red AYM line for glide deletion of /ay/), but it also includes the “Hoosier apex” in southern Indiana and the Kansas City area, which are already marked for their extreme fronting of /uw/. The advanced /Kuw/ area extends northward into the Mid-Atlantic region, southward into Florida and in the western section of the South, northward into Oklahoma and Nebraska. In a point to be developed further in Chapter 18, the /Kuw/ area does include Charleston, which was excluded from the South as defined by the AYM line.

There is also a heavy concentration of orange symbols in the Midland, in about the same area as the magenta circles that indicate extreme fronting of /Tuw/. This includes almost all the major Midland cities: Kansas City (but not St. Louis), Indianapolis and Columbus, Pittsburgh and the cities of the Mid-Atlantic region.

The yellow circles on Map 12.2 indicate intermediate fronting of /Kuw/. Large geographic areas, including Canada, the Midland, and the West, show only moderate fronting of /uw/ after non-coronals, well behind the center of the vowel system, and considerably behind /uw/ after coronals.

12.2. The fronting of /ow/

In the history of many languages, the fronting of /o/ or /ow/ is found parallel to and somewhat behind the fronting of /u/ or /uw/. In the triangular shape of the acoustically defined vowel space, there is a smaller fronting range available to /ow/ in absolute terms (a maximum of only 1400 Hz for /ow/, compared to 2200 Hz for /uw/). But even in relative terms, the fronting of /ow/ lags behind the fronting of /uw/. Map 12.1 showed that the great majority of speakers have a /Tuw/ mean frontier than the mid position of 1550 Hz, while for /ow/, it will appear that maximal fronting is at mid position and very few speakers go beyond this point. Figure 12.4 shows the distribution of all /ow/, with a relatively small number of tokens above 1550 Hz.

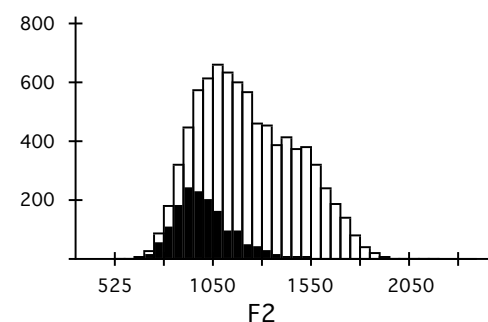


Figure 12.4. Distribution of /ow/ vowels for all of North America (N = 8313). Vowels before /l/ are shown in black (N = 1577)

The major allophonic divisions for /ow/ are much less marked than for /uw/. Figure 12.4 does not show a bimodal pattern. The vowels before /l/, shown in black, fall into a symmetrical range around 900 Hz within the overall /ow/ distribution.

Figure 12.5 shows all /ow/ not before /l/. The vowels with coronal onsets are shown in black. The contrast with Figure 12.2 is striking. There is a tendency for /ow/ with coronal onset to be grouped at the upper end, but there is no single modal value; the distribution is diffuse over a broad range from 1200 to 1600 Hz. In contrast to /uw/, the effect of coronal onset on /ow/ is not markedly greater than other environmental effects.

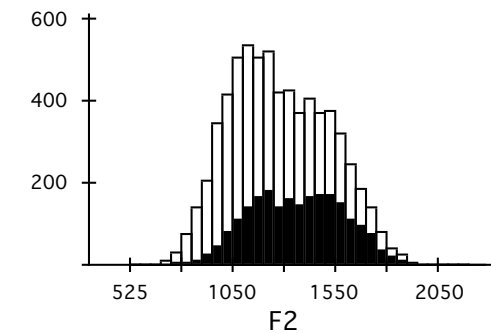
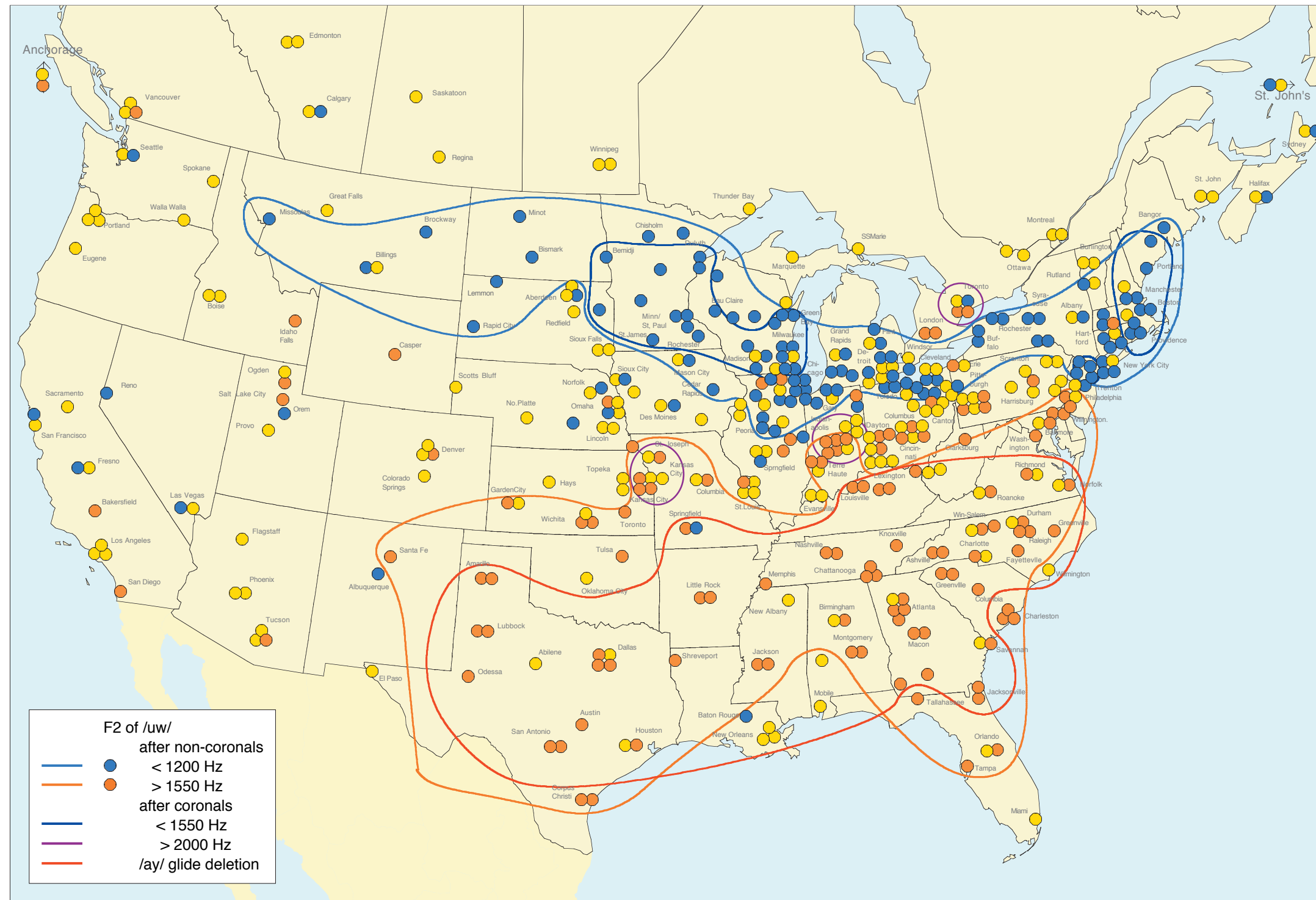


Figure 12.5. Distribution of /ow/ tokens not before /l/ for all of North America (N = 6736). Black = vowels with coronal onsets (N = 2251).

Table 12.3. Regression coefficients for F2 of /uw/ and /ow/ for all of North America. Vowels before /l/ excluded

	/uw/ [N = 4747]		/ow/ [N = 6736]	
	Coef	Prob.	Coef	Prob.
Constant	1537		1386	
Age * 25 yrs	-101	<.0001	-24	<.0001
Female	42	<.0001	46	<.0002
Less than high school	-35	.0036	-21	.0116
High school education	-45	<.0001	-67	<.0001
Some college	-64	<.0001	-35	<.0001
Onset				
Coronal	480	<.0001	94	<.0001
Velar	181	<.0001	43	<.0001
Liquid	151	<.0001	—	n.s.
Obstruent+Liquid	164	<.0001	—	n.s.
Labial	104	<.0001	-70	<.0001
Nasal	-54	.0020	—	n.s.
Coda				
None	—	n.s.	31	.0003
Coronal	70	<.0001	—	n.s.
Nasal	-193	<.0001	-101	<.0001
Labial	—	—	-122	<.0001
Fricative	-137	<.0001	-21	.0023
Stop	-89	<.0001	-30	<.0002
Voiced	40	.0095	—	n.s.
Following syllables	—	—	-75	<.0001

Table 12.3 compares the regression analysis of /uw/ (from Table 12.1) with a parallel analysis of the /ow/ tokens not before /l/. The age coefficient for /ow/ is much smaller, indicating a slower rate of shift in apparent time. Gender and educational effects are similar, indicating that women are in the lead and that col-



Map 12.2. Fronting of /uw/ after non-coronals (Kuw)

The vowel systems of North America also show fronting of /uw/ in words beginning with non-coronal consonants, as in *boot*, *move*, *roof*, and *coupon*. This tendency is minimal in the Northern area outlined in light blue; when /uw/ is less than 1200 Hz, it is heard as a back vowel. In a southern area somewhat larger than

the South as defined in Chapter 11, the Kuw vowels are front of center (orange symbols and orange isogloss). Otherwise, Kuw is fronted only moderately, about halfway from its original back position to the center line.

lege graduates shift more than others. A striking difference appears in the effect of coronal onset: only 94 Hz for /ow/ as opposed to 480 Hz for /uw/. There is in addition a significant effect of final position. In other respects, the conditioning effects on /ow/ are not as strong as for /uw/, except for the effect of a following labial, which is strongly negative for /ow/ but not at all for /uw/.

Table 12.4 gives data parallel to Table 12.2, showing the regional distribution of the major constraints on /ow/ not before /l/. The regions are arranged in order of descending mean /ow/, followed by the age coefficient, the effect of coronal onset, and the effect of word-final position. The ordering of dialects is similar to Table 12.2, except that ENE is much lower in the scale, and Mid-Atlantic is advanced beyond the Midland and the South. The most advanced region, the Mid-Atlantic, shows no further movement in apparent time. The shift appears to be active in the South, western Pennsylvania, the Midland, the West, and Eastern New England. The North and Canada show a small but significant tendency in the other direction; /ow/ does not appear to be advancing in these areas.

All dialects but ENE show a moderate effect of coronal onset. But in two of these the effect of final position is as great as coronal onset, and in ENE, final position is the only environmental constraint. Since coronal onset does not have the dominant effect that it does with /uw/, all /ow/ not before /l/ will be treated together in what follows.

Table 12.4. Regression analysis of F2 of /ow/ of vowels not before /l/ by region.
Note: * = $p < .05$; ** = $p < .01$; *** $p < .001$.

	N	Mean	Age*25	Coronal Onset	Final
Mid-Atlantic	226	1467	–	78**	75*
South	1452	1445	–77***	110***	–
Western Pa	252	1422	–57*	105***	90**
Midland	994	1367	–56***	132***	–
West	709	1233	–72***	98***	–
E.N.E.	136	1152	–90***	–	109***
Canada	475	1147	43*	55**	–
North	1836	1127	14*	120***	52***

The geographic distribution of the fronting of /ow/ in North America is shown in Map 12.3. As the legend indicates, the degrees of fronting are divided into five color-coded levels. The lowest degree of fronting of /ow/ (<1100 Hz) is indicated by dark blue circles, the next lowest by medium blue (< 1200 Hz) and third lowest by light blue (<1300 Hz). The areas of strong fronting are indicated by orange (1300–1400 Hz) and by red (> 1400 Hz).

The dark blue isogloss for $F2(ow) < 1100$ Hz outlines the area of minimal fronting. It extends over the Inland North, and falls a little short of the North–Midland line. It does not stop at the westward boundary of the Inland North or the Northern Region, but extends well into Montana and western Canada. In addition, the city of Providence is marked by (two out of three) speakers at this level.

The oriented medium blue isogloss for $F2(ow) < 1200$ Hz /ow/ includes (by definition) the dark blue isogloss. It extends in the east to cover all of the North, including Eastern New England, and extends only slightly southward to the line separating the North from the Midland, but in the west it expands widely to cover most of the Western region. This expanded area of moderate /ow/ fronting shows low homogeneity, and there is great variation within it.

The light blue isogloss for $F2(ow) < 1300$ Hz is bundled quite closely to the medium blue isogloss except again in the West, where it expands to cover all of the Western region.

No boundary can be justified to separate the orange and red symbols on Map 12.3. The Midland and the South (identified by the AYM line, here dashed) are

equally engaged in the fronting of /ow/. Very few blue symbols in the South or the southern portion of the Midland lie below the blue isoglosses; moderate to strong fronting of /ow/ is characteristic of the Southeastern region as defined in Map 11.11.

The overall view provided by Map 12.3 is a sharp division of the eastern half of North America into a region where /ow/ is fronted and a region where it is not, while the western half shows the opposite situation: a graded shift from low to high fronting, with much individual variation. The region of minimal fronting cuts through Canada as defined in Map 11.7 (see Chapter 15).

The relation between the fronting of /uw/ in Map 12.1 and the fronting of /ow/ in Map 12.3 generates the taxonomy of American dialects first displayed in Figure 11.3, reproduced here as Figure 12.6. The added circles are intended to suggest that all American dialects can be divided into three types: those that front neither /uw/ nor /ow/; those that front /uw/ but not /ow/; and those that front both. Here “the fronting of /uw/” indicates the more advanced allophone, /uw/ after coronal onsets.

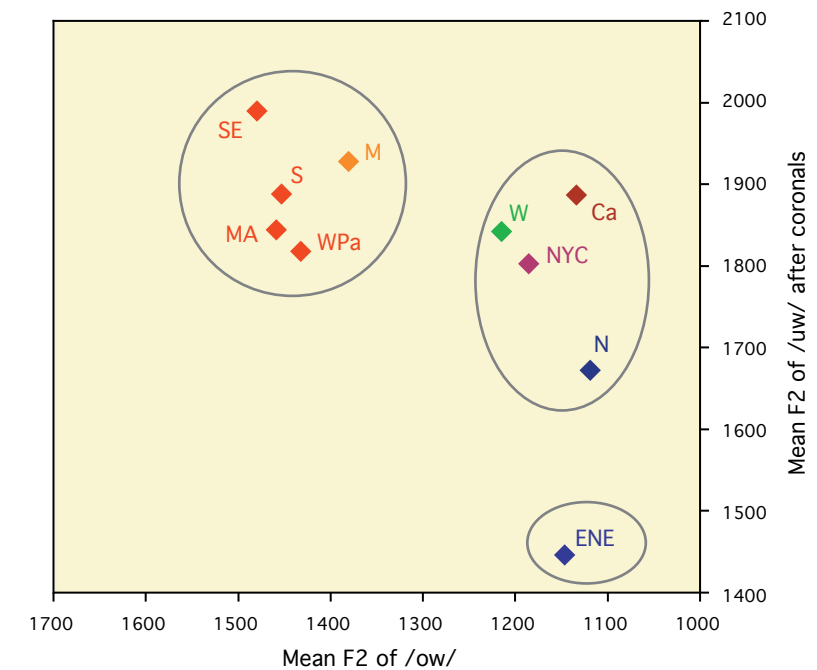


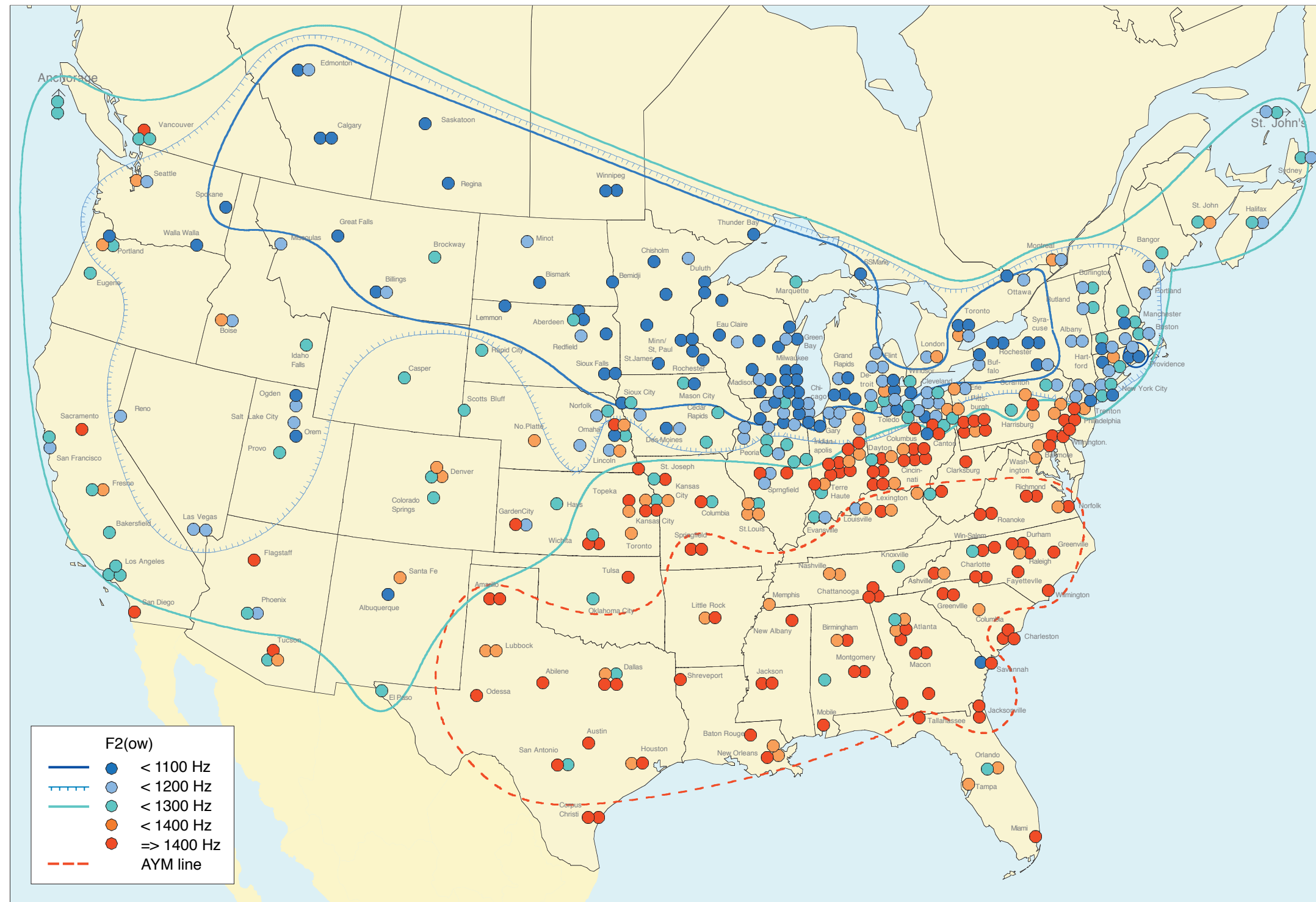
Figure 12.6. Mean values for the fronting of /uw/ after coronals and the fronting of /ow/ for North American regions

12.3. The fronting of /aw/

The sharp division of North American dialects in the fronting of /ow/ is matched by an equally sharp division between front and back positions of /aw/. It should be noted that the mean values for the nucleus of /aw/ exclude vowels before the apical resonants /l/ and /n/. Vowels before /l/ are fronted less than others, while vowels before nasals are considerably more fronted as a rule, and often raised to lower-mid or upper-mid position.

Map 12.4 shows the distinction between the dialect areas where the nucleus of /aw/ is back of center (< 1550 Hz) and those where it is front of center, and it compares these areas to the distribution of fronted /ow/. The light green and orange symbols representing fronted /aw/ are rarely to be found in the northern area where /ow/ resists fronting, with the exception of a minority of speakers from the Detroit–Cleveland area of the Inland North, and most of the speakers in eastern

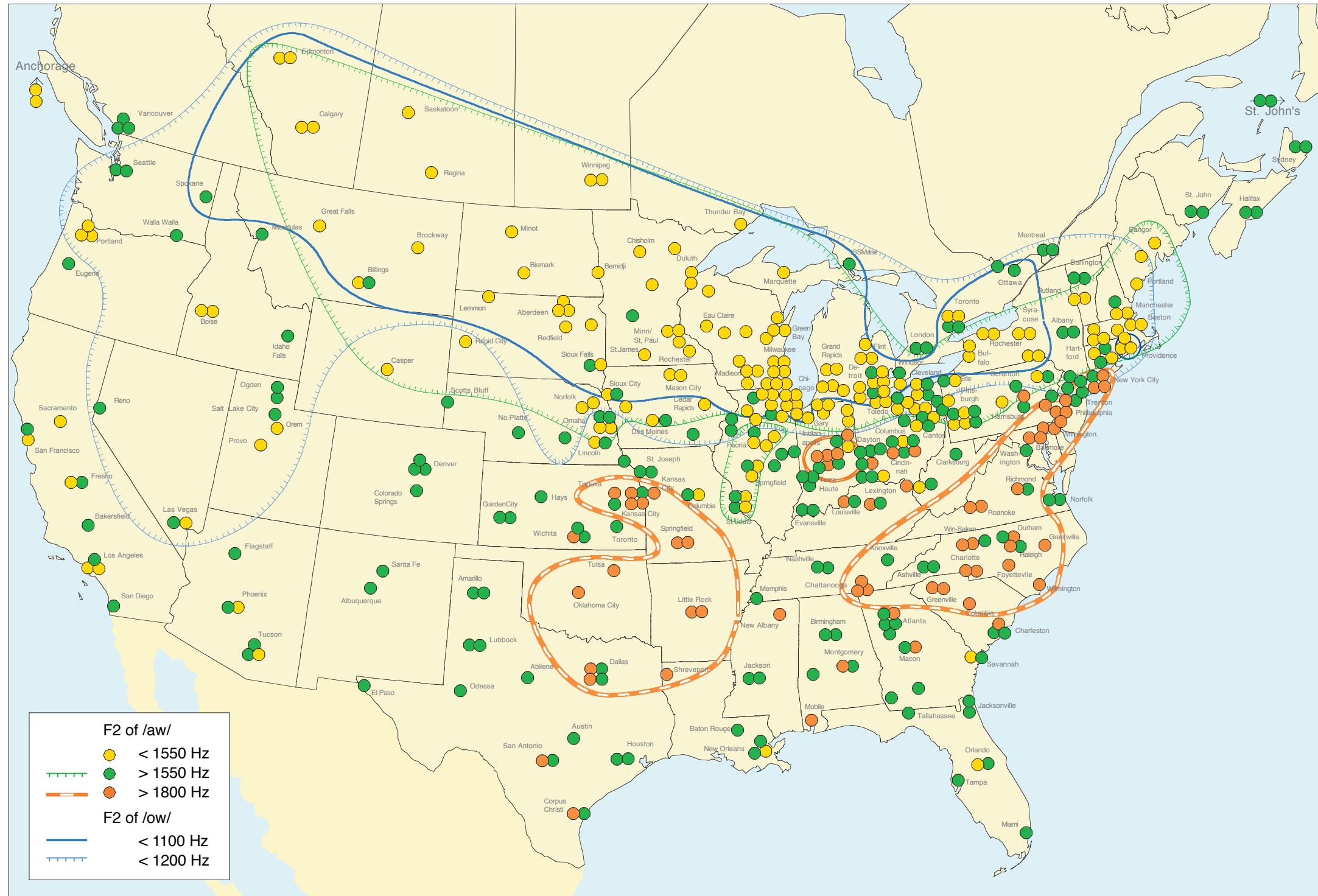




Map 12.3. The fronting of /ow/ in North America

The general fronting of /uw/ is not matched by the mid back upgliding vowel /ow/. The North shows a conservative treatment of /ow/, which remains a back vowel within the area of the darkest blue isogloss. This includes the prairie provinces in central Canada. In the eastern half of the continent, the close approxima-

tion of all blue isoglosses shows an abrupt break between the North and the area of the Midland and South that shows strong fronting of this vowel. In the West, the transition is much more gradual; while there is no strong fronting in this area, there is a scattering of speakers with slight fronting of /ow/.



Map 12.4. The geographic distribution of /aw/

The Northern area of conservative /ow/ shows equally conservative treatment of /aw/, which has a back or central nucleus throughout the area of conservative /ow/ in Map 12.3. The South and the Midland generally show /aw/ with a low

front beginning, similar to the vowel of *bat*. The areas of greatest fronting (barred orange isoglosses) are found in the Inland South, but also in such Midland locations as Kansas City, Indianapolis, and Philadelphia.

Canada. In the eastern half of North America, the green isogloss for fronted /aw/ runs close to the light blue oriented line for F2 of /ow/ < 1200 Hz; in the western half, it is close to the dark blue line for the even more conservative criterion of F2 < 1100 Hz.

In most of North America, including eastern Canada and Vancouver, /aw/ is in front position and might well be represented as /æw/ rather than /aw/. This pattern is more consistent in the South and the Midland than in the West. Nine speakers with back /aw/ are found in the Far West. The orange circles indicate speakers with extreme fronting (and raising) of /aw/, using the criterion of F2 of /aw/ > 1800 Hz. The broken orange isoglosses identify several regions where such speakers are concentrated: in Virginia, North Carolina and South Carolina, and in a region west of the Mississippi River, including Kansas City; Dallas; Springfield Missouri and Little Rock. We also find strong concentrations of the fronting of /aw/ in the largest Midland cities: Indianapolis and the cities of the Mid-Atlantic region: Philadelphia, Baltimore, and Wilmington. As with /ow/, the strong fronting of /aw/ is not primarily a Southern characteristic; it is equally strong, or stronger, in the Midland.

The criterion used in Map 12.4 is a quantitative measure of the F2 of /aw/, which can be referred to as the AW1550 line. An even sharper division between North and South can be achieved with the structural isogloss that is defined by the relative frontness of /ay/ and /aw/. In Map 12.5, the dark green symbols represent speakers for whom the mean second formant of the nucleus of /aw/ is backer than the mean second formant of the nucleus of /ay/. The dark green isogloss that is defined by these points is very similar to the light green isogloss for /aw/ back of center, but it does not extend as far south. The dark green isogloss does not reach St. Louis; only three of the 12 speakers in the St. Louis corridor show /aw/ backer than /ay/. It also does not include western Pennsylvania, where only one such point is found.

The greatest difference between the two /aw/ criteria is the number of marked points outside the isogloss. Table 12.5 compares the parameters of the two isoglosses. The total number of points within the AWY line is considerably less than those within the AW1550 line, but the greatest difference is in the total marked outside, 14 as against 43. The homogeneity of the AWY line is less, only 0.72 as against 0.82 for the AW1550 line, but consistency is greater, at 0.86 vs. 0.77. The structural isogloss appears to be most effective in dividing the dialect regions into two separate groups. It is also the criterion used in assessing the recordings analyzed in Thomas (2000) at the outset of this chapter, where a certain number of the nineteenth-century speakers in the South did not show the characteristic shift of /aw/ to the front reflected in the solid array of yellow symbols on Map 12.4.

Table 12.5. Isogloss parameters for the AWY line and /aw/ < 1500 line

	Total marked	Total inside	Total marked inside	Total marked outside	Homogeneity	Consistency	Leakage
aw < 1500	183	170	140	43	0.82	0.77	0.16
AWY line	102	123	88	14	0.72	0.86	0.04

Social and phonological constraints on /aw/

Table 12.6 shows the social and phonetic conditioning of the second formant of /aw/ for the eight regions that were tabulated in Tables 12.2 and 12.4. There is an immediate and striking contrast of age coefficients. Table 12.2 showed significant negative age coefficients for the fronting of /uw/ in all but one region, and Table

12.4 showed a similar pattern for /ow/ in all but the two most conservative regions. But there is no indication of fronting in apparent time for /aw/. Table 12.6 shows that three regions – the two most advanced and the one least advanced – show positive age coefficients, suggesting a shift towards backer forms of /aw/. The others show no significant relation to age coefficients.

The Mid-Atlantic region is of particular interest here because the fronting of /aw/ in Philadelphia is one of the new and vigorous changes found in that city from the 1970s on, and it has been used as a model of the social trajectory of a linguistic change (Labov 1990, 2001). ANAE analyzes acoustically a set of 15 Mid-Atlantic speakers from Wilmington (4), Baltimore (2), Philadelphia (3), and four from central and South Jersey. The strong positive age coefficient indicates the change is not characteristic of the region as a whole: in Baltimore, Wilmington, and South Jersey, it is the older speakers who show greater fronting of /aw/.⁶

The phonological conditioning of /aw/ is consistent in the sense that all trends are in the same direction, though significant correlations are not found in all regions. As in the case of /uw/ and /ow/, coronal onsets favor fronting (in *doubt*, *towel*, *now*, *sow*, etc.). Even more consistently, fricative codas disfavor fronting, (in *house*, *houses*, *mouth*, etc.) Word-final position strongly favors fronting in four of the eight regions, but not in the other four. On the whole, the /aw/ situation resembles that of /ow/ more than /uw/, since coronal onset does not play a predominant role in the relative degree of fronting or backing.

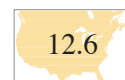
Table 12.6. Regression analysis of F2 of /aw/ by region
Significance: *** p < .001, ** p < .01, * p < .05

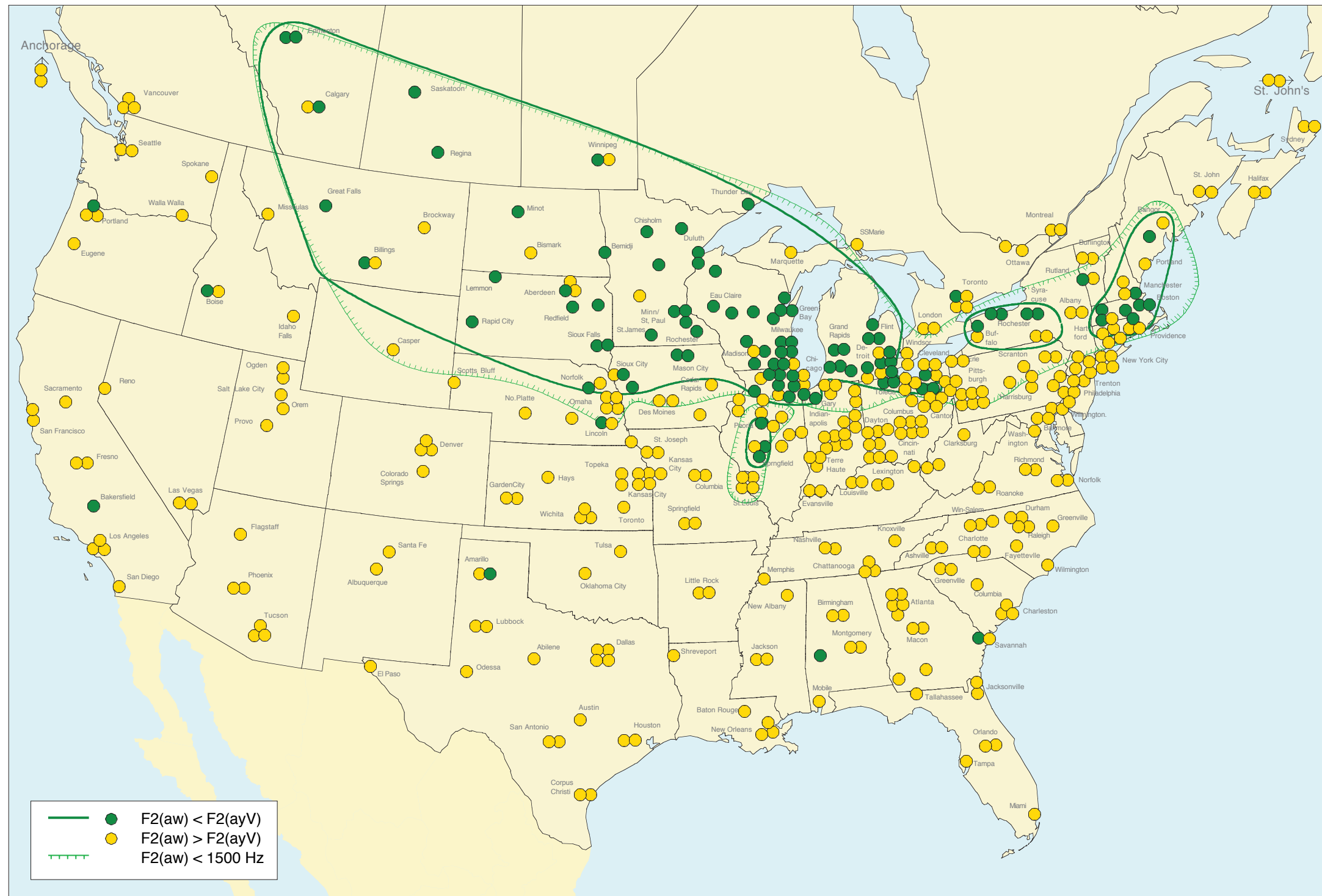
	N	Mean	Age*25	City pop'n	Coronal Onset	Fricative Coda	Word Final
Mid-Atlantic	209	1,870	116***	134***	101*	-229**	-
South	1,393	1,812	26***	-64***	-	-43**	140***
Midland	929	1,739	-	34***	35*	-128***	114***
West	571	1,655	-	-	146***	-188***	-
Western Pa	230	1,637	-	-298***	-	-91*	217***
Canada	604	1,597	-	-	78***	-47*	89***
E.N.E.	113	1,505	-	-285***	86*	-236***	-
North	11,610	1,468	32***	-	66***	-102***	-

The final member of the back upgliding class is /iw/, the high front rounded vowel that was the result of the loss of /y/ before /uw/ after coronals in *dew*, *suit*, *chew*, *fruit*, *tube*, etc. Map 8.3 presented the minimal pair data on this contrast, showing that the opposition of /iw/ and /uw/ is now confined to two small areas in the South. For the great majority of the Telsur speakers, /iw/ does not exist as a separate phoneme, but is merged with /uw/. The fact that /iw/ exists only after coronals links it with the behavior of /uw/ after coronals. It seems likely that there is a structural connection between the merger of /iw/ and /uw/ and the strong fronting of the merged phoneme after coronals.

Map 12.6 superimposes the results of acoustic measurements of the /uw/ and /iw/ classes on the minimal pair data of Chapter 8. Because the /iw/ class is relatively small, mean differences between /iw/ and /uw/ must be tested for statistical significance. The light red symbols on Map 12.6 are speakers for whom the difference in the means of /iw/ and /uw/ shows a t-test probability of less than .05. The magenta symbols show a probability less than .01, and the purple symbols

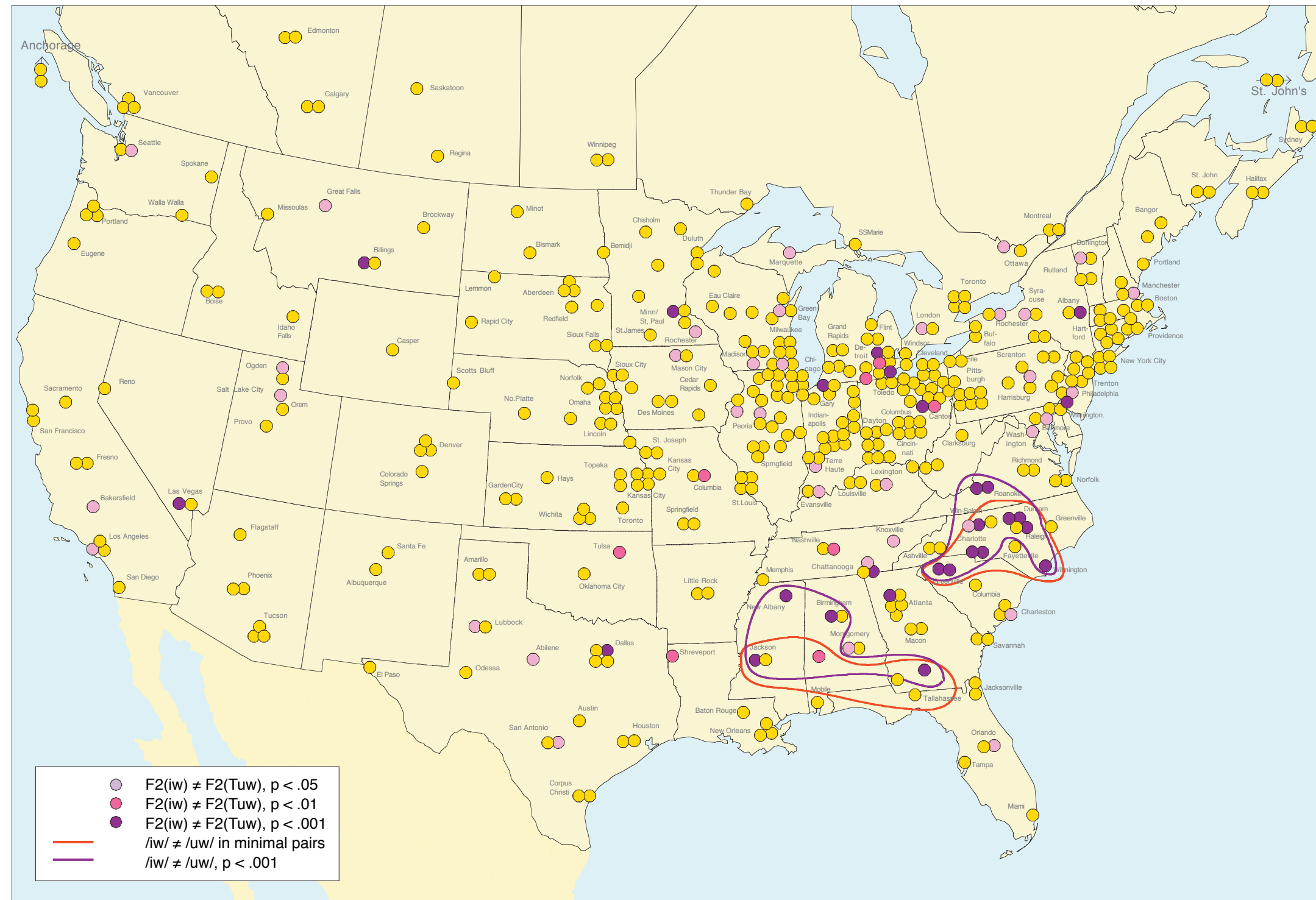
⁶ In a recent re-study of Philadelphia with 73 subjects, Conn (2005) finds that two of the new and vigorous changes, the fronting and raising of /eyC/ and the raising and backing of /ay0/, have proceeded further but that the fronting and raising of /aw/ is receding among younger speakers.





Map 12.5. The relative frontness of /aw/ and /ay/: The AWY line

The dark green isogloss represents the structural relationship between /aw/ and /ay/, which is geographically sharper than the division that results from using the phonetic criterion of Map 12.4 (the light green isogloss). The dark green isogloss is also closer to the North–Midland bundle of isoglosses that divides the eastern United States into the North and the Midland regions (Chapters 11, 14).



Map 12.6. The status of /iw/

The phonemic distinction between /iw/ and /uw/ in *dew* ~ *do*, *lute* ~ *loot*, has almost disappeared from North America. The red isogloss shows those narrow areas of the South where Telsur subjects showed a consistent distinction in minimal pairs. The symbols colored dark, medium, and light purple show acoustic patterns

in spontaneous speech that support such a distinction. The dark purple isogloss surrounds the communities where *t*-tests show that the difference between the two categories would arise by chance less than once in 1000 trials.

less than .001. Since we are testing 439 speakers, we can expect some 22 results at the .05 level purely by chance. There are in fact 25, and the light red symbols may safely be ignored. The purple symbols indicating a .001 effect are concentrated in the South; there are only four tokens scattered in other regions. The purple isogloss is the outer limit of communities where /iw/ differs acoustically from /uw/ at the $p < .001$ level.

The red isoglosses on Map 12.6 are not derived from the pink, magenta, and purple symbols on this map, but are superimposed from the minimal pair data of Map 8.3. They show the regions where there is a dominant tendency for speakers to judge /iw/ and /uw/ as different and to produce them as different in minimal pairs. The purple isogloss shows the outer limit of a clear difference in production of /iw/ and /uw/. There is a general coincidence of the two ways of recording the distinction, in North Carolina, and in the southern section of the Gulf States.

In the treatment of /uw/ in Maps 12.1 and 12.2, vowels before /l/ were excluded since they showed no tendency toward fronting.⁷ The South is an exception to this generalization, as shown in Figure 12.7. The dialect regions of North America are arranged from right to left in order of increasing mean value of F2 for /Tuw/, as indicated by the magenta line. The dark blue line shows the mean value for /uw/ before /l/, which is maintained below 1000 Hz for all regions except the South. The display of /uw/ by region shows somewhat higher values in the Texas South and Inland South. But while the differences between the three Southern dialects and all others are significant at $p < .0001$ ($t = 6.38$, d.f. = 1331), differences among the Southern dialects are not significant.

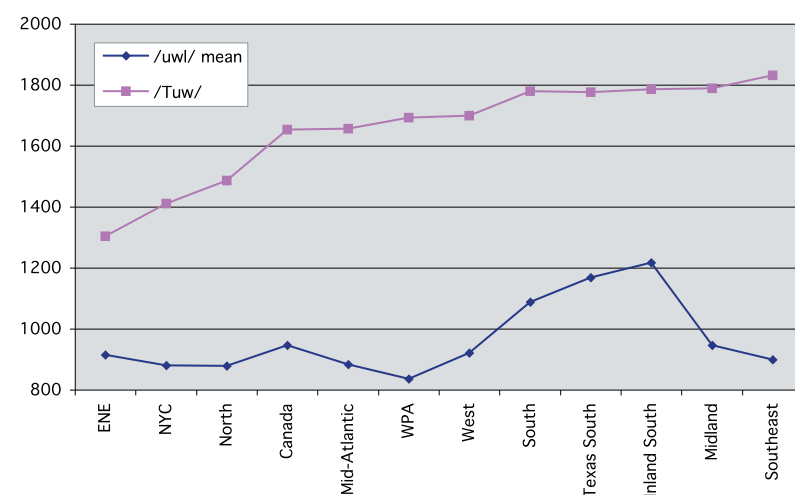


Figure 12.7. Second formant of /Tuw/ and /uw/ before /l/ by Region. Inland South and Texas South separated from other regions of the South

Map 12.7 locates the extreme development of the fronting of /uw/ before /l/ by identifying the speakers with /uw/ greater than 1550 Hz, the general mid-line of the Telsur sample. The size of the red circles indicates the number of tokens with this characteristic. Though only a few speakers have such an extreme development of /uw/, the map shows that this feature is concentrated in the Texas South more than the Inland South and in the area of cenreal North Carolina isolated in Map 12.6. Map 12.7 also locates an area of high fronting of /uw/ that has not been identified as a leading subsection of the South up to now; this area includes most prominently Little Rock in Arkansas, and it extends northward to Springfield, Missouri, and southward to the Mississippi delta.

The social parameters of this fronting of /uw/ are different from that of /uw/ as a whole, as a comparison of Table 12.7 with Table 12.1 makes clear. The age

coefficient for F2 of /uw/ as a whole in Table 12.2 is -101 Hz, indicating a 100 Hz shift frontward with each younger generation. Table 12.7 shows the opposite: a large positive value of 187, indicating a rapid retreat in apparent time. The gender situation is accordingly reversed; in place of a positive value of 42 for female gender, we have a negative value of -78 . The phonetic parameters, on the other hand, are similar; the two features of the onset are strongly positive for coronal, and negative for labial.

The educational profile for the fronting of /uw/ is also similar to that for /uw/ in general. The negative coefficients for education indicate that those with intermediate educational status show the strongest retreat from the fronting of /uw/ before /l/. As in other studies, this intermediate group shows a greater sensitivity to social stigma than those who are lower or higher in the socioeconomic scale (Labov 1972: Ch. 5). From the evidence of age, gender, and educational coefficients, it seems that the fronting of /uw/ before /l/ has received a certain amount of social stigma, although this effect has not risen in social consciousness to the level of a stereotype, available for overt discussion of Southern speech.

Table 12.7. Regression analysis of F2 of /uw/ before /l/ in the South

	Coefficient	Probability
Age (* 25 yrs)	187	≤ 0.0001
City size (*10 ⁶)	-123	≤ 0.0001
Female	-78	≤ 0.0001
Coronal onset	138	0.0031
Labial onset	-86	≤ 0.0001
H.S. education	-55	0.0163
Some college	-59	0.0021

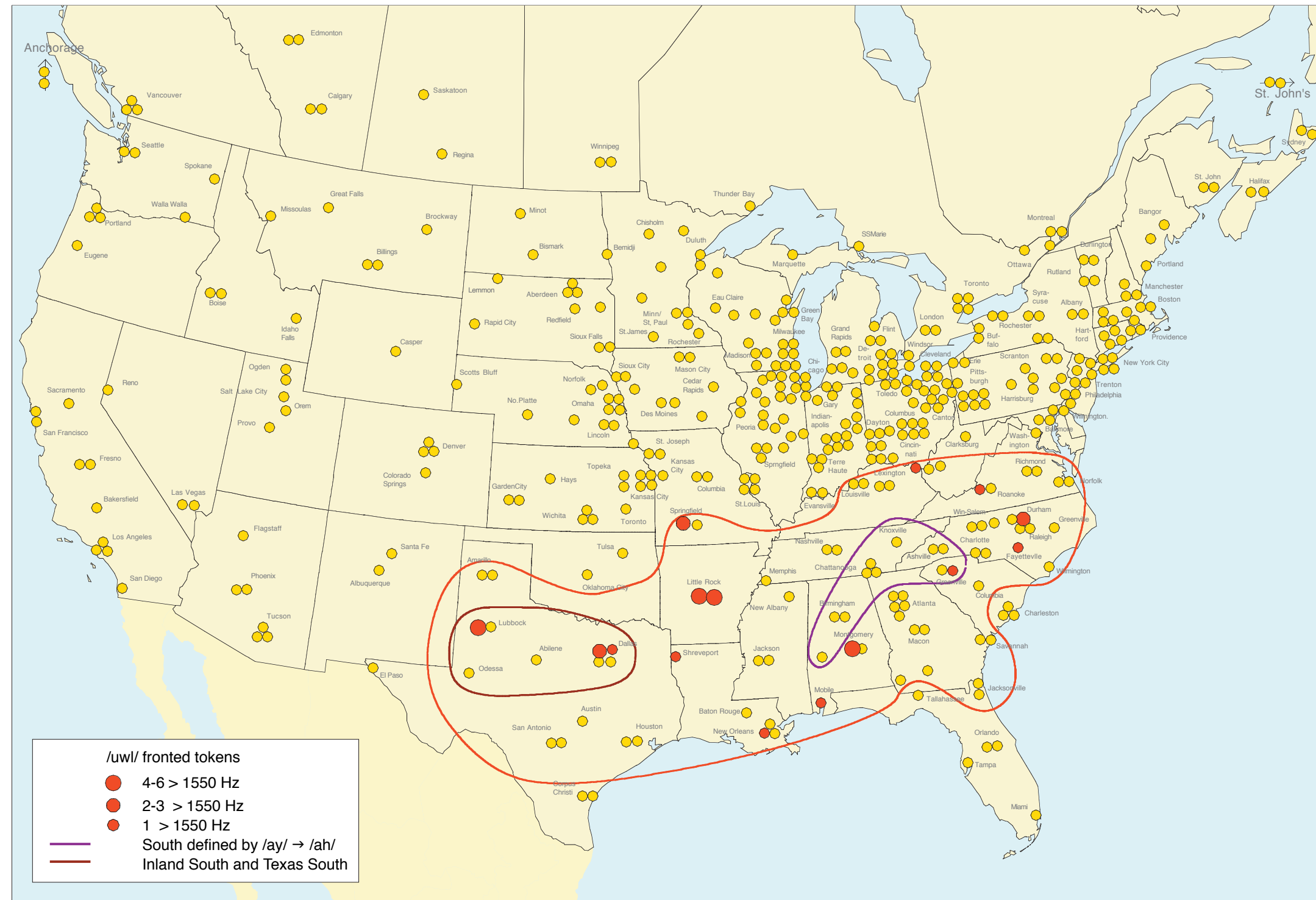
The overall view of /uw/ fronting in the South shows that it is advancing with younger speakers, though not as strongly as in some other sections of the country. Strong fronting of /uw/ and /ow/ is even more of a Midland feature than a Southern feature. The marginal areas of the South included in the Southeast region are carried along in a general Southeastern fronting. The general tendency to front /uw/ does not include fronting before /l/, which is in retreat in the one area where it developed. Finally, fronting has never affected vowels before /r/ in any section of North America.

12.4. Individual vowel systems

This section will present individual vowel systems that exemplify the various types of fronting, or absence of fronting of back upgliding vowels, in North American English. The phonetic conditioning shown by the regression coefficients in the various tables will here be illustrated by the words that most strongly favor and disfavor fronting. Most of the vowel systems presented in this section show no fronting before /l/, so that the degree of fronting of a given vowel can be measured by the distance of the main distribution of tokens from those before /l/.

The most conservative dialect, Providence, Rhode Island, is displayed in Figure 12.8. In this system, the means of all Vw vowels remain back of center. Vowels after coronal onsets (/Tuw/) are just short of mid position (*two, too, do*) and the other set (/Kuw/), is not much fronter than /uw/ (*boots, roof, goose*). The representatives of the /iw/ class – *Tuesday, stupid, studios* – are further back than

⁷ This is a common characteristic of vowels before liquids, and it holds even more strongly for /r/ than for /l/. Since Plotnik treats vowels before /r/ as separate categories, vowels before /r/ did not appear in the vowel systems of the preceding section.



Map 12.7. Fronting of /uw/ before /l/

In most of North America, there is a strong prohibition against fronting of /uw/ or /ow/ before liquids /l/ and /r/, but throughout the South such fronting is common. This thematic map shows by the size of the red circle the frequency of fronted

/uw/. It is concentrated in the Inland and Texas South, but also quite prominent in Little Rock, Arkansas, where other features of Southern States phonology are not very far advanced.

the mean of /Tuw/. But they are also higher, a dimension that we do not usually take into account. The same phenomenon is seen in the vowel systems of all three Providence speakers.

In Figure 12.8, /ow/ is not fronted at all, except for one token of *toast*. The word that is usually in the forefront of /ow/ fronting, *go*, is firmly a back vowel.

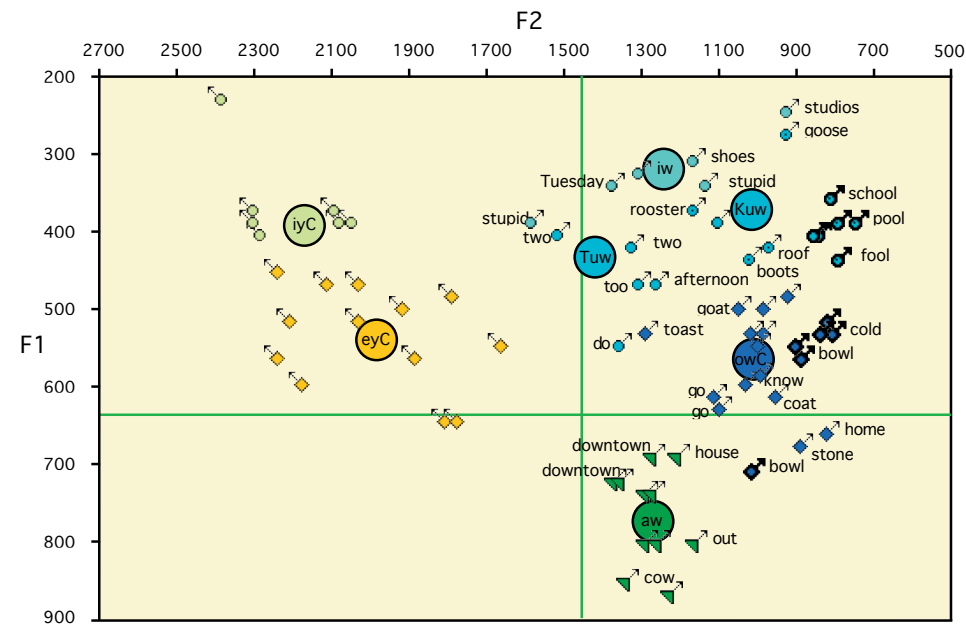


Figure 12.8. Absence of Vw fronting in vowel system of Alex S., 42, Providence, RI, TS 474. Back vowels before /l/ highlighted

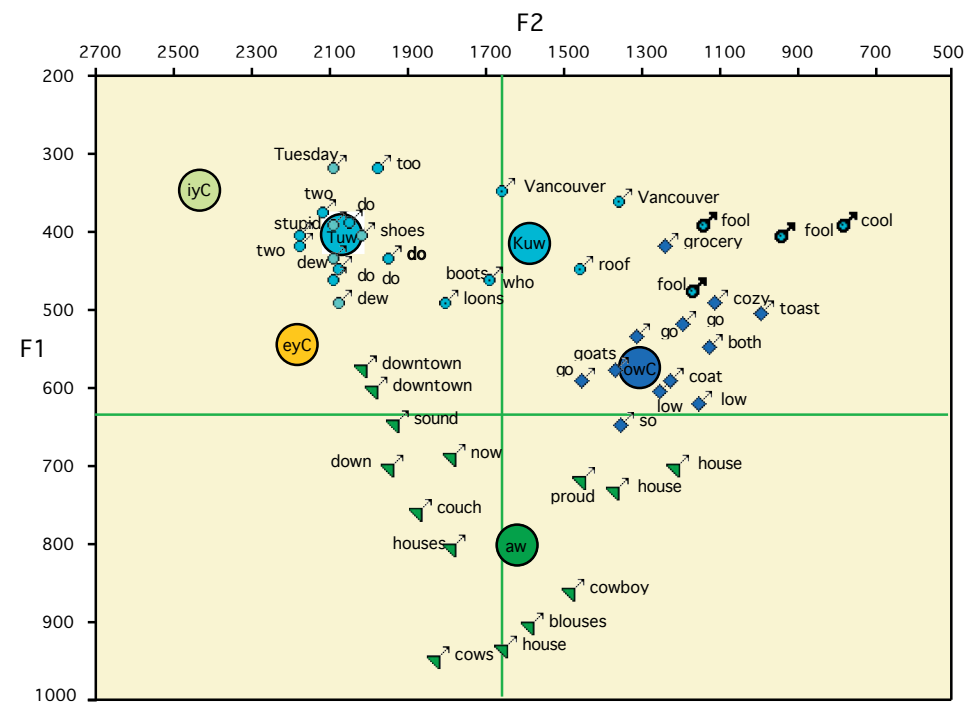


Figure 12.9. Canadian pattern of /Tuw/ fronting in vowel system of Lena M., 34, Toronto, ON, TS 645. Vowels before /l/ highlighted

The /aw/ class is also squarely back of center, as in most Northern systems, and even /aw/ before nasals is found back of center.

The large northwestern area comprising Canada and the West shows common properties in the fronting of Vw words. In this system, the vowel /uw/ is fully fronted after coronals but only moderately after non-coronals, and /ow/ remains fully back. As an example, Figure 12.9 displays the Vw vowel system of Lena M., a 34-year-old woman from Toronto. The /Tuw/ class is fully fronted, with a mean well beyond 2000 Hz, (*two, too, do*), intermixed with the /iw/ class in the same position (*Tuesday, stupid*). In fact the mean for /iw/ is identical with that of /Tuw/ and is concealed by it. The /Kuw/ class (*boots, roof*) is back of center, though considerably advanced beyond /uwl/.

The nucleus of /ow/ remains fully back in Figure 12.9. The word *go*, usually the frontest member of the class, is well back of mid position.

Toronto is outside the Northern area in which /aw/ is backer than /ay/ (Map 12.5). Figure 12.9 shows that about half of the non-nasal /aw/ tokens are front of center, with the vowels before nasal consonants fronted even further and raised. The two back tokens of *house* reflect the Canadian raising of /aw/ before voiceless consonants (Jooa 1942, Chambers 1973). The pattern is not as clear as usual, however, since *proud* is close to these tokens and another *house* is in low central position.

The characteristic Vw pattern of the West is similar to that of Canada, with /Tuw/ and /iw/ fronted together, /Kuw/ well behind, and little observable shift of /ow/. Figure 12.10 is the vowel system of a 55-year-old woman from Reno, Nevada that exemplifies this pattern. The /iw/ and /Tuw/ classes are not distinct and no tokens have F2 greater than 1900 Hz. There is a great distance between these vowels and the /iy/ mean. The /Kuw/ allophone is located firmly back of center, but well fronted in comparison with /uwl/. On the other hand, /ow/ shows no signs of fronting except for the word *no*. The /aw/ class is just front of center, but without any trace of Canadian raising.

In Maps 12.3 and 12.4 it appeared that the most extreme fronting patterns are not found in the South, but in various areas of the Midland. Figure 12.11 shows the vowel system of a 37-year-old woman from Columbus, Ohio. The means of

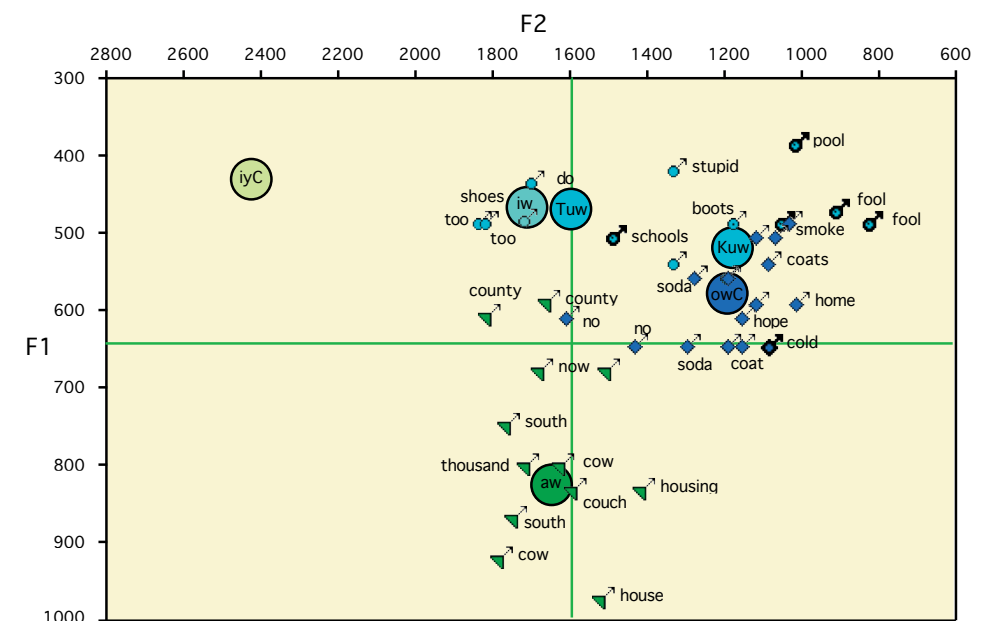


Figure 12.10. Western pattern of Vw fronting in system of Ira H., 55, Reno, NV, TS 312. Vowels before /l/ highlighted

/iw/, /Tuw/, /Kuw/, /ow/, and /aw/ are all well front of center. The only vowels remaining in back position are those before */l/*; the remainder form tight groups front of the midline. The */iw/* class (*juice, dew*) is slightly front of */Tuw/* (*Doodie, two*) but not significantly so. The */Kuw/* class (*boots, hoot*) is also front of center, in contrast to the pattern of Figure 12.9.

The main body of */ow/* words are tightly clustered front of center, with *go*, the most advanced token, in front nonperipheral position. The back */ow/* vowels are those before */l/*, along with the single word *home*, which is a regular exception to fronting.

The */aw/* class is more consistently fronted than in the previous diagrams, with the nasals leading. Note that */aw/* before */l/* (*owl*) is well to the front unlike pre-lateral tokens of */uw/* and */ow/*.⁸ Here the relative positions of */ow/* and */aw/* suggest a chain shift, with */ow/* in nonperipheral position and */aw/* in peripheral position.⁹

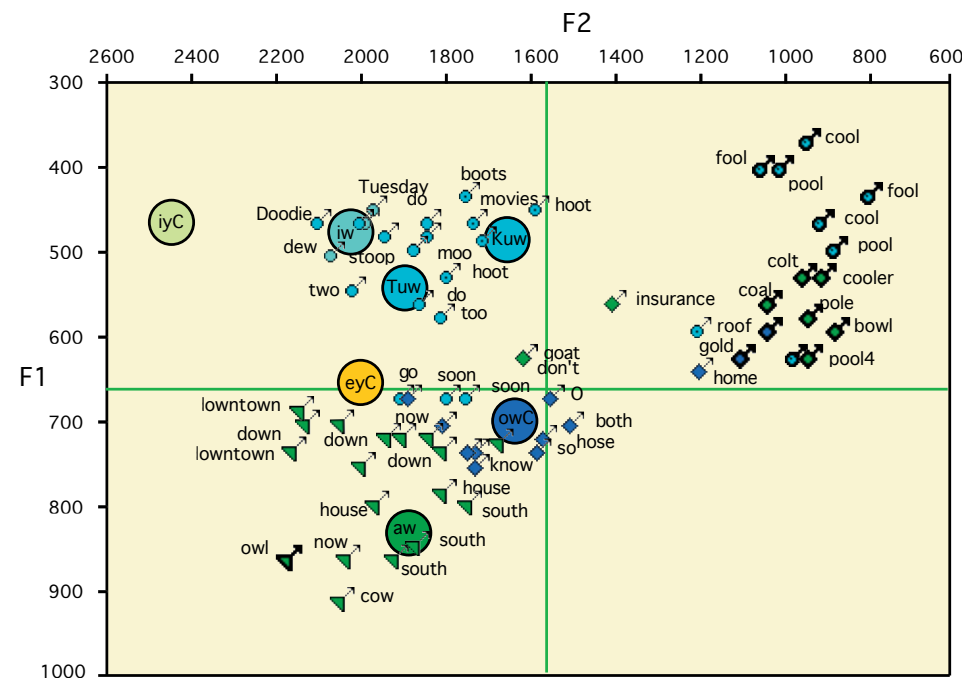


Figure 12.11. Fronting of all Vw in the vowel system of Danica L., 37, Columbus, OH, TS 737. Vowels before */l/* highlighted

The northern cities of Ohio contrast sharply with the strong fronting found in Columbus and the other cities in the Midland dialect area. Figure 12.12 shows the conservative pattern of */ow/* in the vowel system of a Cleveland speaker. While the main body of */ow/* words is not as far back as */ow/* before */l/*, none of them approaches the center, and they are heard as back vowels. In this Northern system, *Tuw* is well fronted (*do, two*) but *Kuw* is well back of center (*roof, coop, boots*). One can also note the conservative behavior of */aw/*; Cleveland is north of the green isoglosses of Map 12.4.

Figure 12.13 shows the strong fronting of Vw in a southern system where */iw/* is preserved as a separate category, the vowel system of a 45-year-old man from Charlotte, N.C. The */iw/* class (*news, dew, new, shoe, Duke*) is in high front position. It is the frontest vowel of the system since the nucleus of */iy/* has undergone the Southern Shift and its mean is lower and backer than the mean of */iw/*.¹⁰ This */iw/* class is higher and significantly fronter than */Tuw/* (*do, two*), with no overlap.

In Figure 12.13, the */Kuw/* allophone (*through, blue, roof*) is well back of center and only moderately fronted. The */ow/* mean is also back of center. How-

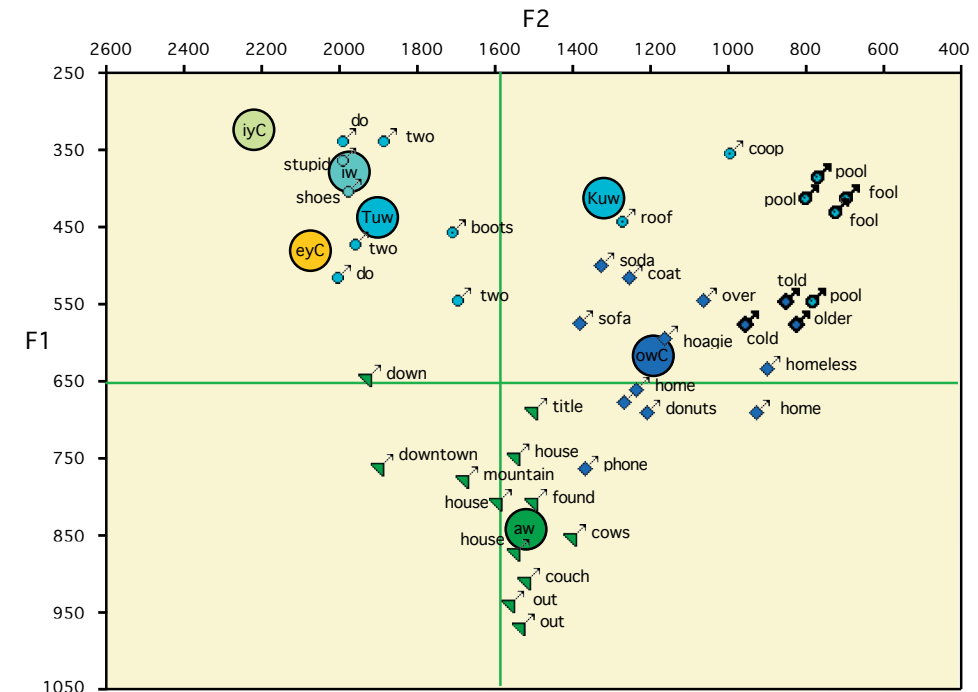


Figure 12.12. Conservative */ow/* in the vowel system of Alice R., 32, Cleveland, OH, TS 110. Vowels before */l/* highlighted

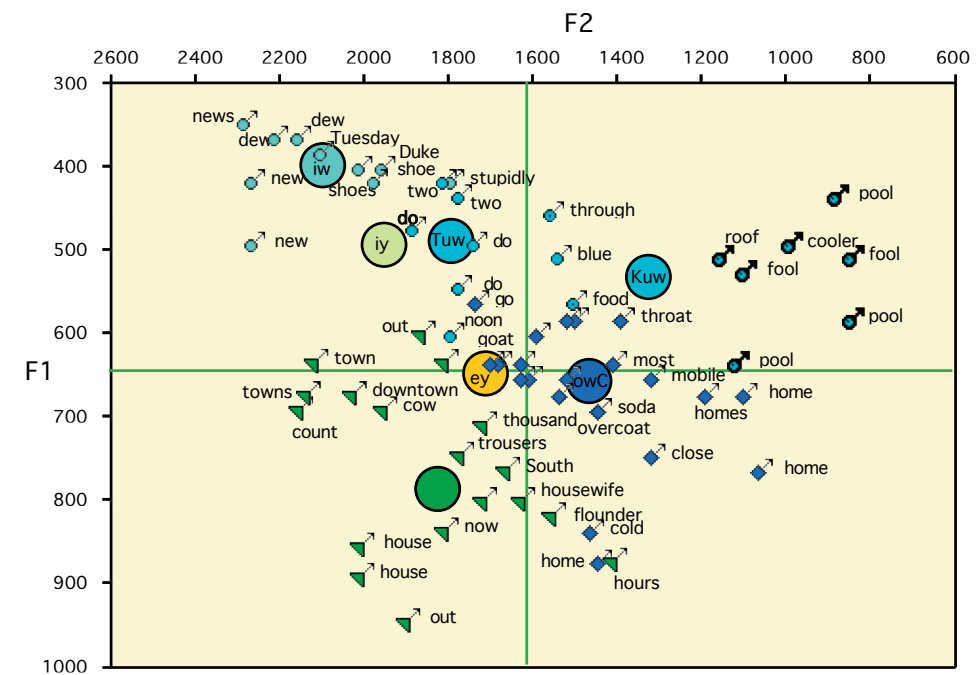


Figure 12.13. */iw/* distinct from */uw/* in the vowel system of Matthew D., 45, Charlotte, NC, TS 483. Vowels before */l/* highlighted

⁸ This is not a general feature of */aw/* for all regions. But in the regression analysis of the fronting of F2 in the Midland, a following */l/* has a positive coefficient of 130, with a *p* value of < .01.

⁹ This pattern is replicated in the Philadelphia vowel system (Labov 2001).

¹⁰ Most short */i/* tokens have not moved to peripheral position, so that the mean of */i/* is close to that of */iyC/*.

ever, the most favored forms with velar initial (*go, goat*) are located front of center and overlap with the centralized and lowered nucleus of /eyF/. On the other hand, /aw/ is well fronted, with the nasal allophones raised, and only the least favored forms (*flounder, hours*) remain back of center.

In Southern dialects where /iw/ has completely merged with /Tuw/, there is no longer any impediment to the fronting of the high vowels. Figure 12.14 is the vowel system of a 34-year-old woman from Lexington, Kentucky. All of the non-lateral high back upgliding vowels are clustered together in high front, non-peripheral position, with a majority of the F2 measurements above 2000 Hz. The distance between these fronted forms and the /uw/ forms is 1000 Hz.

For this Lexington speaker, /ow/ is not as fully fronted as in the Midland pattern of Figure 12.11, though there is considerable lowering, mirroring the lowering of /eyC/. The mean value would be considerably fronter if the lexical exception *home* were excluded. The wholesale fronting of /aw/, with raising of vowels before nasals, is notable in this dialect.

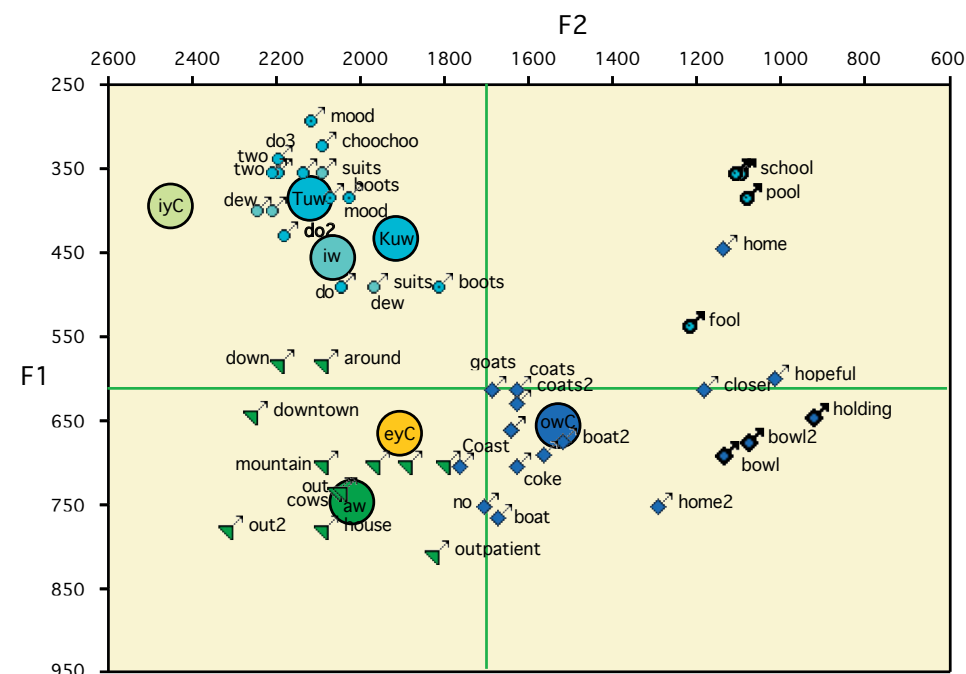


Figure 12.14. Fronting of all /Tuw, Kuw, iw/ in the vowel system of Fay M., 34, Lexington, KY, TS 283. Vowels before /l/ highlighted

Figure 12.15 displays extreme fronting in the vowel system of a 71-year-old woman from Little Rock, Arkansas. Because so many vowels are strongly fronted, the grand mean of this particular system is shifted forward 100 Hz from the usual normalized mean of 1550 Hz. There is marked fronting of /uw/ before /l/. The /uw/ vowels for *fool* have F2 higher than 1550, and both *tool* and *foolish* are fronter than the grand mean of this system, at 1650 Hz. Tokens of /uw/ with coronal onsets (*tool, tooling*) are even fronter than many /Kuw/ tokens. They are however not as far front as /Tuw/, which has the same mean as /iw/, with some tokens above 2200 Hz.

The /ow/ tokens are fronted as far as in most Southern systems, but not to the midline of this system. On the other hand, all /aw/ tokens are tightly clustered in low front position with higher F2 values than the mean of /eyC/. Map 12.4 showed that extreme fronting of /aw/ is characteristic of this region.

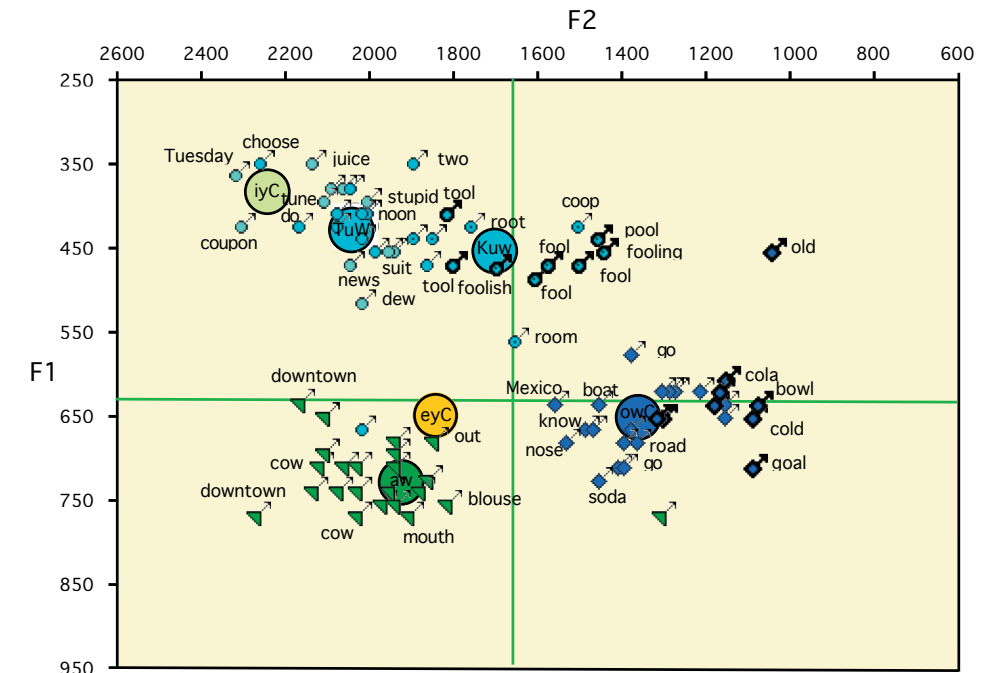


Figure 12.15. Fronting of /uw/ in the vowel system of Mary K., 71, Little Rock, AR, TS 402

12.5. Overview

A review of the back upgliding vowels shows that the fronting process is general across North America. The earliest of these three movements appears to be /aw/, followed by /uw/ and then /ow/. In general, the position of /aw/ appears to have reached a maximum and may be beginning to recede, but active change in progress is found in the continued fronting of /uw/ and /ow/.

While the fronting of /uw/ is active across the entire continent, there is a sharp split between the North and the Southeastern region in the fronting of /ow/ and /aw/. The fronting of /ow/ is most advanced in the Mid-Atlantic region but is also seen to be advancing in apparent time in all other areas except the North and Canada. The fronting of /ow/, like the fronting of /aw/, is sharply constrained by the North–Midland border, while the fronting of /uw/ is not.

In general, there is no fronting of Vw vowels before liquids. The one exceptional case is the fronting of /uw/ before /l/ in the South. But while /uw/ generally shows negative age coefficients, indicating an active fronting in apparent time, the fronting of /uw/ before /l/ shows the reverse behavior and is receding strongly across the South.

Figure 12.16 is a Plotnik Meanfile diagram of Vw, showing the relative position of the 22 dialects defined in Chapter 11 for /Tuw/, /Kuw/, /ow/, and /aw/. Individual dialects are labeled with the abbreviations introduced in Section 11.3. The /iy/ and /ohr/ means are added as points of reference to show how far Vw means are from the front and back limits of the vowel space.

It is immediately apparent that the changes affecting /uw/ now in progress are responsible for the wide range of means from 1000 Hz to 2100 Hz, in sharp contrast to the /iy/ and /ohr/ mean values, which are tightly clustered. One /iy/ value lies outside of the main distribution, the green circle with an arrow representing the Inland South at F1 456, F2 2071 (Map 12.4). Otherwise, there is no overlap of /iy/ and /uw/ means. The most advanced fronting of /Tuw/, characteristic

of Charleston and the Southeast,¹¹ is several hundred Hertz lower than the /iy/ means, indicating that the /uw/ vowels are still rounded.

This diagram also reproduces the pattern of Figure 12.6 in the relations of /Tuw/ and /ow/. A group of Southern dialects have means of /Tuw/ well front of center, while Eastern New England and Providence are the most conservative, well back of center. The symbols with dots at the center and bold labels indicate the corresponding relations for /Kuw/, with the IS and SE means at one extreme, front of center, while Eastern New England and Providence are again in back position, not far from /ohr/.

Figure 12.16 also shows that the fronting of /ow/ is considerably behind /Tuw/. Charleston is in the lead, along with the Mid-Atlantic States, Pittsburgh, the Texas South, and the Inland South, while the New England dialects and the North are in the rear. Canada shows strong fronting of /uw/, but is quite conservative to the fronting of /ow/.

It can be seen that the realizations of /aw/ are fairly evenly divided into those back of center and front of center. Again, Eastern New England and Providence have the furthest back means, but all Northern dialects are located back of the medial green line. The strongest fronting is found in the Mid-Atlantic dialect, but the three Southern dialects are not far behind.¹² New York City shows an unusual pattern, with strong fronting of /aw/ but conservative, Northern-like treatment of /uw/ and /ow/.¹³

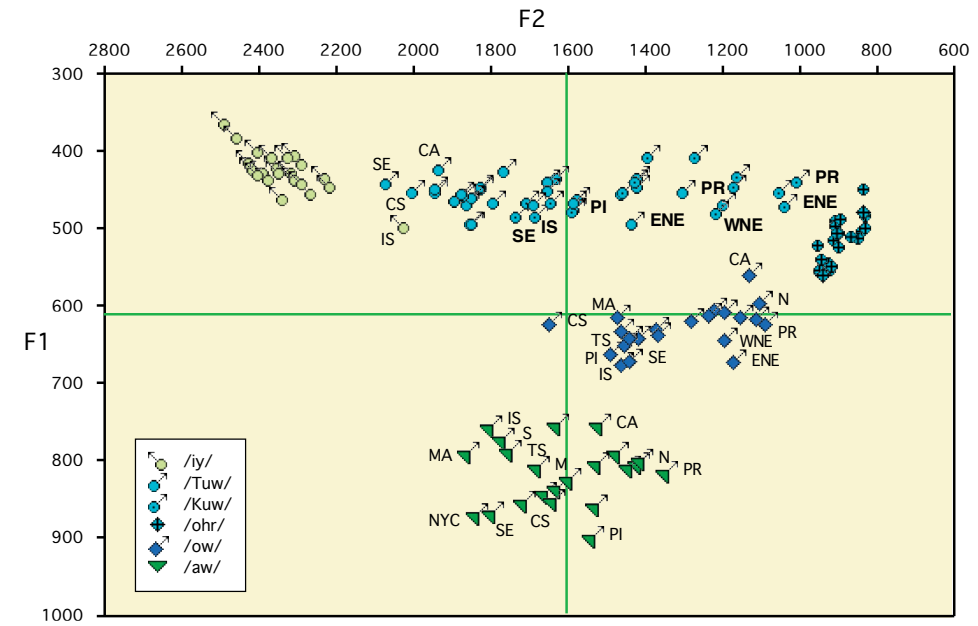


Figure 12.16. Meanfile diagram of Vw vowels for 22 dialects

11 The Southeast, as defined here, is the small group of Southern States communities that are not included in the South or the Midland, but are included in the Southeast super region on the basis of strong fronting of Vw classes.
 12 It should be noted that /aw/ tokens before nasal consonants are not included in these means, but form a distinctly separate distribution further front and extending to upper mid position.
 13 See Labov (1966: Ch. 10) for the early stages of the fronting of /aw/ in New York City.