

# 11. The dialects of North American English

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## 11.0. Introduction

This chapter presents the basic framework for the analysis of North American English dialects. It will introduce the criteria for the major regional divisions and define within these the specific dialect configurations that are the focus of the chapters to follow. The outer boundaries of these dialects will be established, bearing in mind that the Atlas is a study of urbanized areas. The exact location of many boundaries must await the completion of studies in small towns and rural areas.

The literature of North American dialectology exhibits considerable skepticism in regard to the location of dialect boundaries, returning repeatedly to the theme that they can only be more or less arbitrary selections from a large number of possibilities. This skepticism extends to the very notion of dialect. Carver characterizes his own construction of regional boundaries as a set of arbitrary cuts in a continuum:

A map of language variation is merely a static representation of a phenomenon whose most salient characteristic is its fluidity. It is an almost seamless fabric covering the land. A person traveling southward from Superior, Wisconsin, to Mobile, Alabama, would be aware of the differing speech patterns but would not be able to say at what points along the route the changes occurred ... What follows, then, is not the definitive description of regional dialects of America, because such a description is impossible. It is merely one attempt to seize the linguistic river as it flowed through. (Carver 1987: 19)

One reason for this hesitancy may be that dialect classifications in North America have in the past been based on linguistically isolated lexical items (Kurath 1949; Carver 1987). Lexical isoglosses are unlikely to show close interrelations, insofar as there are no necessary structural relations among the lexical items that produce them.<sup>1</sup> Words are selected for study on the basis of their regional heterogeneity and their possible connection with settlement history, rather than their relations with other linguistic elements. In contrast, the dialect boundaries established in this chapter are based on the systematic study of phonological relations in the vowel system and the activation of general principles of chain shifting. One might expect a very different set of dialect boundaries to be selected. But in this chapter, and many of those to follow, there will appear a high degree of convergence between isoglosses based on regional vocabulary and the patterning of phonological isoglosses. Some major divisions will depart from those based on lexical and grammatical evidence, to a large extent the result of current changes in progress. Yet others will show a satisfying coincidence with the lexical boundaries established by the Dictionary of American Regional English [DARE] and the Linguistic Atlas studies that preceded it.

Confidence in the phonologically based dialect boundaries displayed here is not based only on coincidence with previous studies. It is founded on two types of correlation between geography and linguistic structure. In one, isoglosses for the various elements of a chain shift coincide in an isogloss bundle, the end result

of a completed series of linked changes. In the other, the successive stages of a chain shift are nested one within the other, with the oldest showing the widest domain and the most recent the most restricted application, producing a display of incomplete changes in progress.

Unlike the mergers studied in Chapters 8 and 9, chain shifts require acoustic analysis for an accurate description. The data of this chapter are therefore based on the vowel systems of the 439 Telsur subjects for whom acoustic analysis is completed, a total of 134,000 measurements. Though the splits and mergers discussed in the last chapter will also play a role, the data set will be limited to these 439 subjects, so that the basis for drawing isoglosses will be comparable for all variables.

The most surprising finding of current studies of linguistic change in progress in North America is that regional dialects are becoming increasingly differentiated from each other. This increasing diversity does not apply to smaller units within the major regions. Within most of the regional boundaries, linguistic changes in progress have the effect of solidifying and developing the regional pattern. Many local dialects are indeed disappearing, but they are assimilating to larger regional patterns rather than to a national or continental model.

The output of this chapter is a classification of American dialects that will be the basis of all the chapters that follow. This classification is not an end in itself. Dialect diversity creates many practical problems, particularly for automatic speech recognition. The definition of the boundaries of North American dialects and their degree of differentiation provide the optimal framework for sampling American speech and creating the training bases for speaker-independent recognition.

The location of dialect boundaries raises many historical and theoretical issues. How did these dialects become differentiated in the first place? How do we account for the location of isoglosses, particularly those that bundle together tightly? These questions involve us with settlement history, with the interplay between structural and historical factors, and with the dynamics of spatial diffusion. Ultimately, all of these studies will be brought to bear upon our efforts to answer the perpetually challenging question: What are the causes of linguistic change? The many ongoing changes in American English that are reflected in these maps will replenish and fortify our efforts to illuminate this question.

### Criteria for defining dialect regions

Chapter 10 showed clear evidence of geographic differentiation of the North American vowel system for most of the variables examined. This chapter is designed to draw the boundaries of those geographic areas on a principled basis.

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<sup>1</sup> There has been considerable discussion as to whether the original selection of vocabulary items was carried out on a principled basis (Schneider and Kretzschmar 1989; Kretzschmar 1992). Carver's emphasis on the continuous character of dialect boundaries reflects the large number of regional markers that he used to construct national dialect divisions.

It seems clear that a candidate feature for dividing an area into dialect regions should be geographically continuous and uniform. Ideally, (a) every community within a continuous region would be marked by such a feature, and (b) none of the speech communities outside the region would be marked by this feature. However, criterion (a) is not likely to apply to linguistic changes in progress. A speech community engaged in a new change in progress must include some conservative, older speakers who were not affected by the change when they were acquiring language. The traditional definition of an isogloss as the outer limit of a regional feature is consistent with the emphasis on criterion (b) rather than an insistence on (a).

One can distinguish four other criteria for candidate regional markers. (c) They should be based on variables that occur frequently, so that they can be easily identified and confirmed by repeated sampling. (d) Qualitative criteria, which do not depend on particular methods of measurement or normalization, will be preferred. (e) The ideal criterion should also display a convex shape, indicating that the feature is expanding from an originating center or still preserves evidence of such earlier expansion. (f) In keeping with the aims of the present work as developed in Chapter 1, features should be systemic, rather than isolated, reflecting relations among two or more elements of the phonological system. To sum up, the features preferred here for dialect classification are (a) consistent, (b) exclusive, (c) high frequency, (d) qualitative, (e) convex in distribution, and (f) systemic.

The criteria for the identification of dialects will draw upon the description of the initial position of North American vowels provided in Chapter 2 and the general principles of sound change presented in Chapter 3. Chapter 3 distinguished two types of systemic changes: those that alter the phonemic inventory (splits and mergers) and those that do not (chain shifts and parallel shifts). Chapters 8 and 9 reviewed a range of mergers taking place in North American English, many of them concentrated in particular geographic regions. An unconditioned merger like the fusion of /o/ and /oh/ might seem to be a good candidate for defining dialects, since it satisfies criteria (c, d, e, f) and measures up quite well on criteria (a) and (b). But the fact that mergers expand regularly at the expense of distinctions (Labov 1994: 311) means that these boundaries will often be separated from bundles of other features with which they were originally united by historical development. Thus it will appear that the merger of /i/ and /e/ before nasals is a Southern States feature, but it is not very useful in defining the southern region since it has expanded northward a considerable distance into the Midland area (see Chapters 9, 18). At the same time, the existence of splits or mergers in the low vowels has a profound effect upon the economy of the system and will play a major role in the definition of dialect regions to follow. The geographic boundaries of areas that show resistance to merger will have considerable significance for the definition of regional dialects, more than the boundaries of the completed merger.

Chain shifts, mergers, and other sound changes can be best understood by their relationship to the phonological system as a whole (Martinet 1955). Differences in inventory created by mergers or splits are therefore fundamental in the mechanism of sound change. Many of the mergers that were mapped in Chapters 8 and 9 are conditioned mergers, confined to allophones before nasals or liquids, and do not directly affect the system as a whole. By contrast, the unconditioned merger of the low back vowels presented in Chapter 9 does have an important effect on the vowel system as a whole, and the status of this merger will be one of two pivotal criteria in establishing a typology of North American vowel systems. The other pivotal factor is the status of the historical short-*a* class, which follows many radically different forms throughout the continent. The two pivot conditions have to do with the status of the low vowels as shown in (1).

(1)

Long & ingliding	Short vowels	Long & ingliding						
æh ~	<table border="1"> <tr> <td>i</td> <td>u</td> </tr> <tr> <td>e</td> <td>ʌ</td> </tr> <tr> <td>æ</td> <td>o</td> </tr> </table>	i	u	e	ʌ	æ	o	~ ah ~ oh
i	u							
e	ʌ							
æ	o							

In the initial position, there is a system of six short vowels. The short-*o* class in *got*, *sock*, *rod*, etc., rarely remains as a separate unit. In most North American dialects it is unrounded and merged with the long vowel /ah/ in *father*, *pa*, etc. When /o/ is a separate phoneme it cannot occur finally; when it merges with /ah/ the resulting category is a *free* vowel that includes words like *spa*, *pa*, etc. Only in Eastern New England does /o/ remain separate from /ah/. There it merges instead with /oh/. The greatest degree of dialect differentiation stems from the relation of the /o/ class to /oh/, regardless of whether it is merged with /ah/. The merger of /o/ with /oh/ is referred to as the *low back merger*.

The /oh/ class is one of the most irregular and skewed categories in English phonology. As discussed in Chapter 9, it was formed by the union of three highly conditioned processes: the vocalization of /l/ in *talk*, *stalk*, *balk*, etc.; the monophthongization of *aw* in *dawn*, *hawk*, *awful*, *bawd*, and *awe*; and the monophthongization of *au* and *ou* in *caught*, *thought*, *caul*, *maul*. The end result was a highly restricted phoneme which occurred primarily before *-t*, *-d*, *-k*, *-l*, *-n*, *-z*, and finally in *law*, *saw*, etc. In North America, short-*o* words began to migrate from the /o/ class to the /oh/ class by lexical diffusion: before /θ/ in *broth*, *moth*, *cloth*, etc., before /s/ in *loss*, *cost*, etc.; before /ŋ/ in *long*, *strong*, *song*, etc.; before /g/ in *dog*, *log*, *frog*, etc. The end result was not the original skewed distribution as it remained in British English, but a bewildering variety of dialect patterns for the occurrence of /oh/. This odd distribution may have played a role in the widespread and independent merger of /o/ and /oh/.

The long and ingliding subsystem is itself a marginal subsystem in initial position. The only sizable word-classes represented by /Vh/ phonemes are the oddly skewed /oh/ and the even more limited /ah/. The latter revolves around a few core lexical items, *father*, *calm*, *palm*, *pa*, *ma*, with a very large number of words of foreign origin spelled with *a*: *bra*, *drama*, *lager*, *macho*, *mirage*, *salami*, *spa*, etc. (Boberg 2000).<sup>2</sup> In *r*-less dialects the entire long and ingliding system is strengthened by additions to three other marginal ingliding classes: /ih/ in *idea* and *theater*; /eh/ in *yeah*; /uh/ in *skua*, as well as to /ah/ (*car*, *cart*) and /oh/ (*core*, *cord*). In Eastern New England, the /ah/ class is expanded by many words in the Southern British broad-*a* class: *half*, *aunt*, *pass*, *can't*, etc. When /r/ is restored (Chapter 7), this expanded long and ingliding system re-contracts to the more limited set of marginal items.

The short vowel *a* undergoes many complex phonetic shifts in North American English (Chapter 13). In one common development, it has a raised allophone before nasals and remains in low front position elsewhere. In the North, it is raised as a whole with fine-grained phonetic conditioning (Chapter 14). In the Middle Atlantic states, short-*a* undergoes a split into two categories that cannot be predicted by any simple rule. The split of short-*a* produces a skewed /æh/ class, in marginal contrast with /æ/, which occurs primarily before voiceless fricatives and nasals, roughly the same classes that effect the tensing of /o/. Like the split of /o/, the split of short-*a* produces an irregular lexical distribution with

<sup>2</sup> In southern England, the /ah/ class is greatly augmented with words before nasal clusters and voiceless fricatives. This condition may have been the ancestor that generated the split of short-*a* words in NYC and the Mid-Atlantic States (Ferguson 1975). In North America, the broad-*a* class is found primarily in Eastern New England, and in a few words like *vase* and *aunt*.

great dialect variation; unlike the split of /o/, it shows intricate patterns of grammatical conditioning (Chapter 13).

The dynamics of a North American vowel system therefore depend upon whether (a) the low back merger has taken place and (b) whether the short-*a* split has taken place.

## 11.1. The dialects of North American English

Map 11.1 presents the relationship of the two pivot points of North American English vowel structure: the low back merger and the short-*a* configuration. The green symbols show speakers for whom the merger is complete in both perception and production, and the oriented green isogloss defines the region where such speakers predominate.<sup>3</sup> This includes the majority of the Telsur subjects in Canada, the West, Eastern New England, and a separate area in Western Pennsylvania, with an extension down into West Virginia and Kentucky.

Map 11.1 also shows the regions that are most resistant to the merger, indicated by the oriented blue isogloss. The dark blue symbols represent speakers with clear distinctions in both production and perception, while the light blue symbols cases where the pairs are clearly distinct in production *or* perception. There are five such areas in Map 11.1, though in the discussion to follow they will be reduced to three. The most homogeneous concentration of blue symbols is in New York City and the Mid-Atlantic States. A second area includes a large portion of the South, with considerably more internal variation. A third group is subdivided into three areas: New York State, the large cities of the Great Lakes region,<sup>4</sup> and a narrow corridor running down to St. Louis. The areas outlined in blue are conservative in regard to the low back merger, as are also the core areas of the dialect in which the major chain shifts (Northern Cities Shift, Southern Shift) are actively in progress.

Following the general convention of ANAE maps, the yellow symbols are the residual class where none of the marked features are found. In this case, yellow symbols represent speakers for whom the low back merger is in a transitional state, not satisfying any of the three preceding criteria for the green and blue symbols. Such changes in the phonemic inventory alter the economy of the subsystem of short vowels, setting in motion processes of vowel shifting that account for the most salient regional differences among dialects.

The red, orange and black isoglosses on Map 11.1 display the relation between the short-*a* configurations and the low back distinction. The red isogloss represents the general raising of the short-*a* class from lower front to mid position, the outer limit of speakers whose normalized mean value for F1 of /æ/ is less than 700 Hz.<sup>5</sup> The consequent absence of vowels in low front position triggers the fronting of the short-*o* class in the Inland North (the Great Lakes region, New York State, and the St. Louis corridor).<sup>6</sup> The match between the red and the oriented blue isoglosses is quite close: the raising of short-*a* does not extend as far eastward as the blue area, though it does include a few communities farther to the west.

In the Eastern corridor – NYC and the Mid-Atlantic States – there is an even closer match between the short-*a* configuration and the low back distinction. Within the area of the short-*a* split (the black isogloss), there is a slightly smaller region outlined by an oriented blue isogloss where all of the 19 Telsur speakers show a clear distinction between /o/ and /oh/. The split into /æh/ and /æ/ insures that there will be a large representation of the short-*a* class in low front position, and there is no fronting of /o/.

The South also retains short-*a* in low front position, not through a lexical split, but through Southern breaking (interrupted orange isogloss). In the early stages of the Southern Shift, /æ/ is tensed and raised, but in the fullest develop-



ment of the Southern pattern, the /æ/ syllable breaks into two distinct morae. The first mora reverses the general raising pattern, shifting down to low front position, where it effectively blocks any fronting of /o/. It is followed by a palatal upglide and then an inglide. This palatal breaking is often identified with the Southern drawl, with *pass* as [pæ:ɹəs] (Feagin 1987: Chapters 13, 18). As the map shows, the area of palatal breaking coincides with the general (though variable) resistance to the low back merger.

The presence of a low front /æ/ class in the Mid-Atlantic and Southern areas contravenes the mechanism of resistance to the low back merger found in the Inland North. Map 11.2 will develop the structural basis for resistance in these areas.

In Map 11.1, the three areas of resistance to the low back merger are seen to coincide with three different short-*a* configurations. Map 11.2 develops the logic of these alignments, following the different structural developments that insulate each dialect from the merger.



### The Inland North

The first area of resistance to the low back merger is the Inland North, defined by the Northern Cities Shift [NCS] (LYS 1972; Labov 1981; Eckert 1999; Gordon 2001). The basic sequence of events follows the trajectories of Figure 11.1.<sup>7</sup>

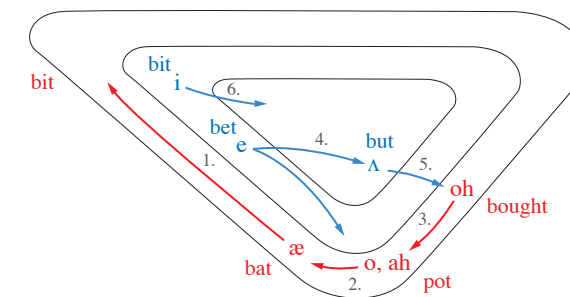


Figure 11.1. The Northern Cities Shift

The NCS was first recorded in the major cities of Detroit, Chicago, Buffalo, Rochester, and Syracuse.<sup>8</sup> This chain shift was triggered by the general raising of short-*a*, displayed in Maps 11.1 and 11.2 as the red isogloss, the outer limit for speakers with a mean F1 of /æ/ less than 700 Hz. The second stage is the fronting

3 This isogloss is not altered from that constructed in Chapter 9 on the basis of the minimal pairs judged and pronounced by all Telsur subjects: it fits the pattern of the 439 subjects analyzed acoustically as well as the larger number of Chapter 9.

4 This Great Lakes–New York territory was once continuous but is now broken into an eastern and a western half by a shift of the dialect allegiance of the city of Erie to the Midland (Chapter 14, 19).

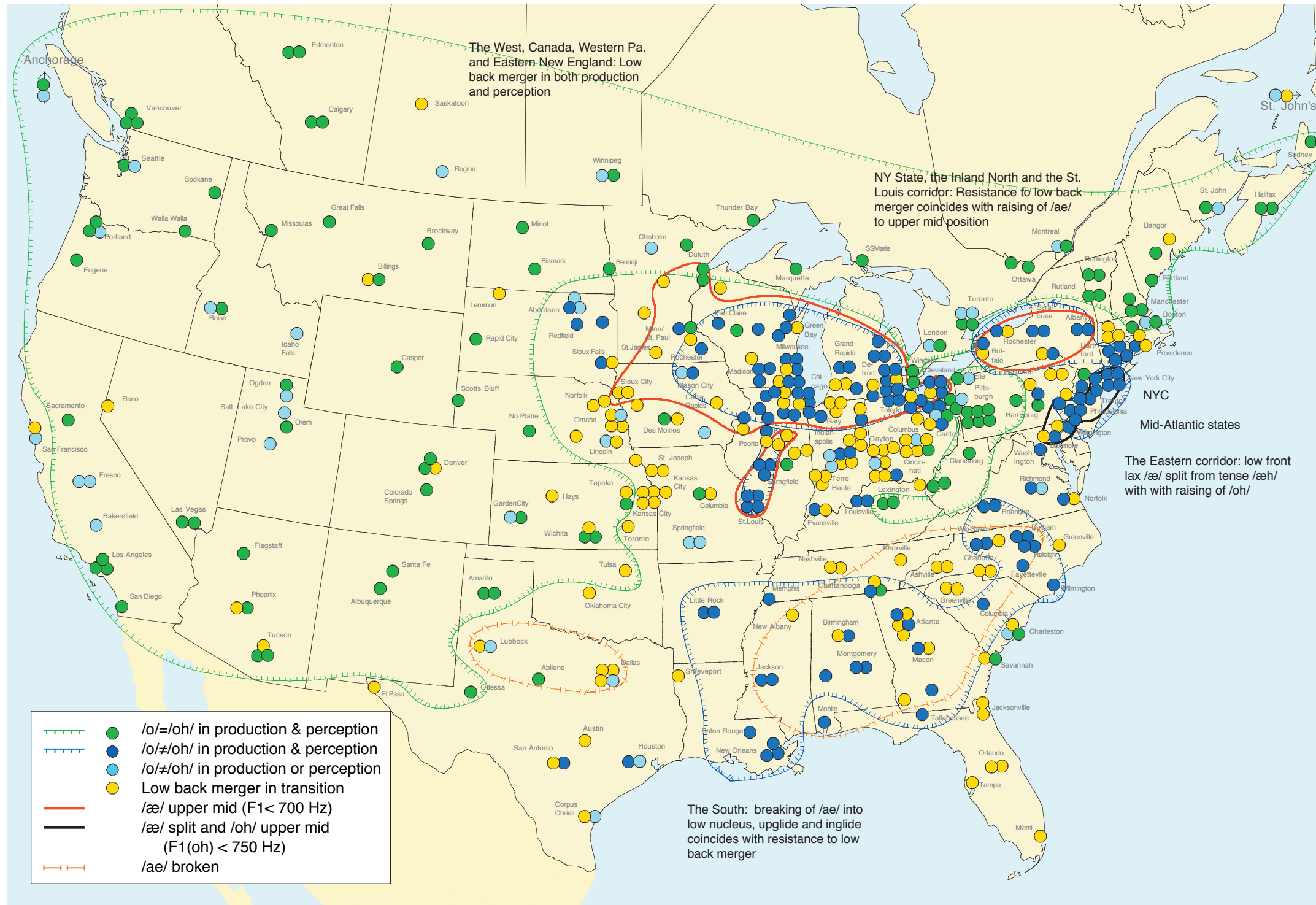
5 The red isogloss on Map 11.1 is also defined by the absence of any glide deletion of /ay/, excluding those speakers in the South who also have raised nuclei of /æ/. with less Southern breaking than those described below.

6 This mean value does not include vowels before nasals and so is not influenced by the general tendency for /æ/ to be raised before nasal consonants.

7 An earlier shift from initial position is the merger of /o/ with /ah/, which is not specific to the North.

8 Stages 1 and 2 of the NCS were first noted by Fasold (1969) in an unpublished analysis of Detroit data from Shuy, Wolfram, and Riley (1967). Stages 3 and 4 were developed in LYS (1972), including the alternative (and perhaps earlier) lowering of /e/ to overlap the former position of short-*a*. Stage 5 was first observed by Eckert (1999) in the Detroit suburbs.



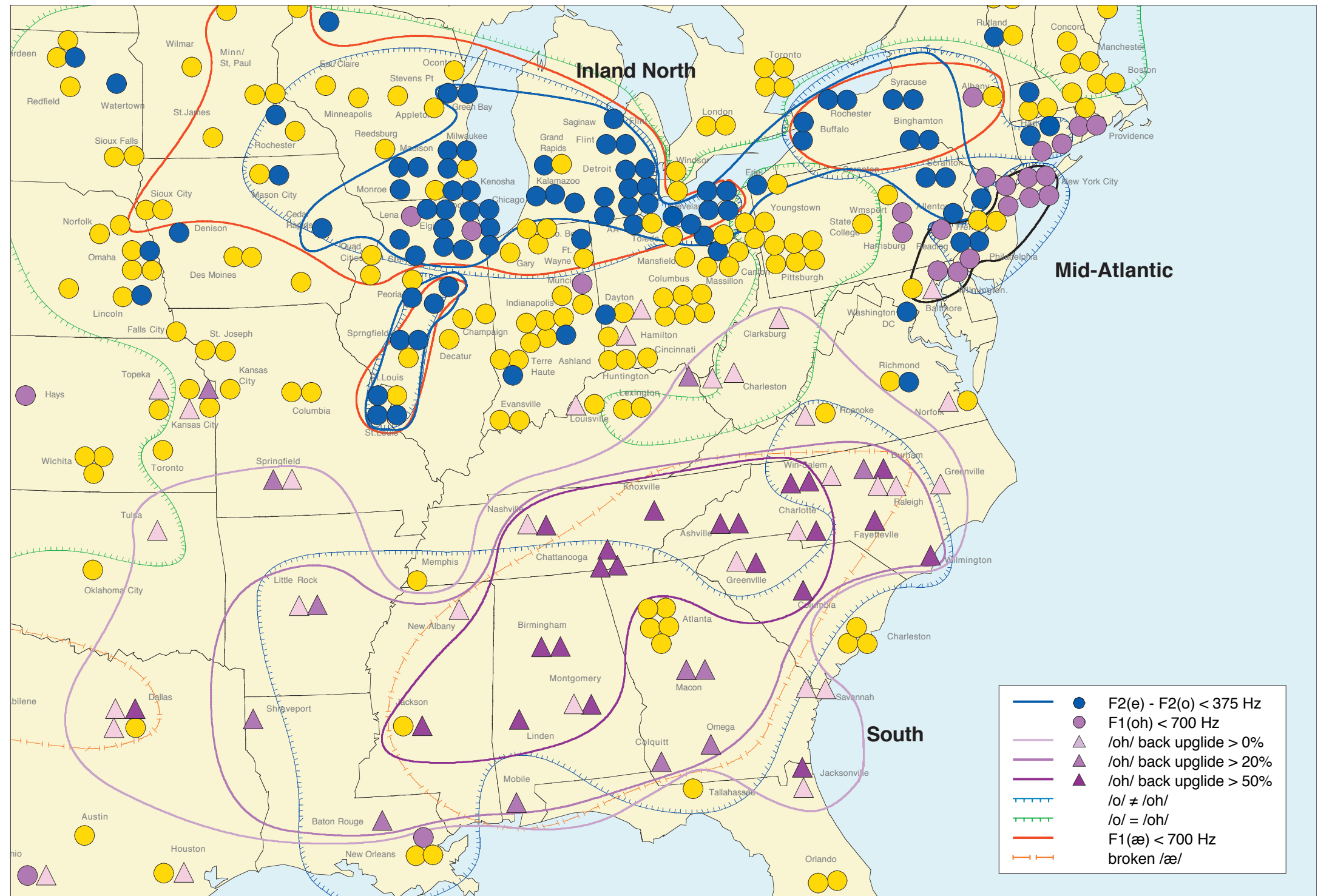


Map 11.1. The geographic relation of the low back merger to short-a configurations

The green symbols on this initial map show the areas of complete merger of short-*o* (*cot*, *Don*) with long open *o* (*caught*, *dawn*), and the blue symbols the areas with strict separation of these two classes. Resistance to the merger in these three areas is the result of the behavior of the short-*a* class in *man*, *bad*, *that*, etc.

In the Inland North, the entire short-*a* class is raised and fronted. In the Mid-Atlantic States and NYC it is split into a lax /æ/ and a tense /æh/ class. In the South, short-*a* shows Southern breaking (the “Southern drawl”).





Map 11.2. Three mechanisms for avoiding the low back merger

In each of the three areas of resistance to the low back merger, a different mechanism is operating to block the merger. The blue symbols show that in the Inland North, short-*o* in *cot*, *Don*, etc. has moved to the front, so that it is almost as front as the short-*e* class: this is part of the *Northern Cities Shift*. The magenta symbols

show that in the Mid-Atlantic States and NYC, the long open-*o* in *caught*, *dawn*, etc. has moved in the opposite direction, to upper mid position. In the South, neither of these shifts has taken place, but long open-*o* is distinguished by a back upglide (magenta triangles), a feature of the *Back Upglide Chain Shift*.

of the merged /o ~ ah/ class, which moves front of center with an F2 sometimes exceeding 1550 Hz (the center of the normalized system). The /oh/ class then moves down and front to approximately the position formerly occupied by /o, ah/, preserving the same margin of security. Short /e/ moves back towards /ʌ/, which in turn shifts back to the position formerly occupied by /oh/. Finally, /i/ can be seen to shift to the back (and sometimes down) in response to the movement of /e/.

A systematic measure of the progress of the NCS is obtained from the reduction of the front–back difference between /e/ and /o/. For the more conservative dialects of the Midland area, just south of the Inland North, /e/ is a front vowel with an overall F2 mean of 1825 Hz, while /o/ is a back vowel with a mean F2 less than 1300 Hz, a difference of more than 500 Hz. In the Inland North, the backing of /e/ and the fronting of /o/ gradually reduce this difference until, in the most advanced speakers, both /e/ and /o/ are central vowels with the same mean F2 (see Chapter 14 for the details of this process). This measure of the advancement of the NCS will be defined as  $F2(e) - F2(o)$  and abbreviated as ED. The Northern Cities Shift is then initially defined by the ED measure, as illustrated in Map 11.2. The criterion is a quantitative one,<sup>9</sup> that ED should be less than 375 Hz.<sup>10</sup>

On Map 11.2, the speakers participating fully in the NCS are indicated by dark blue circles and the solid dark blue isogloss. They are concentrated in two main areas, both labeled Inland North. An eastern section in New York State includes the cities of Syracuse, Rochester, and Buffalo. A western section extends from northern Ohio, Michigan, and northern Illinois to southeastern Wisconsin, including the cities of Cleveland, Akron, Toledo, Detroit, Grand Rapids, Flint, Kalamazoo, Chicago, Rockford, Joliet, Kenosha, Milwaukee, Madison, and Green Bay. The city of Erie, in northwestern Pennsylvania, separates the two sections.<sup>11</sup> The Inland North comprises some 88,000 square miles and a population of over 34,000,000 (see Table 11.3 below). It may be defined as the region of large American cities bordering the Great Lakes, a conurbation that is comparable in size to the eastern seaboard metropolitan concentration from Boston to Washington, D.C.

Several other areas show blue symbols to indicate a concentration of speakers with this NCS feature. One is a corridor that follows Route 55 from Chicago to St. Louis, including the cities of Fairbury, Springfield, and Bloomington. Chapter 19 deals with the history of the St. Louis dialect, the erosion of its special features, and the emergence of the Northern Cities pattern that differentiates the city from the surrounding Midland area. A fourth area of concentration of low ED figures is in Western New England, including southern Vermont, western Massachusetts, and northwestern Connecticut. Chapter 14 will examine this region, exploring the possibility that it is the originating center of the Northern Cities Shift (see also Map 11.12).

There is also a scattering of dark blue symbols in the North Central states, to the west of the Inland North. This larger northern region is defined by the structural matrix out of which the NCS originated, so that a certain number of speakers can be expected to satisfy the ED criterion.

The ED line is nested within the first stage of the shift, the raising of /æ/ shown by the red isogloss. This is a geographic reflection of temporal ordering: the /æ/-raising line reaches into southeastern Minnesota, while the westernmost representatives of the NCS are Green Bay and Madison in Wisconsin. The ED line also coincides to a large extent with the line of resistance to the low back merger (the oriented blue isogloss). In the east, the ED line does not include Albany but does extend across the Pennsylvania border to Scranton. The map makes it clear that the advance of the NCS is tied to resistance to the low back merger. The mechanism which produces this effect is evident: the fronting of /o/ is an effective mechanism in relieving pressure towards the merger of /o/ and /oh/.<sup>12</sup>

## The Mid-Atlantic States and New York City

The region encompassing the Middle Atlantic States and New York City was defined in Map 11.1 by both resistance to merger and the split short-*a* system (Chapters 13, 17). As noted above, the short-*a* split leaves the major group of short-*a* words in low front position, blocking any forward movement of /o/. The margin of security between /o/ and /oh/ is enlarged by a movement in the opposite direction, the raising of /oh/. The magenta circles in the Mid-Atlantic area on Map 11.2 designate those speakers whose mean value of F1 of /oh/ is less than 700 Hz.<sup>13</sup> /oh/ rises to an upper-mid or lower-high position as a long and ingliding vowel, in parallel with the movement of /æh/ in the front. The distribution of magenta circles covers the same general region as the two isoglosses carried over from Map 11.1, though it extends somewhat further north and west.<sup>14</sup>

This upward movement of /oh/ associates this phoneme with the Back Vowel Shift before /r/:<sup>15</sup>

/ahr/ → /ohr/ → /uhr/

This shift is represented in many areas of the U.S., but only in the Mid-Atlantic area does the larger /oh/ class consistently follow this upward route.<sup>16</sup> Detailed studies of New York and Philadelphia show that the chain shift is more advanced in Philadelphia, where all speakers have /ahr/ in lower mid back position, and the merger of /uhr/ and /ohr/ is complete for most speakers (Labov 2001). In New York City, /ahr/ shows a lexical split and the merger is variable (Labov 1966).

The outer limit of the area is defined by the splitting of short-*a*, but the conditions of the split divide the area sharply into New York City vs. the Mid-Atlantic cities (Philadelphia, Reading, Wilmington, and Baltimore). It is even more sharply divided by the vocalization of postvocalic /r/, which is characteristic of the New York City vernacular but not the Mid-Atlantic cities.

A closer view of New York City and the Mid-Atlantic states will be provided in Maps 11.9 and 11.12. Chapter 17 is devoted to a detailed analysis of these two dialects, which are united by the splitting of short-*a*, the raising of /oh/ and participation in the Back Chain Shift before /r/, but differentiated by the nature of the short-*a* split, the vocalization of /r/, and the extent of fronting of back upgliding vowels (Chapter 12).

<sup>9</sup> The qualitative criterion of which phoneme is fronter than the other is not suitable, since only in a few most advanced speakers is /e/ actually backer than /o/.

<sup>10</sup> This figure will be justified in Map 11.14, where it will be seen that it bundles tightly with the qualitative UD criterion, and in Chapter 14, where it will coincide with other measures of the NCS and other Northern characteristics.

<sup>11</sup> In the records of LAMSAS, Erie shows consistently Northern patterns. It is unique among the cities of the North in shifting its linguistic allegiance from North to Midland in the period 1940–1990 (Chapter 14).

<sup>12</sup> It is not totally inconsistent with that merger, since in at least one dialect (Newfoundland) both /o/ and /oh/ front together as a merged phoneme.

<sup>13</sup> The selection of the magenta circles includes the stipulation that  $F2(e) - F2(o) > 375$  Hz. The 700 Hz criterion is the same quantitative criterion that was used for the raising of /æ/. In the Mid-Atlantic area, tense /æ/ (designated /æh/) is raised in parallel with /oh/ (Labov 1966).

<sup>14</sup> The phonetic patterns of the New York and Philadelphia systems extend somewhat beyond the phonological pattern that is the basis of the short-*a* split.

<sup>15</sup> The notation here assumes the nearly completed merger of /ohr/ and /ɔhr/ (Chapter 8).

<sup>16</sup> There are a few scattered points in a global region surrounding Chicago, but this sporadic phenomenon is quite distinct from the heavy concentration in the Mid-Atlantic area.

### The South

The third region of resistance to the low back merger is the South, where another mechanism comes into play. In the South generally, the nuclei of /o/ and /oh/ are much closer together than in other regions that distinguish these vowels, as shown in Table 11.1. This table also shows that the F1 difference between the two vowels in the Mid-Atlantic region is much larger than for the other dialects. For the Inland North, the F2 mean for /o/ is much higher than for the other dialects, and the margin of security is also the greatest. The margin of security for the /o/ ~ /oh/ distinction in the South is not established by F1/F2 values but in the presence of a back upglide with /oh/.

Table 11.1. Mean formant values of /o/ and /oh/ for three regions resistant to the low back merger

	/o/		/oh/		F1 dif	F2 dif
	F1	F2	F1	F2		
South	812	1,287	763	1,177	48	110
Mid-Atlantic	845	1,343	675	1,053	170	290
Inland North	845	1,493	747	1,180	98	313

Map 11.2 shows the distribution of this Southern upglide by magenta triangles: light magenta for speakers with up to 20 percent back upglides, darker magenta for those with 20 to 50 percent back upglides, and darkest for those with more than 50 percent. The darkest magenta isogloss is clearly contained within the area of broken short-*a* as well as the area of resistance to the low back merger. This third mechanism for resistance to the low back merger will be examined in greater detail in Chapter 18.

### Characteristics of the major isoglosses

Appendix A to this chapter gives the isogloss parameters (Chapter 6) for each of the maps that introduces one or more dialect boundaries. The table shows the total number of speakers with the criterion feature (the marked cases), the number of Telsur subjects inside the boundary, and the number of marked subjects inside the boundary. These parameters, derived from the map, are then used to calculate the number of marked speakers outside of the boundary, homogeneity (proportion inside the boundary that are marked); consistency (proportion marked that are inside the boundary); and leakage (proportion outside the boundary with the marked feature).

The isogloss for raised /æ/ shows high homogeneity and consistency (.84, .79) and rather little leakage (.05). For the ED isogloss that defines the Inland North as a whole, the table shows a high level of homogeneity (.87), moderate consistency (.62) but slightly greater leakage (.10). Homogeneity is given for three subsections of the Inland North. Western New York State shows the highest (1.00). The transitional St. Louis corridor shows the lowest homogeneity (.78).

Under the Map 11.2 section of Appendix A, parameters are also given for the back upglide isoglosses in the South. In this case, the calculations are cumulative; that is, all the speakers within the isogloss which denotes a frequency of back upglides greater than 50 percent are also contained within the isogloss which denotes a frequency of back upglides greater than 20 percent, and similarly for the isogloss which delineates a frequency of back upglides greater than zero. These three Southern isoglosses are remarkable for their high consistency and low leakage; it is generally true that Southern features are limited to the Southern region.

Map 11.2 demonstrates that the active chain shift at the core of the Northern region, triggered by the general raising of the short-*a* class, preserves the integrity of the short-*o* class. In the Mid-Atlantic states, the shift of back vowels before /r/ may be associated with the parallel raising of /oh/ and the preservation of the short-*o* class by a quite different route. The Southern treatment of the /o/ ~ /oh/ distinction is part and parcel of a third chain shift, the Back Upglide Chain Shift (Chapter 18).

### The Outer Limits of the South and the Southern Shift

The Southern region is defined with greater clarity and precision by the outer limits of the Southern Shift, a more complex and extensive set of sound changes. The Southern Shift is triggered by the removal of /ay/ from the subsystem of front upgliding vowels: the deletion of the /y/ glide or monophthongization of /ay/, often with a slight fronting of the resulting long nucleus.<sup>17</sup>

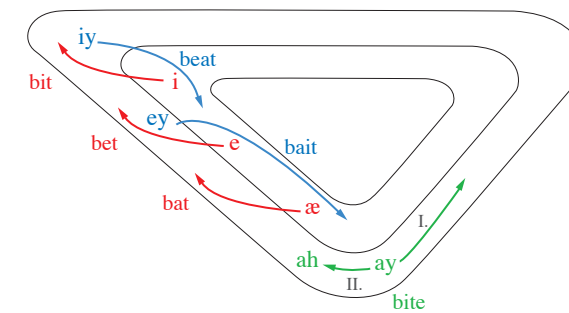


Figure 11.2. The Southern Shift in the Southern United States

Stage 2 of the Southern Shift is the centralization and lowering of the nucleus of /ey/ along a non-peripheral track, as it moves into the phonological space that is still largely occupied by the nucleus of /ay/ after glide deletion. This is accompanied by a fronting and raising of /e/, which develops an inglide as it moves to the position formerly occupied by the nucleus of /ey/. Stage 3 of the Southern Shift is the consequent and parallel lowering of /iy/ and fronting and raising of /i/.<sup>18</sup> The end result is a relative reversal of the front/back locations of /ey/ and /e/, /iy/ and /i/.<sup>19</sup>

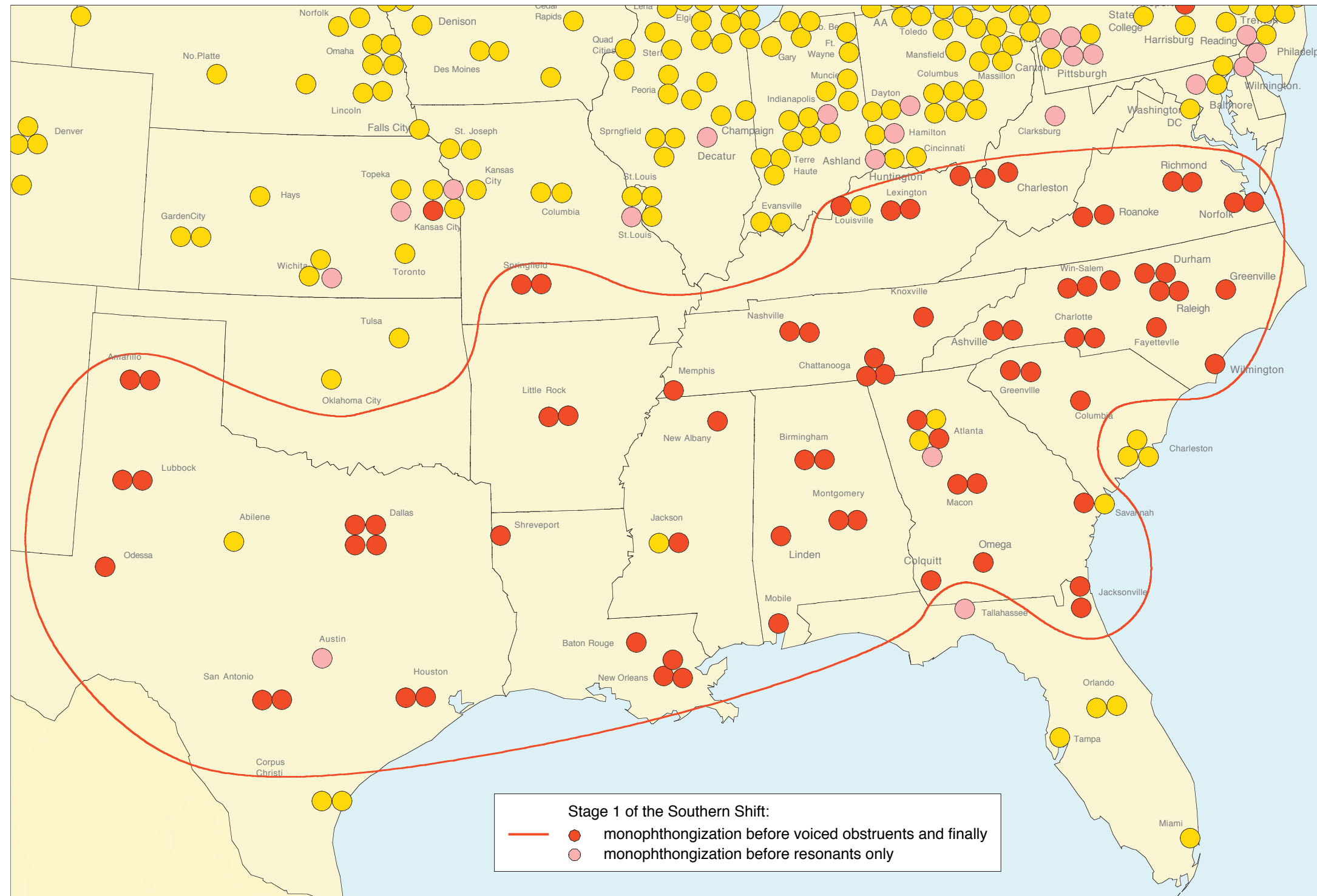
### Defining the South: Stage 1 of the Southern Shift

The red symbols in Map 11.3 indicate speakers who show glide deletion of /ay/ before voiced obstruents or finally, in *wide, wise, oblige, tiger, alive, high, guy*, etc. A considerable amount of glide deletion is found just north of the red isogloss, in Midland cities close to the South. However, in these communities /ay/



17 In southern England, Australia, New Zealand, South Africa, and eastern North Carolina, the triggering event is the backing and raising of /ay/ to lower-mid or mid position, usually accompanied by an upward chain shifting of /oy/ to high position (LYS 1972; Sivertsen 1960; Mitchell and Delbridge 1965; Wolfram 1994, Trudgill 2004).  
 18 The relative timing of the two components of Stages 2 and 3 is not easy to determine. In PEAS, nuclei of the originally short vowels in the South are shown regularly with [I] and [E], but as with other LAMSAS notation, it may be understood as an understatement of the phonetic situation.  
 19 In southern England and Australia, the short vowels shift to relatively higher and fronter positions without developing inglides. In New Zealand, /i/ moves back to high central position, forming a chain shift with /e/ as it rises to high front peripheral position





Map 11.3. Stage 1 of the Southern Shift: glide deletion of /ay/

In the southern United States, ANAE shows a solidification and generalization of the major regional dialect, defined by the *Southern Shift*. The triggering event in this shift is deletion of the glide of the /ay/ phoneme in *my*, *guy*, *wide*, *wise*, etc, which then becomes a long steady state vowel (or “monophthong”). The speakers marked with red circles all show this feature; only one such case lies outside of

the red isogloss that marks the outer limit of the South as a dialect area. The light red circles show some glide deletion, but only before /l, m, n, r/ (“resonants”), as in *while*, *time*, *fine*, *fire*, etc., but not finally or before voiced obstruents (stops or fricatives). The major metropolis of Atlanta shows considerable variation, one aspect of large-scale Midland and Northern immigration to that city.

glides are deleted only before resonants (nasals and liquids), in *time*, *nine*, *tire*, *mile*, etc.<sup>20</sup> New Orleans and Amarillo are included in the South, not on the basis of frequency of glide deletion, but on the basis of where that deletion occurs. None of the three New Orleans speakers has more than 20 percent glide deletion, but they show /ah/ in *drive* and *side*. Amarillo, in the panhandle of Texas, shows /ah/ in *five* and *satisfied*.

The red isogloss shows an extraordinary homogeneity of .90 (Appendix A). Within the isogloss, 75 of the 83 speakers show glide deletion before obstruents. Much of the residual variation is found in metropolitan Atlanta. The fact that only 2 of the 5 Atlanta speakers show glide deletion before obstruents is indicative of strong influence from outside the South (Chapter 18).

The consistency of the AYM line reaches an even more remarkable level of .99 (with leakage at .003); there is only one dark red circle outside the isogloss, a single speaker in Lawrence, Kansas. The actual percentages of glide deletion for individual speakers are quite high, in many cases approaching 100 percent before voiced consonants and finally (Chapter 18). Since the AYM line is defined by glide deletion, the triggering event for the Southern Shift, it represents the most likely candidate for a structural delimitation of the outer limits of the Southern dialect region. It extends to the west further than previous definitions of the Southern dialect region (Map 11.16) and extends to all the urbanized areas in Texas except El Paso and Corpus Christi. It does not include any cities in Oklahoma, but it extends northward to include Springfield in Missouri. It then follows the Ohio River to West Virginia,<sup>21</sup> where Charleston is included but not Clarksburg. On the eastern seaboard, Norfolk and Charleston are excluded, and Florida is excluded except for Jacksonville.

#### Stages 2 and 3 of the Southern Shift

The results of Stages 2 and 3 of the Southern Shift are displayed in Map 11.4. As indicated in the legend, the light green symbols and isogloss represent the relative reversal of /ey/ and /e/: Stage 2 of the shift. In most dialects, the nucleus of /e/ is lower and backer than the nucleus of /ey/; in terms of formant measurements, the mean F1 of /e/ is higher than the mean F1 of /ey/, and the mean F2 of /e/ is lower than the mean F2 of /ey/. These relations are reversed for the speakers with green circles. The dark green circles represent speakers for whom this reversal also applies to /i/ and /iy/, which is Stage 3 of the Shift.

The temporal sequence of the Southern Shift is reflected in the geography of the isoglosses. Speakers at Stage 2 are a subset of those at Stage 1, defined by the red AYM line. Similarly, the region of Stage 3 is nested within Stage 2. Stage 2 includes most of the Southern region but does not extend to the Atlantic coast in any of the southeastern States. New Orleans and adjoining southeastern Texas are not included, nor is western Tennessee.<sup>22</sup> Within Texas, Dallas shows divided status for Stage 2, an indication of the weakening of the Southern vowel system in that metropolis as in Atlanta.

The Stage 3 reversal of /iy/ and /i/ appears in a much more limited region than Stage 2. It is concentrated in the Appalachian area of Knoxville and Chattanooga in eastern Tennessee, extending southward to Birmingham, Linden, and Montgomery in Alabama, and to the relatively small city of Colquitt in southwestern Georgia.<sup>23</sup> Stage 3 is one of the elements of Southern phonology that will be used to define the *Inland South*.

The isogloss parameters for Map 11.4 in Appendix A are in the .80 range for homogeneity and consistency, again with very little leakage, the characteristic pattern for Southern features.

The outer envelope of the Southern region is formed by the AYM line, indicating glide deletion before voiced obstruents and finally. It is generally con-

sidered that glide deletion of /ay/ before voiceless consonants – in *wipe*, *white*, *nice*, *like* – is a feature of working-class speech, and it is stigmatized socially (Feagin 1979). Though this situation holds for most regions of the South, there are areas where monophthongization is extended to all environments for all speakers. Map 11.5 superimposes this feature upon the the AYM isogloss from Map 11.3. The orange isogloss registers the minimum glide deletion before voiceless consonants, below 20 percent, and the dark brown isogloss indicates heavy use of glide deletion in this environment, above 50 percent.

Small percentages of glide deletion before voiceless consonants can be found in most parts of the South, except for southern Texas, Louisiana, and the Gulf Coast. The strong use of this feature is concentrated in the area that has already been identified as the center of the most advanced features of the Southern vowel system – the Appalachian area, in this case extending up into West Virginia. A second center of strong glide deletion appears in West Texas, where Southern breaking of /æ/ is also to be found.

Since glide deletion before voiceless consonants is a socially marked feature, we can expect a fair degree of social variation within the isogloss, and homogeneity will be somewhat lower for the two (ay0) isoglosses. Appendix A shows .68 and .72 for homogeneity. Again, high consistency (.86 and .93) and low leakage (.02, .00) are characteristic of Southern features.

Glide deletion before voiceless consonants is concentrated in just those areas where the Southern Shift is most advanced. If vowel systems were governed by features rather than by segments, one might easily envisage a system in which the Southern Shift operated only before voiced consonants, while vowels before voiceless consonants remained stable. This is not the case here: chain shifting is facilitated when the /ay/ phoneme as a whole vacates its former position (Chapter 18).

The Southern region is actually defined not by one, but by two different chain shifts. Besides the Southern Shift, the back upglide with /oh/ that is traced in Map 11.2 is linked to a second fronting.

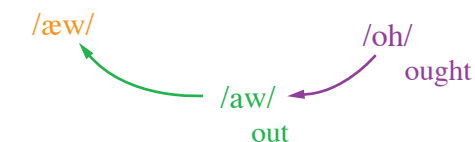
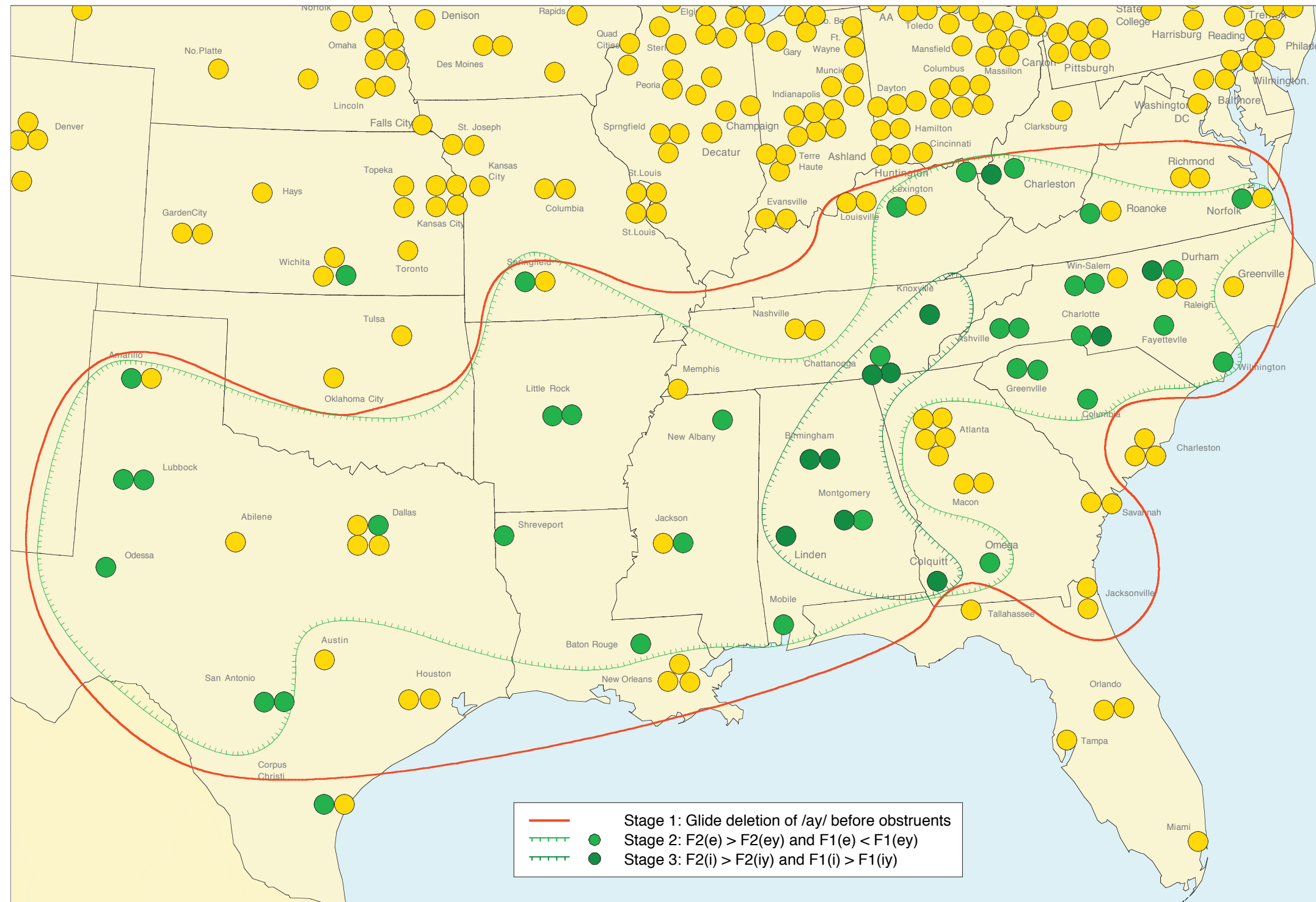


Figure 11.3. The Back Upglide shift

As we have seen, /oh/ has a low back rounded nucleus [ɔ], and this is retained in some forms of the Southern diphthong (e.g., *caught* as [kɔʊt]). However, the nucleus does not remain as a low back rounded [ɔ] as a rule. When it is accompanied by a back upglide, it normally unrounds and shifts forward. This brings the original /oh/ into the phonetic area occupied by /aw/ in the North. In the South, the nucleus of /aw/ is front of center: in conservative utterances it is [æo], but in many cases (especially before nasals) the nucleus is a front mid vowel [eo] (or

- 20 Within the South, there are three such speakers with glide deletion only before resonants and 21 outside. This includes three speakers in the Southwest, not shown in Map 11.3
- 21 Southeastern Ohio is well known to show strong Southern influence in speech patterns, but since there are no urbanized areas in this region large enough to fall into the Telsur sample, the ANAE isogloss is not informed by any data from this area.
- 22 But see Fridland's detailed study of Memphis, which shows that many speakers do show Stage 2 but not Stage 3 of the shift (1999).
- 23 Colquitt is one of the smaller communities in the Telsur sample, in an Urbanized Area of 117,000, added to obtain greater geographical representation.



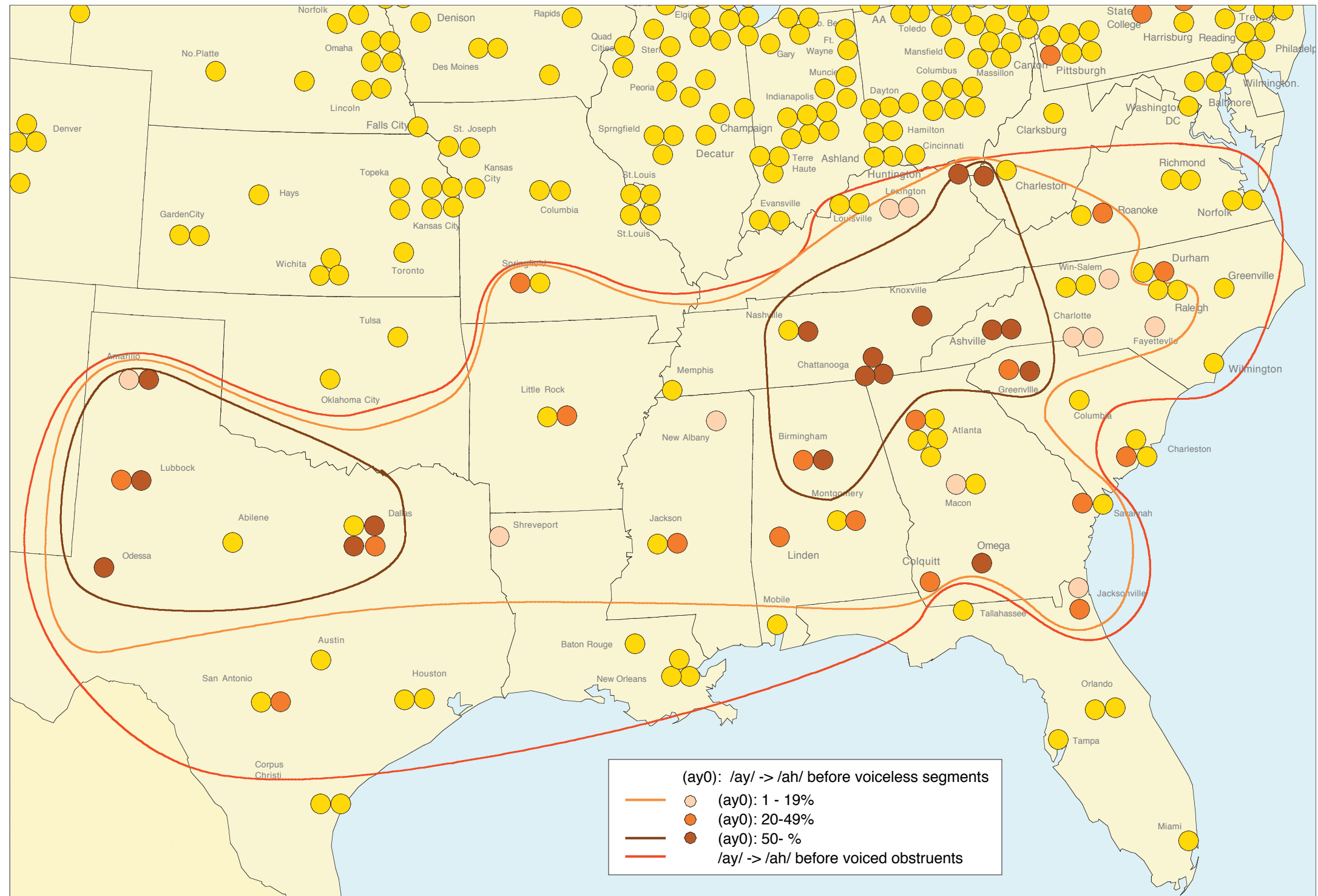


Map 11.4. Stages 2 and 3 of the Southern Shift

The loss of the glide in /ay/ leads to the second and third stages of the Southern Shift. In Stage 2, the /ey/ vowel in *made*, *chase*, etc. shifts down towards the position formerly occupied by /ay/, so that Southern *raid* can be mistaken for *ride* by speakers of other dialects. At the same time, short-*e* as in *red* moves up and front to the position formerly occupied by /ey/, so that the relative position of these two

word classes reverses; this is true for all speakers marked with green symbols. Stage 2 is almost as widespread as Stage 1 but does not extend to the eastern shore. Stage 3 is marked by dark green symbols; these speakers show the same type of reversal for /iy/ in *read* and /i/ in *rid*. Stage 3 is confined to Appalachia and south Georgia, the most advanced areas of the Southern Shift.





Map 11.5. Monophthongization before voiceless consonants

For most Southerners, the monophthongization or glide deletion of /ay/ presented in Map 11.3 does not include /ay/ before voiceless consonants; *nice*, *white*, *rice* keep their glides. In many areas this is a social class issue, where it is primarily working class speakers who extend this sound change to such words. This map shows that in some areas, words like *nice*, *white*, *type*, *like*, *strike* are monoph-

thongs more than half the time (the dark brown symbols) and Stage 1 of the Southern Shift is extended to the whole vocabulary. This development of /ay0/ is concentrated in two areas: the *Inland South* in the Appalachian region, similar to the area marked for Stage 3 in Map 11.4; and central and west Texas, the *Texas South*.

11.6

[eü]). In this case, the general fronting of back vowels characteristic of the South generates a chain shift relationship.

The relative progress of these two chain shifts is encapsulated in the Southern Vowel Index. It is constructed by awarding a value of 1 for each of the nine isoglosses shown in Maps 11.3 through 11.5. Thus a speaker who is located within all isoglosses will have 3 points for the three /oh/ back upglide isoglosses on Map 11.2, 2 points for the two /ay0/ isoglosses on Map 11.5, 1 point for the monophthongization of /ay/ before voiced consonants on Map 11.3, 1 point for the reversal of /ey/ and /e/ and 1 point for the reversal of /iy/ and /i/ on Map 11.4, and 1 point for the breaking of /æ/ on Map 11.1, for a total of 9 points. Map 11.6 displays these index values for each Telsur speaker, with three levels of color coding to indicate the relative intensity of Southern features. The most advanced region, henceforth the *Inland South*, is the area where such maximum participation in the two shifts is concentrated. A second area of relatively high concentration is found in western Texas (where back upgliding is rare); this will be referred to henceforth as the *Texas South*.

11.7

### Dialects within the low back merger area

Three different modes of resistance to the low back merger have been associated with chain shifts: the fronting of /o/ in the Inland North with the Northern Cities Shift; the raising of /oh/ in the Mid-Atlantic States with the Back Chain Shift before /r/; and the upglide of /oh/ in the South with the Back Upglide Shift. These chain shifts have the effect of driving the dialects involved in different directions (though in the South, the main momentum is carried by the Southern Shift, which is not directly associated with resistance to the low back merger). We will now examine the other side of the coin: dialects that have submitted to the low back merger. Map 11.7 examines three distinct dialects within the area of the low back merger, outlined by the light green oriented isogloss.

#### Canadian English

Canadian English has traditionally been described by the presence of the low back merger, as first displayed in Map 11.1, and by Canadian raising, the centralization of the nucleus of /ay/ and /aw/ before voiceless consonants (Joos 1942; Chambers 1973, 1989). If Canada has a distinct dialect of North American English, it must be defined by linguistic features that reliably separate Canada from three different American dialects across the international border: the West, the Inland North, and New England. The low back merger establishes such a separation only in the southern Ontario region (Boberg 2000). Though Canadian raising is certainly common in Canada, it is not consistent enough in Telsur records to define Canada as a dialect region (Chapter 15);<sup>24</sup> it also extends strongly into the Inland North (Chapter 14).

The definition of Canada as a dialect region will follow the same procedure as in Maps 11.1 through 11.5, identifying the chain shifts that are currently active in the area. The Canadian Shift, first described by Clarke, Elms, and Youssef (1995), is a candidate for such a definition. It is triggered by the low back merger, with /o/ in low back position as [ɒ]. The merger extends the margin of security between /æ/ and /o/; it is followed by the backing of /æ/ and the backing and lowering of /e/.

The Canadian Shift is necessarily defined by quantitative measures. On Map 11.7, backing of /o/ is defined as a mean F2 less than 1275, the backing of /æ/ is defined as a mean F2 less than 1825, and the lowering of /e/ by a mean F1 greater than 660. With these definitions in place, 22 of the Canadian cities within the dark

red isogloss are selected. This view of the Canadian dialect does not include the Atlantic Provinces. No Telsur Canadian city east of Montreal shows the Canadian Shift.<sup>25</sup>

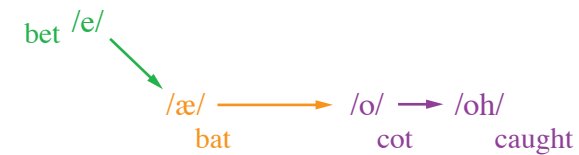


Figure 11.4. The Canadian Shift

The isogloss parameters for the Canadian Shift show high homogeneity (.84) but low consistency (.34), since the pattern extends in an irregular fashion to affect many speakers in the western United States.

### Eastern New England

A second dialect that is readily distinguished within the low back merger area on Map 11.7 is Eastern New England [ENE]. It is defined jointly by the vocalization of /r/ and the low back merger. As shown in Chapter 7, vocalized /r/ in postvocalic, tautosyllabic position survives strongly in only two areas: Eastern New England and New York City (see Map 11.9).<sup>26</sup> The high figures for homogeneity and consistency of the ENE isogloss in Appendix A (.91, .91) reflect the specificity of the defining characteristics for Eastern New England.

#### Western Pennsylvania and Pittsburgh

Western Pennsylvania is a third dialect area within the low back merger region of Map 11.7. This area appears to represent an independent instantiation of the merger, since it is separated geographically from the Canadian merger by Lake Erie. The low back merger in Pittsburgh may be the result of the great influx of Polish and other Eastern European workers to the area at an earlier date, just as the more recent merger in eastern Pennsylvania was triggered by immigration to the coal-mining areas (Herold 1990).

The speech of western Pennsylvania bears some similarity to Canadian English, including the low back merger generally and the Canadian Shift (in seven of the 14 speakers). Western Pennsylvania will be more sharply distinguished from Canadian English by the fronting of /ow/, discussed in the following section.<sup>27</sup> In its northward extension, Western Pennsylvania now includes the city of Erie.<sup>28</sup> To the south, Western Pennsylvania also includes the city of Clarksburg in West

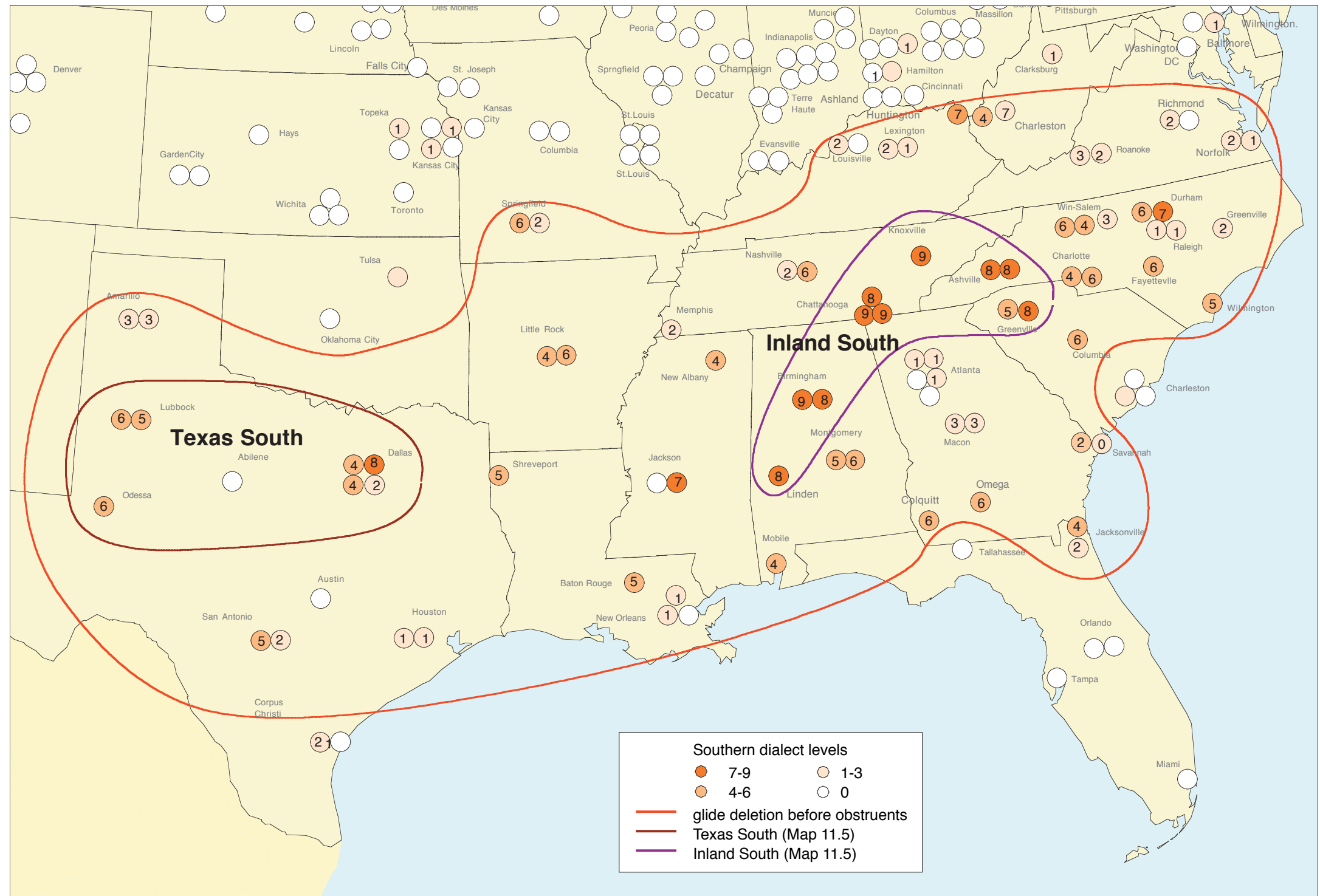
24 Compare also the report of Chambers and Hardwick (1985) that for younger speakers in Vancouver and Toronto, the centralized nucleus is being replaced by a low front nucleus, following the U.S. pattern, or by a low back rounded nucleus.

25 It should be noted that the Canadian Shift is not limited to Canada in the way that the monophthongization of /ay/ is limited to the South. In addition to the 21 Canadians, 41 Americans show the Canadian Shift. These are not concentrated in any one area, except for the central Western region, so that Appendix A shows a consistency of only .39 for the Canadian Shift.

26 The sole Telsur representative of Bangor, Maine, is shown here with the dark red representing the Canadian Shift. This speaker is not included in ENE since she did not show any vocalization of /r/.

27 See Chapter 20 for a more detailed examination of Pittsburgh and the chain shifts triggered by glide deletion of /aw/.

28 See Chapter 14 for a discussion of the shift of Erie from Northern to Midland status.

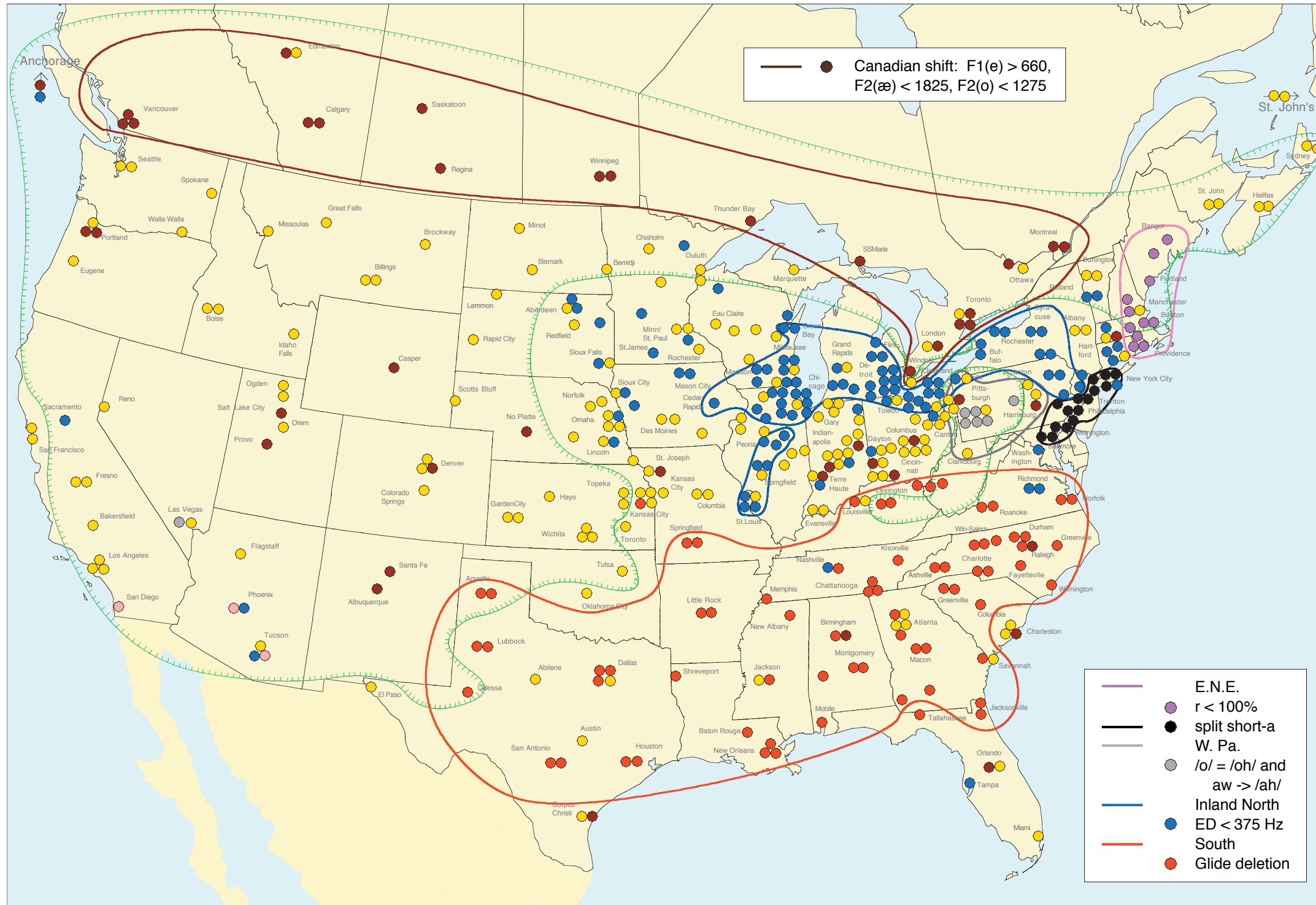


Map 11.6. Structure of the South by dialect levels

The structure of the Southern dialect area is displayed by an index of Southern dialect level, which combines all of the features of Maps 11.1 to 11.5 into a nine-point scale. There is a clear concentration of speakers with high levels (7–9) in the Appalachian area defined as the *Inland South*, but also extending into central

North Carolina. A group of relatively high values is found in central and West Texas, differentiating Lubbock and Odessa from other Texas cities. The largest metropolis, Dallas, shows considerable variation.





Map 11.7. Three dialects in the low back merger area: Canada, Eastern New England, and Western Pennsylvania

Canada is defined here by the *Canadian Shift*, a downward and backwards movement of the short vowels /e, æ, o/, which is triggered by the low back merger. Dark red symbols show speakers affected by this shift. Like Canada, Eastern New England shows the low back merger. It is the only such area that also shows the vocalization of post-vocalic /r/ in *car, card, board*, etc. (magenta symbols).

Western Pennsylvania is the third low back merger area defined in this map. At its center, the city of Pittsburgh is marked by the unique monophthongization of /aw/ in *down, town, house*, etc. (gray symbols), a feature shown in popular spelling as *dahntahn*.

Virginia. The diffusion of the /o ~ oh/ merger to Appalachia is not limited to West Virginia, but extends to northern Kentucky as well. Aside from Clarksburg, these cities are firmly included within the Southern orbit on the basis of the monophthongization of /ay/.

On the western boundary, three speakers in Youngstown, Ohio, are also included in the Western Pennsylvania region, on the basis of the low back merger. The PEAS data does not extend to Ohio, but the 1964 telephone survey of the low back merger (Chapter 9) showed that the expansion into eastern Ohio had already taken place at that time.

At the center of the Western Pennsylvania area is the city of Pittsburgh, a speech community defined by a unique phonological feature, the deletion of the glide of /aw/.<sup>29</sup> A monophthongal realization of the vowel of *now*, *down*, *out* is not uncommon in southern England and is the norm in London working-class speech (Kerswill and Williams 1994; Williams and Kerswill 1999) but it is not a general characteristic of any other North American dialect. In the city of Pittsburgh, it is stereotypical of the Pittsburgh dialect, and pronunciations like “dahn-tahn” are well recognized as representative of Pittsburgh (Johnstone et al. 2002). A dozen Telsur speakers outside of Pittsburgh show occasional monophthongal tokens of /aw/, but these are only in the most favored environments, before liquids (*hour*, *towel*) or in unstressed function words (*out*, *about*). The gray circles on Map 11.9 indicate deletion of the glide of /aw/ before obstruents for five of the six Pittsburgh speakers shown here. Further structural configurations that are the consequences of this sound change are developed in the more detailed treatment of Pittsburgh in Chapter 20.

### Defining the outer limits of the North

The outer limit of the Southern region was established by the outer limit of the glide deletion of /ay/, the precondition for the Southern Shift. The next task is to define the outer limits of the North as the area harboring the preconditions for the Northern Cities Shift. Unlike the situation in the South, the Northern area is considerably larger than the outer extent of the Northern Cities Shift.

Map 11.8 defines the North in accordance with the logic of Maps 11.1 and 11.2, where the status of the low vowels /æ/ and /o/ is seen to determine the dynamic possibilities within a dialect region. The North is defined as an area in which /o/ and /oh/ are not merged and in which /æ/ is one unit, that is, not split into lax and tense categories. The red isogloss on Map 11.8 accordingly outlines the core area of the North where /æ/ is raised as a whole (as first shown in Maps 11.1 and 11.2). This coincides for the most part with the dark blue oriented isogloss, which shows the area of greatest resistance to the low back merger – where /o/ and /oh/ are different in both production and perception for all allophones examined. A somewhat smaller area is defined by the dark blue isogloss, first introduced in Map 11.2 as a measure of the progress of the NCS. It is the area where the backing of /e/ and the fronting of /o/ bring them into close proximity on the front–back dimension.

OUTER LIMITS OF THE NORTH. The outer limit of the North is shown by the barred light blue isogloss. Its extent is defined first by the oriented green isogloss, which marks the outer limits of the area where the low back merger is complete: /o/ and /oh/ are the same in perception and production in all environments. It is also limited by the black isogloss, defining the area where short-*a* is split.<sup>30</sup> A third outer limit is set by the oriented light blue isogloss, which outlines the area in which /ow/ remains a back vowel, with a mean F2 for the nucleus of less than 1200 Hz.<sup>31</sup> The /ow/ isogloss determines the Southern limit of the North, on a line which will later appear to be the North–Midland line, the deepest phonological



11.8

division between North American dialects. The conservative behavior of /ow/ in the North is matched by a parallel measure of the fronting or backing of /aw/. As with /ow/, the North maintains a relatively back position of the nucleus of /aw/, in contrast with the Midland and the South.<sup>32</sup>

Appendix A shows that this construction of the Northern isogloss achieves reasonably high homogeneity (.82) and consistency (.78), with low leakage (.08).



11.9

### Between the North and the South

The presentation so far has defined the boundaries of Canada, the North, the South, Eastern New England, and Western Pennsylvania. There remains a large undefined territory extending from Ohio to the Pacific coast. The analysis to follow will divide that large territory into two regions, the West and the Midland. Neither territory is dominated by the active chain shifts discussed so far. Instead, they are largely characterized by negative features – the absence of these chain shifts – and by the differential development of sound changes that affect the continent as a whole.

#### The Midland (Chapter 20)

The Midland was first defined in Kurath (1949) as a narrow stretch of the Atlantic eastern seaboard, extending westward through Pennsylvania (except for the northern tier of counties) and expanding broadly southward to include the Appalachian region of West Virginia, eastern Kentucky, and eastern Tennessee. This definition of the Midland is based on a broad base of lexical evidence which in turn reflects the settlement history of the region (Kurath 1949: 2–3; Frazer 1993; Carver 1987). The North–Midland boundary is strongly reinforced by phonological evidence. The tight bundle of isoglosses that separates the North from the Midland in Maps 11.7 to 11.9 (to be described further in Chapters 14 and 20) coincides almost perfectly with the westward extension of Kurath’s North–Midland line by Shuy (1962) and Carver (1987). On the other hand, the definition of the South advanced here does not match that of Kurath (see Map 1.1). The Appalachian areas, assigned to the Midland by Kurath, here show a heavy concentration of the chain shifts that define the South. In this respect, the Appalachian region is more southern than the areas that Kurath defined as the South. Kurath’s Midland areas 9, 11, 12, 13 are therefore incorporated into the South in the ANAE definition. The Midland dialect region will be defined here as the westward extension of Kurath’s Midland areas 8 and 10.<sup>33</sup> It includes the various midwestern lexical studies that followed (Davis 1951, 1948; Shuy 1962; Carver 1987).

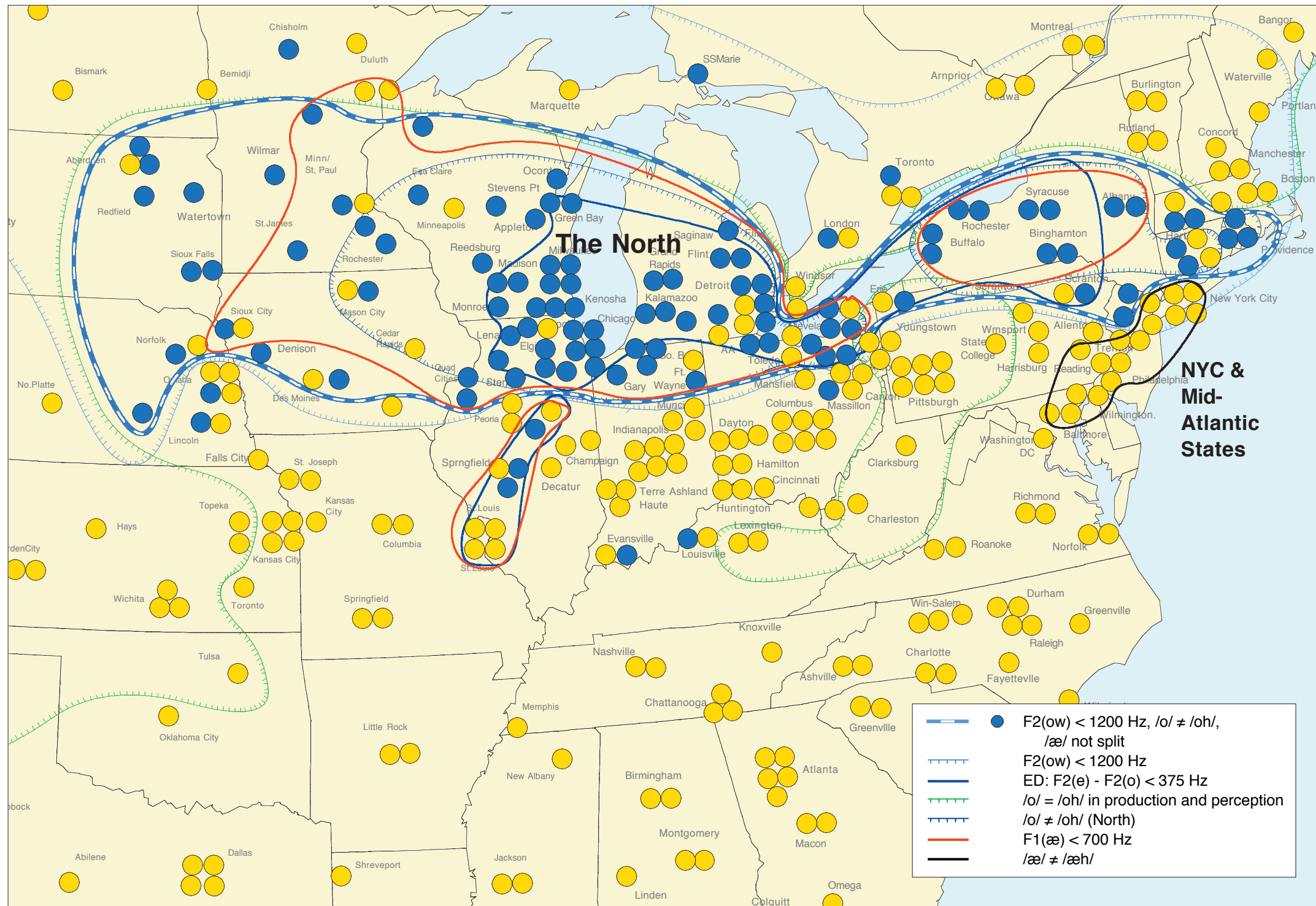
<sup>29</sup> Though glide deletion of /aw/ is a well-established feature of Pittsburgh speech, it was not recorded in PEAS.

<sup>30</sup> This area has already been split into two sections: NYC on the North, where /r/ is vocalized, and the Mid-Atlantic States, where it is not.

<sup>31</sup> An isogloss may also be drawn at 1100 and 1300 Hz (see Chapter 12). The 1200 Hz isogloss is the one that coincides most with other measures of the vowel system.

<sup>32</sup> The third member of the Vw system, /uw/, is undergoing fronting in almost all North American dialects, except for in a few sections of the North (Chapter 12). The fourth member, /iw/, has collapsed with /uw/ except for a scattering of conservative speakers, mostly in the South (Chapter 8).

<sup>33</sup> In Carver (1987), an area closely approximating the Midland as defined here is called the “Lower North”, and the area defined by Kurath as the South Midland, along with its westward extensions, is called the “Upper South” (Carver 1987, Map 8.1).

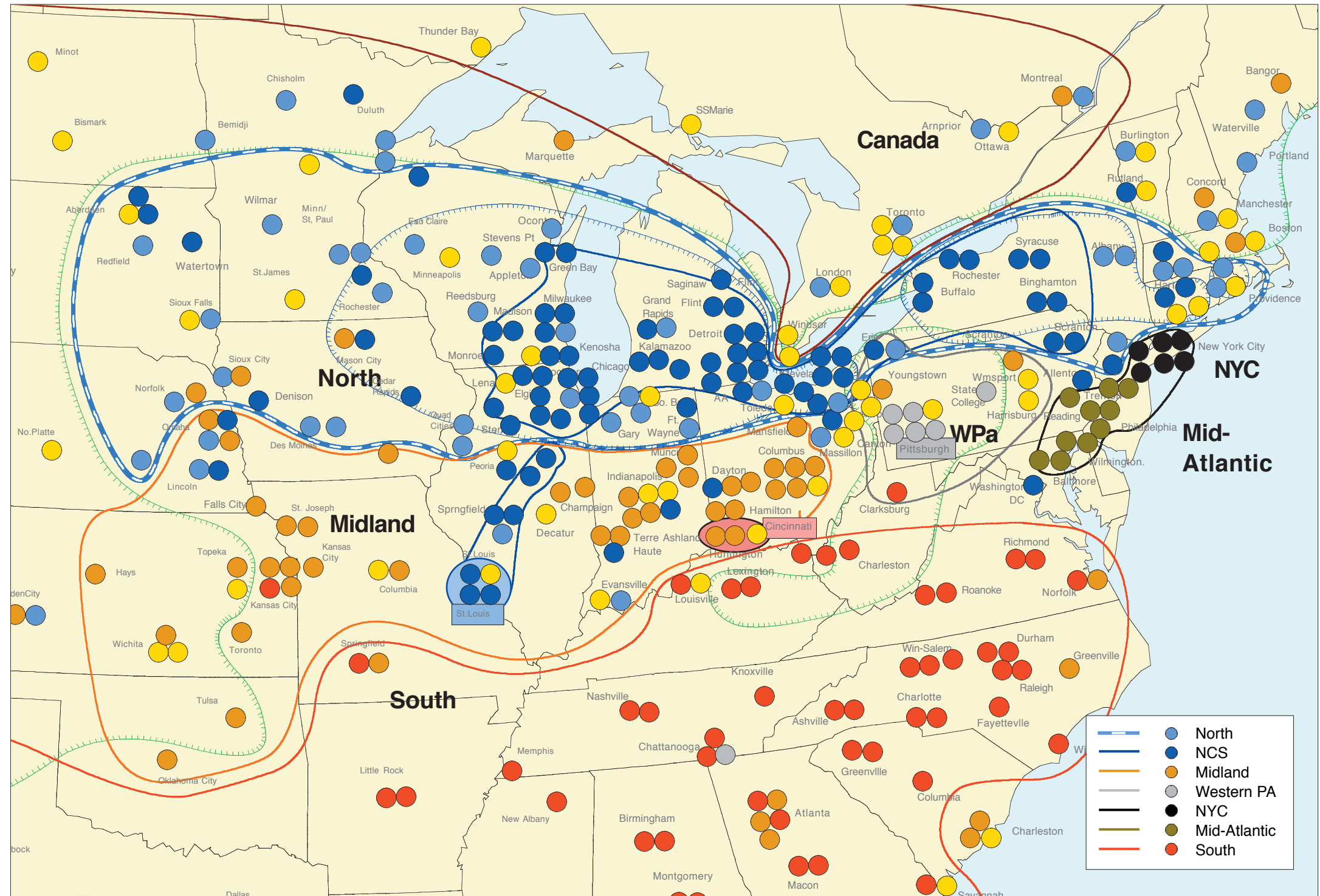


Map 11.8. The outer limits of the North

Maps 11.1–11.2 defined the Inland North on the basis of resistance to the low back merger and the Northern Cities Shift as shown by the dark blue isoglosses. The barred medium blue isogloss establishes the outer limit of the North, representing the conditions necessary for the NCS to take place. One such limiting condition is shown by the oriented blue isogloss for the fronting of /ow/. The

North is extremely conservative in this respect. A second limit is the light green oriented isogloss, representing the completed low back merger. The black isogloss of the split short-a systems in the Mid-Atlantic States forms the eastern limit of the North, since such split systems are incompatible with the NCS.





Map 11.9. The Midland and the Mid-Atlantic regions

This map provides a closer view of the dialects of the Midland, the region between the North and the South. New York City and the Mid-Atlantic region are both marked by the unique split of short-*a* into lax /æ/ and tense /æh/. New York shows vocalization of postvocalic /r/ but the Mid-Atlantic States do not. Pittsburgh has the unique development of /aw/ noted in Map 11.8. The older Cincinnati dialect shows the phonetic pattern of New York City, but this is receding

among younger speakers in favor of the general Midland pattern. The Midland proper (tan symbols) is transitional in regard to the low back merger and shows a strong fronting of /ow/ in *go*, *road*, etc. Columbus, Indianapolis, and Kansas City exemplify this pattern. St. Louis is losing its traditional dialect, with a merger of *are* and *or*, in favor of the Northern Cities Shift of the Chicago area, and the corridor along Route I-55 shows the direction of influence.

*The Midland proper (Chapter 20.1)*

The Midland region that is the main focus of Map 11.9 is enclosed in the brown isogloss. It outlines an area that extends westward from central Ohio, a territory intermediate between the North and the South. Its western border will be considered in the discussion of Map 11.10. As the legend of Map 11.9 indicates, the Midland is defined by the absence of the defining features of the neighboring regions. Those neighboring features are indicated by (1) the blue symbols for the Northern Cities Shift and the larger definition of the North; (2) the grey symbols for the defining features of Western Pennsylvania; and (3) the red symbols for the defining glide deletion of the South. Aside from the corridor running southwest from Chicago to St. Louis, there is only a scattering of such symbols in the Midland. Midland speakers, designated by the light brown symbols, are defined by a set of criteria more complex than any presented so far:

- $F2(ow) > 1200$  Hz;
- $F2(e) - F2(o) > 375$  Hz;
- /o/ and /oh/ not clearly distinct or clearly the same in production and perception;
- short-*a* not split;
- no monophthongization of /ay/ before obstruents.

More generally, Midland speakers show the following characteristics:

- The low back merger is in a transitional state. In the Midland system, /o/ and /oh/ are neither consistently the same in production and perception nor consistently different (see Chapter 9, Maps 11.1 and 11.2).<sup>34</sup>
- There is marked fronting of the nucleus of /ow/, a feature shared with the South. Unlike the South, glide deletion of /ay/ is found only before resonants.
- There is no split of short-*a*; the lexical short-*a* patterns of the original Midland areas to the east are not found.<sup>35</sup>

Thus the Midland participates in the general fronting of /ow/ (and /aw/) and in the ongoing low back merger, without involvement in the active chain shifts of Maps 11.1 to 11.8. Appendix A figures for homogeneity (.66) and consistency (.44) are quite low compared to the isoglosses reviewed previously, and leakage is high (.16). There is reason to believe that the Midland is becoming the default system of North American English. Several Southern cities on the Atlantic coast show brown symbols: Norfolk, Richmond, Greenville, and Charleston, suggesting that these cities are losing their original local dialects and are shifting to the regional Midland pattern. Atlanta has received strong Northern influence from recent immigration, but instead of the blue symbols of a Northern dialect, three of the five Atlanta speakers show the brown symbols of the Midland.

One of the general principles of sound change is that mergers expand at the expense of distinctions (Chapter 3). It might seem surprising that the eastern boundary of the low back merger in the West has not progressed further eastward since it was first established in the 1964 telephone survey (Labov 1974). However, the Midland displays a different type of expansion. The low back merger does not reach completion in the Midland, but the Midland as a whole is in transition; its definition excludes a firm distinction between /o/ and /oh/.<sup>36</sup>

*The diversity of the Midland*

It is not accidental that Appendix A shows sharp differences in the levels of homogeneity for the isoglosses defining the South (.90) and the Inland North (.87) on the one hand, and the Midland (.66) on the other. Though there still remains

great variation within the Southern region, the basic organization of the vowel system is dominated by the Southern Shift. The Northern region varies considerably from Wisconsin to Maine, but the central area is dominated by the Northern Cities Shift. The Midland area shows no such organizing principle or direction of sound change, aside from those tendencies that are general to North America (Chapter 12). Instead, many major Midland cities show distinct local patterns, in a few cases shifting in opposing directions.

As noted above, the original Midland was related to Philadelphia and its surrounding region, along with Pittsburgh and Western Pennsylvania. Chapter 17.2 will discuss the rapid changes that have taken place in the vowel system of Philadelphia since the second half of the twentieth century. These involve changes in the split short-*a* system and a re-orientation of the front vowels away from the Southern Shift towards the Northern pattern that lowers the short front vowels. The Pittsburgh dialect appears to have developed its characteristic glide deletion of /aw/ recently (Johnstone et al. 2002), leading to directions of change quite different from those of the surrounding region.

*Cincinnati*

Map 11.9 shows the diverse tendencies of different urbanized areas. Cincinnati, located in southwestern Ohio, has a phonological pattern quite distinct from the surrounding area (Boberg and Strassel 2000). The traditional Cincinnati short-*a* system is unique in the Midland area that extends from Ohio westward to Kansas. While there is no evidence for a phonemic split, the phonetic conditioning of short-*a* in conservative Cincinnati speech is similar to that of New York City, with the raising environments including /ʃ/ and /g/. As in New York, short-*a* before voiced stops (*sad*, *bad*, *mad*) is as high and front as before nasals. For all three Cincinnati Telsur speakers, all /æd/ words are higher and fronter than the general mean, with a Cartesian distance to the general mean greater than 200 Hz. Weaker forms of this pattern are shown by speakers from nearby Dayton, Springfield, and Mansfield, Ohio. Boberg and Strassel (2000) reported that Cincinnati's traditional short-*a* system was giving way among younger speakers to a nasal system similar to those found elsewhere in the Midland and West.

*St. Louis*

Another distinctive Midland city is St. Louis, represented by four Telsur speakers on Map 11.9. The St. Louis dialect has been the subject of a number of studies (summarized in Murray 2002). Its most distinctive traditional feature is a merger of /ahr/ in *barn*, *are*, *far* with /ɔhr/ in *born*, *or*, *for*, while /ohr/ in *bore*, *ore*, *four* remains distinct. Though this feature is in recession, it is still strong enough to act as a defining feature of the St. Louis dialect; three of the four St. Louis speakers showed some evidence of the merger.<sup>37</sup> At the same time, St. Louis is undergoing a very general shift towards the NCS pattern of the Inland North. In many maps of this and other chapters, Inland North features appear in St. Louis and along the "St. Louis corridor" following Route I-55 in Illinois, through Joliet, Bloomington, and Springfield (see Map 11.14).

34 It should be noted, of course, that consistent distinctions and mergers can be found in some particularly conservative or innovative speakers.

35 Though as will appear below, Cincinnati reflects an earlier connection with that pattern.

36 This is not intended to suggest that the merger is proceeding with perfect social uniformity. Boberg and Strassel's (1995) study of Cincinnati showed that the older speakers had very solid and reliable distinctions, while many of the teenagers had equally categorical mergers.

37 The merger of /ɔhr/ and /ohr/ is found in Utah and central Texas as well.

The local dialects of Pittsburgh, Cincinnati and St. Louis are treated in more detail in Chapter 19.

### The West

The solid green isogloss defines the West in terms of the phonological patterns that proceed from the Telsur survey. The West was the last area in North America to be reached in the gradual westward expansion of English-speaking settlement, and its history shows considerable mixing of the linguistic patterns of the regions defined so far.<sup>38</sup> The oriented green isogloss of Map 11.10 confirms earlier findings that the West is one of the major areas of the low back merger (Chapter 9); but it forms a continuous region with Canada in this respect.<sup>39</sup>

The legend at lower left on the map presents the relatively complex definition that distinguishes the West from the neighboring regions of North America as defined so far, the South, the Midland, the North, and Canada. The legend at upper right labels the isoglosses that establish the dialect regions in Maps 11.1 through 11.9. Essentially, the West differs from these other dialects in being a region of low back merger in which /uw/ is strongly fronted, but /ow/ is not.<sup>40</sup>

The differentiation of the West from the South is the simplest case: the West shows no glide deletion for /ay/.<sup>41</sup> No red symbols appear within the green isogloss.

In the treatment of /uw/ and /ow/, the West resembles Canada and the North. The West is distinguished from the North by the low back merger. As pointed out above, this does not establish a clear opposition with the Midland, since the low back merger is in transition in that region. Further separation from the Midland is in the fronting of /ow/, which is strong in the Midland but limited in the West. Chapter 12 displays the full range of isoglosses that register the degrees of fronting of /ow/ and /aw/ in the Midland and the South.

The differentiation of the West from Canada is a more difficult question, involving the degree of activity of similar sound changes. Canada and the West share both the low back merger and the conservative treatment of /ow/. The low back merger lays the foundation for the backing of /æ/ and the consequent lowering of /e/ which form the Canadian Shift. Since the merger takes place at a position further back in Canada, the Canadian Shift is favored more strongly there.

Canadian raising offers a further means of differentiating the West from Canada. Although there is some variation among the Canadian subjects, we can use this characteristic Canadian feature to separate the two dialects. Accordingly, the green symbols that define the West identify speakers with the following characteristics:

- Differential fronting of /uw/ and /ow/: the F2 of /uw/ after coronals (the most advanced class) is more than 500 Hz greater than the F2 of /ow/.
- Complete or nearly complete low back merger: /o/ and /oh/ are identical either in production or perception.
- No Canadian raising of /ay/ before voiceless segments. The difference between the F1 of /ay/ before voiced and voiceless segments is not more than 50 Hz.

On Map 11.10, this definition is applied to subjects after the definition of the Canadian Shift. Of the nine subjects in the West who showed the Canadian Shift on Map 11.7, six are redefined as Westerners by this definition. At the same time, five Canadian subjects are redefined as Westerners.

This complex definition yields only a moderate homogeneity of .60, even lower than that of the Midland, and a comparable consistency of .59, with a leakage of .05. At the same time, the fact that such a complex definition was required leads to the conclusion that the West is a dialect area in formation.



### The larger Southeastern region

The isoglosses of Map 11.10 do not cover all of North America; there are a number of interstitial and marginal areas remaining. The largest of these is Florida, which lies outside of the definition of the South as the area of monophthongal /ay/. The southern and western portions of Texas (Corpus Christi and El Paso) have a similar status. Yet these regions adjoining the South are not devoid of Southern character, as shown in Map 11.11, which defines a Southeastern super-region. It is defined quite simply as an area of fronting of /ow/, using the established criterion of F2(ow) > 1200 Hz, and no low back merger (that is, /o/ and /oh/ are never the same in production and perception).<sup>42</sup> It thus represents the intersection of the converses of the low back merger isogloss and the F2(ow) < 1200 isogloss of Map 11.8.

The Southeastern super-region is a well-defined region, as Appendix A shows. Both homogeneity (.87) and consistency (.76) are high. It groups the Midland with the South and includes the original Midland area of the Mid-Atlantic States. New York City and Northern New Jersey are not included, since they do not satisfy the /ow/-fronting criterion, and Pittsburgh and Western Pennsylvania are excluded on the basis of their completed low back merger.

A comparison with the AYM isogloss that defines the South by glide deletion shows two cities that are excluded from the Southeastern super-region but are included in the South: Savannah, Georgia, and Amarillo, Texas. With those exceptions, the South is a proper subset of the Southeast.

### Eastern New England (Chapter 16.1)

The first and still most detailed study of North American dialect geography is the Linguistic Atlas of New England (LANE; Kurath et al. 1941). The small number of Telsur urbanized areas in this region cannot match the detailed view that is obtained from LANE itself. Map 11.12 focuses on the general features that relate the Northeast region to the dynamics of sound change in the continent as a whole.

Chapter 7 reported the state of *r*-vocalization for the 12 Telsur speakers from Eastern New England. These results are reproduced in the magenta symbols of Map 11.12, which identify all speakers who show some degree of vocalization in Boston, Providence, Worcester, and the states of New Hampshire and Maine.<sup>43</sup> Though all but one of the symbols within the isogloss are magenta, this does not indicate that the speakers are all the same. As Chapter 7 showed, (r) exhibits considerable variation in this region; *r*-lessness is defined here as any degree of vocalization of /r/ as a syllable coda, that is, after a vowel and not before another

38 Carver (1987) points out that the American English of the West “is both extremely young and still undergoing the modifications and leveling processes of a region in social flux” (1987: 205).

39 There is, however, notable variation found in the major cities of the West Coast, San Francisco and Los Angeles. The central mountain areas of the West are more consistent in regard to this merger.

40 Although the overall results of the Telsur survey show little fronting of /ow/ in the West, there have been reports of the fronting of /ow/ as a sociolinguistic variable of some importance (Luthin 1987). Note also the strong fronting of /ow/ as well as /uw/ in Moon Zappa and Frank Zappa’s song, “Valley Girl” (1983).

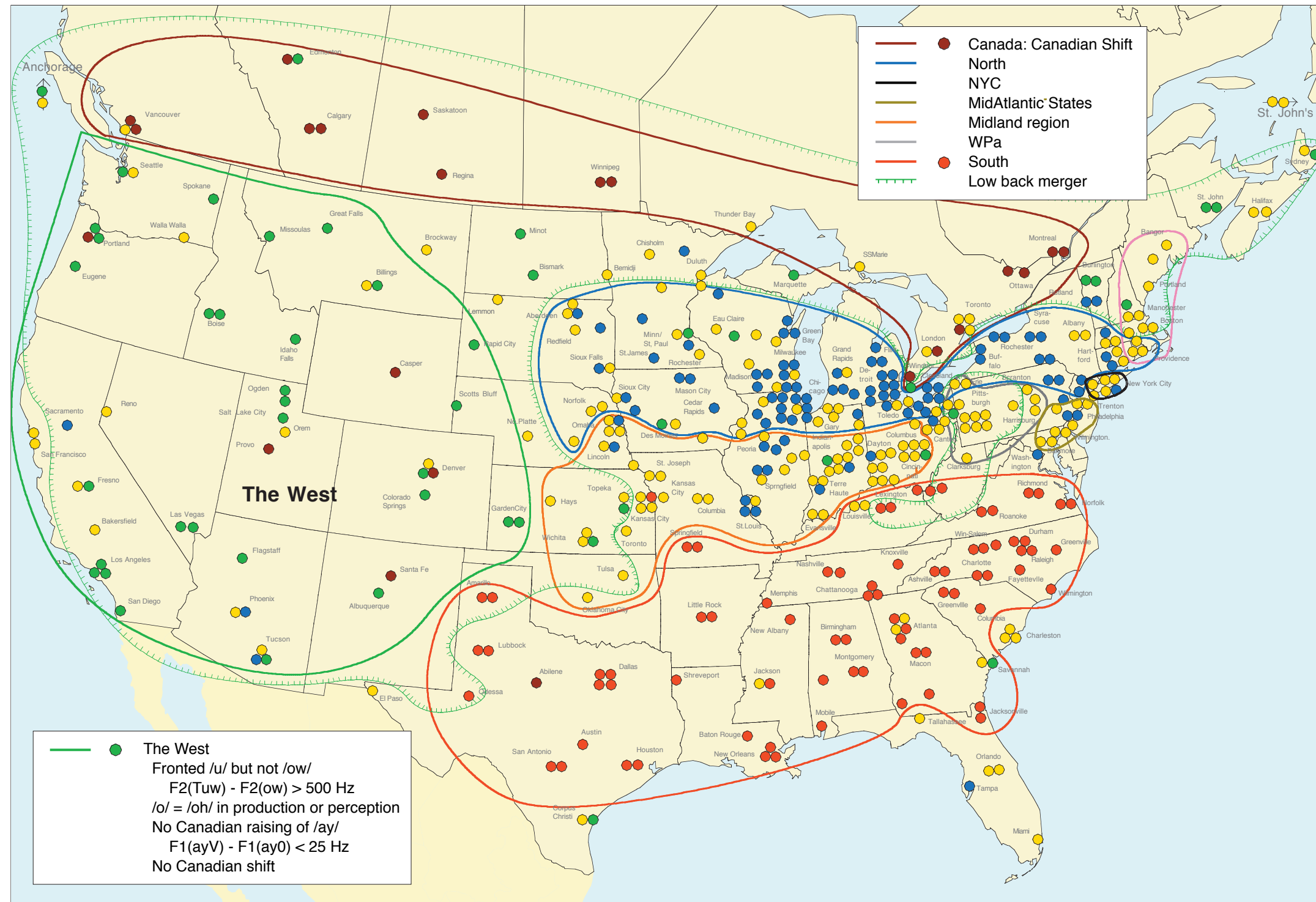
41 Map 11.4, which shows this feature, does not extend to the Western region. But it is important to note that in addition to the southern portion of the Midland, there is some glide deletion before resonants for at least one speaker in each of three southwestern cities: Tucson, Phoenix, and Los Angeles.

42 But as the merger of /o/ and /oh/ spreads in the South, as in the area shown within the red dashed line, this definition may not continue to hold.

43 One Rutland, Vermont, speaker shows 25 percent *r*-vocalization.



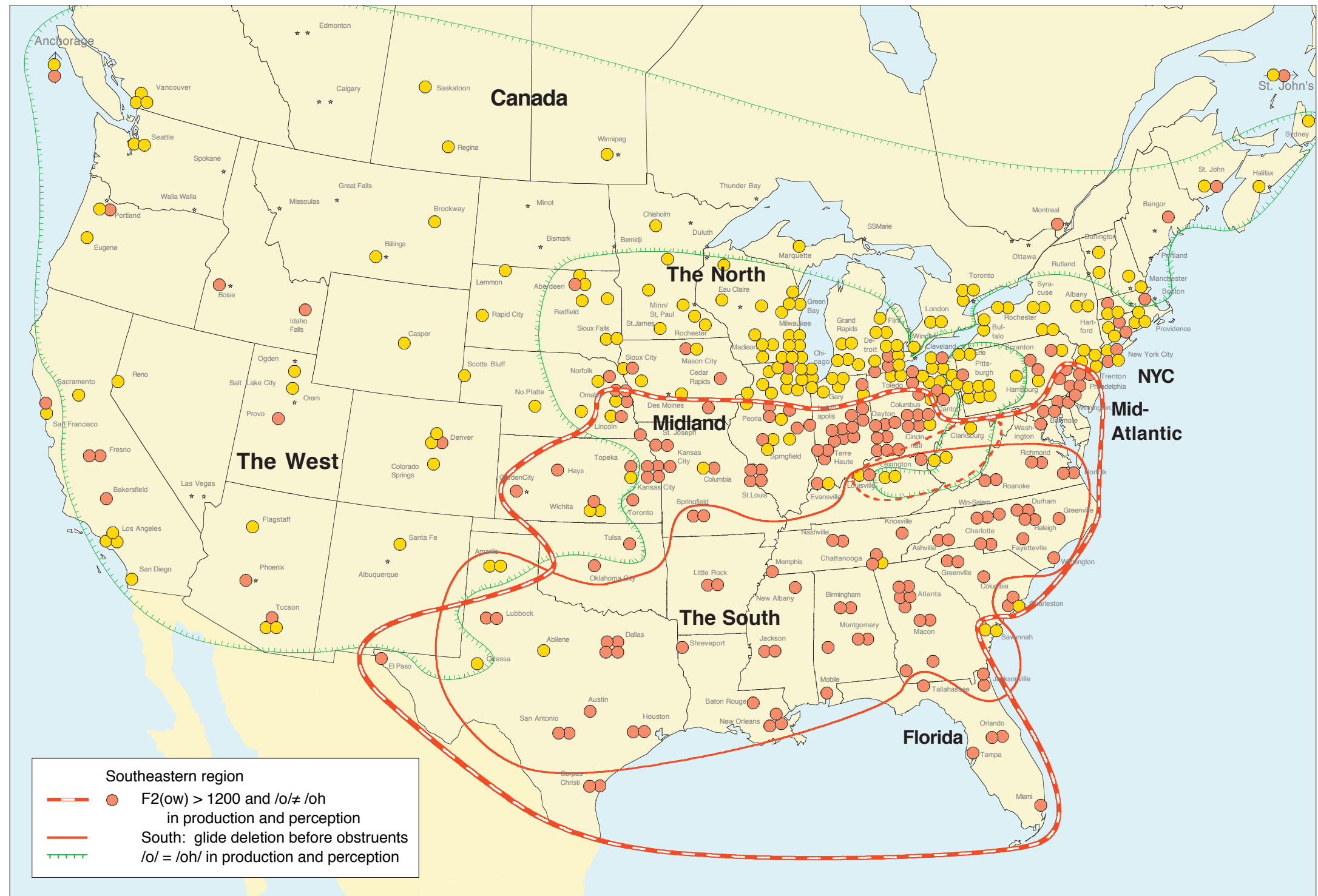




Map 11.10. Defining the West

This map shows the dominant phonetic and phonological tendencies of the West indicated by the green symbols and green isogloss. It is clearly a dialect area in formation without the focused and homogeneous character of the Inland North (blue symbols) or the South (red symbols). The West shares the low back merger with Canada (dark red symbols), but can be distinguished from Canada by its limited participation in the Canadian Shift and by the absence of Canadian rais-

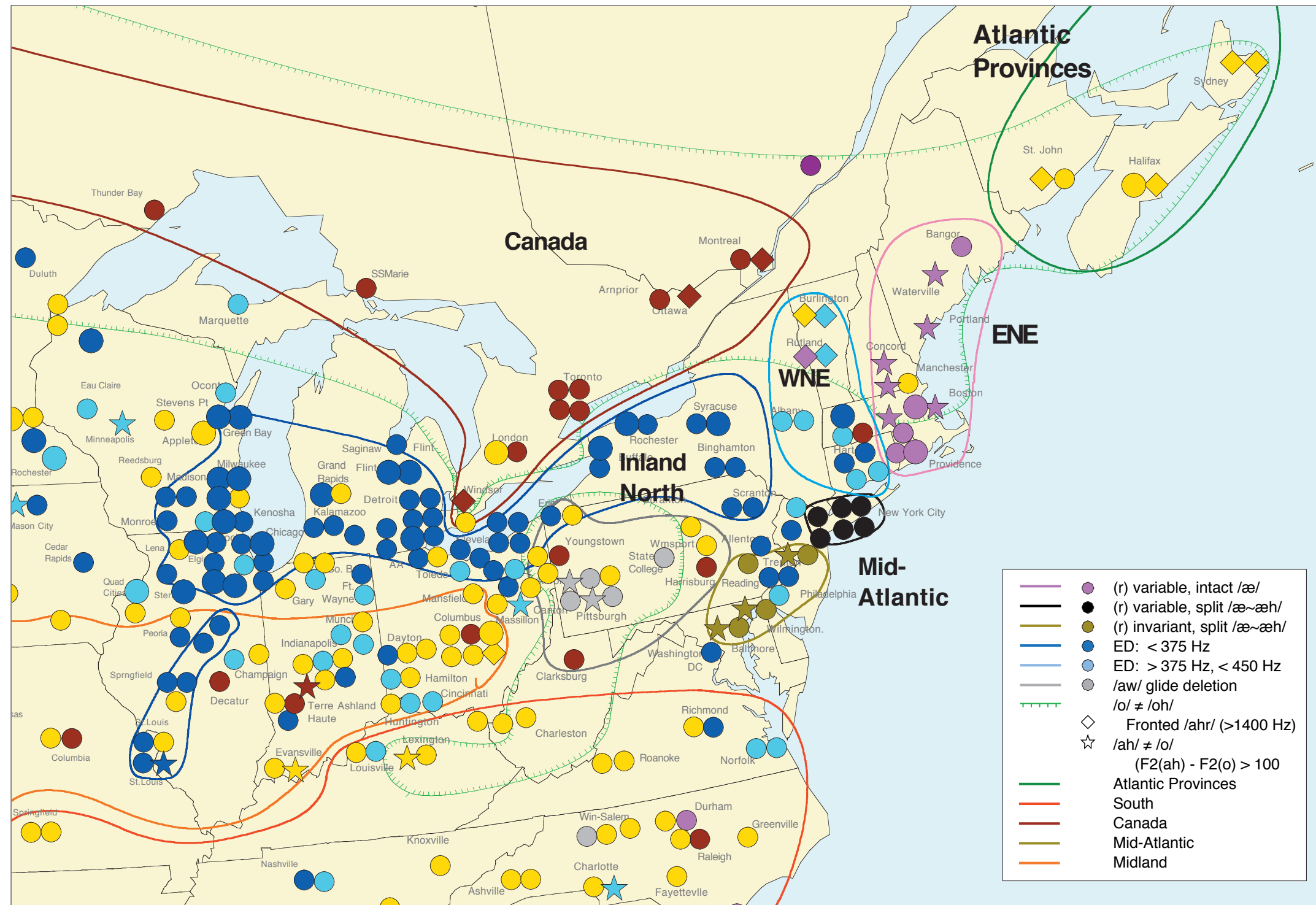
ing in *right, out* etc. It is separated from the North by the low back merger. The West can be distinguished from the Midland by the absence of the /ow/ fronting that is characteristic of that region. On the whole, the West can be defined as the region of low back merger with strong fronting of /uw/ in *too* and *do*, but limited fronting of /ow/ in *go* and *road*.



Map 11.11. The Southeastern super-region

Although the regional dialect of the South is consolidated by the mechanism of the Southern Shift, a broader range of Southern characteristics are indicated in this map, defining a larger southeastern super-region. It includes the fronting of /ow/ in *go*, *road*, *boat*, etc. where the nucleus is fronted to central position or even front of center. This trait involves the South proper, extends southward to south-

ern Texas and Florida, and includes cities on the eastern margin like Charleston. The Southeastern region extends northward to include all of the Midland and the Mid-Atlantic states. The fronting of /ow/ separates the Southeast from the North, Canada, and the West.



Map 11.12. The Northeast

In the northeastern section of the United States, Eastern New England was originally marked by the vocalization of post-vocalic /r/ in *car*, *card*, *fear*, etc. Though this feature is receding, it is still strong in the area ranging from Bangor, Maine to Providence, marked by magenta symbols here. The stars represent speakers who distinguish the class of /ah/ words in *father*, *pa*, *spa*, etc. from the merged class of

/o/ and /oh/ in *pot*, *bother*, *paw*, *caught*, etc. Western New England is *r*-pronouncing. The northern half shows the low back merger, along with consistent fronting of /ah/ before /r/. Southwestern New England shows the basic tendency of the Northern Cities Shift to back /e/ and front /ah/ (blue symbols).



vowel.<sup>44</sup> The *r*-less area extends southward to include Providence, a city with a unique dialect that lies outside of the area of low back merger. This entire *r*-less region is geographically and linguistically distinct from the *r*-less region of New York and is distinguished from it by the absence of a lexical split within the short-*a* system.

The Eastern New England region, centered upon Boston, may be defined more specifically by the behavior of /ah/ in *father, spa, pa*, etc.<sup>45</sup> In many areas of North America, the nucleus of /ah/ is merged with unrounded /o/, but in a few cases it is distinct. Speakers with /ah/ distinct from /o/ are indicated by stars on Map 11.12. The acoustic criterion used here is that for /ah/ to be distinct, its mean F2 should be at least 100 Hz greater than the mean F2 of /o/. A scattering of star symbols also appears in *r*-pronouncing areas: two in Philadelphia, two in Pittsburgh, etc. However, the only area where such stars are characteristic of the community as a whole is Eastern New England, where six of the eight speakers are so marked. In Eastern New England, /ah/ and /ahr/ are both shifted to the front (the criterion for the fronting of /ahr/ is that F2 is greater than 1400 Hz).

### Western New England (Chapter 14.2)

Western New England is an important transitional area between Eastern New England and the Inland North; it is the staging ground for the westward migration that led to the formation of the North and the Northern Cities Shift. On Map 11.12 it appears that only three speakers in Western New England show the alignment of the front-back position of /e/ and /o/ that defines the Northern Cities Shift; these are the dark blue circles that indicate mean F2(e) – F2(o) < 375 Hz. The isogloss for the North cannot be extended to include these Western New England speakers. But seven speakers in the area satisfy the less stringent criterion that F2(e) – F(o) should be less than 450 Hz, indicated by the light blue symbols. Western New England can therefore be characterized as displaying an early stage in the Northern Cities Shift. The light blue isogloss also includes Albany in New York's Hudson Valley, a city that shares other features with New York City (Chapter 17.1). Further exploration of the vowel systems of Western New England is found in Chapter 14.2.

The symbols in the northern half of Western New England are diamonds. These indicate speakers with the low back merger who show fronting of /ahr/ but not /ah/. Chapter 16 will develop the division between Northwestern New England and Southwestern New England.

### The Atlantic Provinces (Chapter 15)

So far, little has been said about those parts of Canada that are not affected by the Canadian Shift. The Atlantic Provinces are not involved in any of the sound changes that have been located in the rest of the continent except for the low back merger. All symbols within the dark green isogloss on Map 11.12 are yellow, indicating lack of involvement in the processes that mark the other areas. A linguistic definition for the Atlantic Provinces is largely negative. The region is not similar to Western New England with respect to the Northern Cities Shift; it does not exhibit the vocalization of /r/ like Eastern New England; it does not have strong fronting of /ow/ like the Midland; but it is not as strongly conservative as Providence. As established above, it does not participate in the Canadian Shift, as does the rest of Canada. However, Map 11.12 shows one unifying trait that will emerge more strongly in Chapter 15. It is characterized as a whole by a front position for /ahr/: all but two of the symbols are diamonds.

## Transitional areas

### The North Central Region

There are 26 Telsur speakers who do not fall within any of the dialect areas defined so far. Eight define a residual dialect area, the North Central region. This region ranges from Montana to Michigan along the U.S.–Canadian border, including the communities of Billings, Bismarck, Minot, Fargo, Duluth, and Marquette. It does not participate actively in any of the sound changes in progress discussed so far except for the low back merger. It is distinguished from the North by the strong presence of that merger (Maps 9.1–2, 11.1). It is distinguished from Canada by the absence of the Canadian Shift. It is distinguished from the both Canada and the West by a very limited fronting of /uw/ after coronals (see Chapter 12; F2 < 1700 Hz for all speakers in this area).

### Transitional cities

Eighteen other communities are identified in Map 11.13 as transitional (red circles). No common characteristic of their vowel systems has been established, and their patterns reflect the transitional or marginal character of their location.

The cities of Paterson, Passaic, and Allentown/Bethlehem are located just outside of the New York City and the Mid-Atlantic areas. They show the nasal short-*a* system characteristic of the Midland, in which raising occurs primarily before nasals, but not the fronting of /ow/ that marks the main Midland regions.

A number of these transitional cities are marginal to the South, ranging from Washington, DC to Corpus Christi and El Paso in Texas. Charleston once displayed a highly specific dialect of its own, but in losing that pattern has not acquired the defining feature of the Southern region, glide deletion of /ay/.<sup>46</sup> However, Chapter 18.2 will show that Charleston has not lost its Southeastern character in other respects and that it has continued as a distinct variety of Southeastern speech. Florida is large enough to form a region of its own, if some unique defining character could be found. All of these Southern marginal cities are included in the Southeastern super-region, along with the Midland (Map 11.11).

The two Alaskan speakers studied by Telsur do not resemble the West strongly enough to be included in that region, but there is not enough data on Alaska to assign it separate status.

In the area between Western Pennsylvania, the Midland, and the North is a section of Ohio that is intermediate in regard to the defining features of these regions, as exemplified by the cities of Canton and Massillon.

Within the major regions, there are also speakers whose vowel systems are intermediate or unmarked in the same sense as the 26 Telsur speakers labeled transitional. However, they are surrounded by other speakers who do exemplify the region they are in, and they are therefore included as members of that region or dialect. Variation of this kind is inevitable when change is in progress or when dialect features become socially marked. On the other hand, we do not find within the heartland of a region any speakers who are fully characteristic of other re-

<sup>44</sup> The Bangor speaker on this map does not show *r*-vocalization herself, but five other Bangor speakers who were not analyzed acoustically show strong *r*-vocalization. The magenta color for this symbol therefore represents the community norm.

<sup>45</sup> This class is amplified by a certain number of words found in the British broad-*a* class (Chapter 16.1), but the irregular lexical distribution involved here makes these words less suitable for a general definition of the region.

<sup>46</sup> See Baranowski (2002). More detailed studies may well show the same pattern in Savannah, but the Telsur speakers located for that city are not as distinct from the general Southern pattern as those we find in Charleston.





Map 11.13. The North Central and transitional areas

This map shows North Central dialect area, a residual region defined by the presence of the low back merger and the absence of the marked features of Canada, the North, and the West. The map also shows the other speakers who do not fit into any of the dialects defined so far. On the margins of the South are Charleston,

Florida, Corpus Christi, and El Paso, which fit into the Southeastern super-region of Map 11.11. Other transitional areas appear in northeastern Ohio, where Canton and Akron lie on the border between the North and the Midland.

gions. There are no exponents of the Northern Cities Shift in North Carolina, for instance, nor any speakers who reverse the relative positions of /e/ and /ey/ in the West or the North.

**Differential behavior of /ow/ and /ʌ/**

Map 11.14 develops the structural relations between the behavior of /ow/ in the Midland and the North and the behavior of /ʌ/ in both areas. The blue symbols represent speakers for whom /ʌ/ and /ow/ are both backer than /o/. The red symbols represent speakers for whom /ʌ/ and /ow/ are both fronter than /o/. Yellow symbols are speakers for whom /ʌ/ and /ow/ are not linked in this way – one may be fronter than /o/ and the other backer.

The separation of North and Midland in Map 11.14 is sharper than any developed previously. There are no red symbols in the North (though they appear in Canada), and there are no blue symbols in the Midland. There are only two blue symbols in the South, both remote from the North–Midland line. This opposition not only provides the most extreme differentiation of the North from the Midland, but it also coincides with the North–Midland line formed by other phonological and lexical variables. It may be inferred that the uniform pattern in the North is the joint result of the conservative position of /ow/ and the backing of /ʌ/, while the uniformity in the South is the joint result of the fronting of /ow/ and the fronting of /ʌ/.

This inverse relation is supported by the results of regression analyses of /ʌ/ by age for all dialects. In Table 11.2, age coefficients for the North show a significant shift of /ʌ/ to the back for younger speakers. The neighboring Midland shows the reverse situation: /ʌ/ is strongly shifting forward. This reflects a Midland and Southern chain shift involving /u/ and /ʌ/ (Chapter 18). The bottom half of Table 11.2 shows the corresponding figures for /ow/. No age coefficients appear for the North, but the negative coefficient for /ow/ indicates a strong movement in apparent time: younger speaker use fronter vowels than older speakers in the Midland.

Table 11.2. Age coefficients for /ʌ/ and /ow/ in the North and Midland

	Age Coefficient	t	P
F2(ʌ)			
The North	2.32	2.31	.023
Midland	-2.95	-3.55	.0007
F2(ow)			
The North	–	–	–
Midland	-2.77	-2.48	.0158

The close relationship between /ow/ and /ʌ/ makes it possible to dispense with /ow/ and use the relation of /ʌ/ to /o/ as a structural indicator of the progress of the Northern Cities Shift, parallel to ED. These two measures are defined as follows:

- (a) the ED condition, the front-back alignment of /e/ and /o/  
F2(e) – F2(o) < 375 Hz
- (b) the UD condition, the reversal of the relative frontness of /ʌ/ and /o/  
F2(ʌ) < F2(o)

As /o/ moves forward, it approaches /e/, which is moving back on its parallel track, to produce condition (a). The same movement brings about a reversal in the



relative frontness of /ʌ/ and /o/, which is accelerated when /ʌ/ shifts backward, producing condition (b), the UD condition. It appears on Map 11.14 as an oriented brown isogloss defining the blue symbols which records the relative backness of both /ʌ/ and /ow/ compared to /o/.

Map 11.8 used condition (a) to create the Inland North boundary, appearing as a dark blue isogloss on Map 11.14. There is a close match of the ED and UD isoglosses on the southern boundary of the Inland North – that is, the North–Midland boundary. The oriented brown UD isogloss is located just north of the general Northern boundary (medium blue isogloss), and it coincides with the dark blue ED isogloss. It extends farther west than the ED line. Like the ED line, it excludes Canada. It is discontinuous, unlike the ED line, reflecting the re-alignment of Erie (with two red circles) to western Pennsylvania. The UD line extends somewhat further east than the ED line to include the southern half of Western New England, New York City, and Providence. Within the Inland North, the UD isogloss achieves the same high homogeneity (.87) as the ED isogloss (.87); consistency is much higher (.85 against .62); and leakage is only half as great (.05 against .10). There is also a good representation of blue symbols in the St. Louis corridor.

The link between /ʌ/ and /ow/ holds with extraordinary rigor for the North, the South and the Midland.<sup>47</sup> There is only a small minority of yellow symbols, which represent those cases in which /ʌ/ and /ow/ differ in their relation to /o/. On the other hand, yellow symbols predominate in Canada and the West, so that the tight linkage between /ʌ/ and /ow/ must be seen as a feature of the eastern half of the United States rather than the continent as whole.

Chapter 14 will examine the North–Midland isogloss bundle in greater detail; it will appear that a number of other isoglosses follow the same geographic pattern.

**11.2. North American dialects classified by the fronting of /uw/ and /ow/**

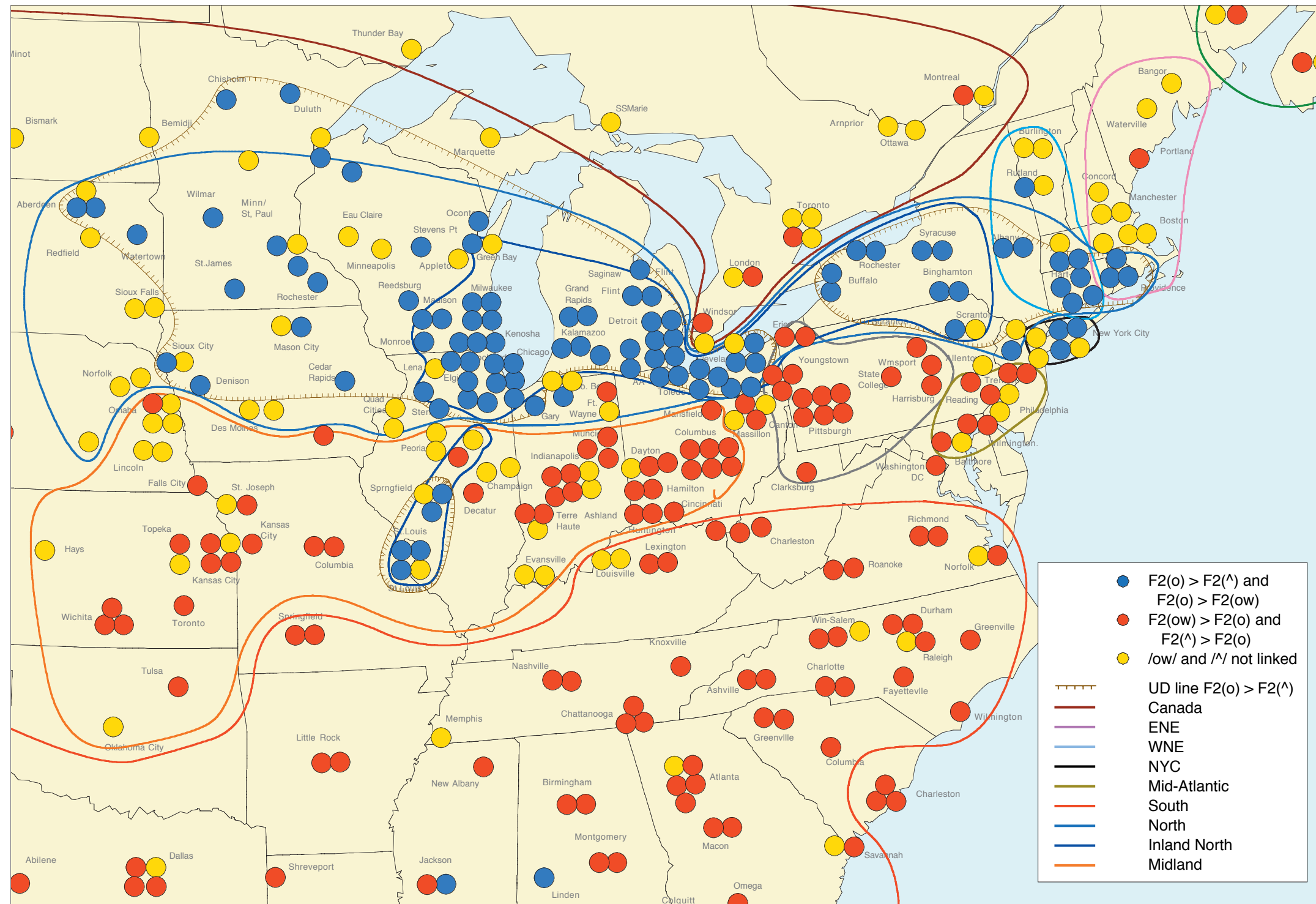
Dialect differences in the fronting of /ow/ were used as criteria in Maps 11.8 to 11.10 and 11.14. The conservative treatment of /ow/ with a mean F2 less than 1200 Hz is a defining feature of the North, the West, and Canada, and the more advanced position of /ow/ (mean F2 > 1200 Hz) is a defining feature of the Midland. On the other hand, almost all of these regions show a marked fronting of /uw/, especially after coronal consonants. A revealing display of the regions and dialects as defined so far can be obtained by plotting the mean F2 of /uw/ after coronals against the mean F2 of /ow/.

In the discussion of dialects and regions, the following abbreviations will be used:

AP	Atlantic Provinces	MA	Mid-Atlantic
B	Boston	N	North
Ca	Canada	NYC	New York City
Ci	Cincinnati	Pr	Providence
Cs	Charleston	S	South
ENE	Eastern New England	SE	Southeast
Fl	Florida	TS	Texas South
IN	Inland North	W	West
IS	Inland South	WNE	Western New England
M	Midland	WPa	Western Pennsylvania

<sup>47</sup> Eastern New England is outside the North as defined in Map 11.8; hence the red symbol in Portland, ME is not a counterexample.





Map 11.14. The North/Midland boundary and opposing movements of /ʌ/ and /ow/

The division between the North and the Midland appears in its sharpest form here. The blue symbols represent speakers for whom both /ʌ/ in *cut* and /ow/ in *coat* are back vowels, further back than /o/ in *cot*. The red circles are speakers for whom the reverse is true: both /ʌ/ and /ow/ are further front than /o/. Except for

the St. Louis corridor, there are no blue circles in the Midland and no red circles in the North. This division is further accentuated by the fact that /ʌ/ is shifting to the back in the North, as part of the Northern Cities Shift, while /ʌ/ is moving to the front in the Midland area.

Figure 11.5 displays the 11 regions of North America on these axes. In the lower right corner is Eastern New England, with the most conservative values for both /ow/ and /uw/. Directly above is the North, with a small degree of fronting of /uw/ but none at all for /ow/. Directly above is a set of three regions with stronger fronting of /uw/. Close to the right hand margin is Canada, with strong fronting of /uw/ but none for /ow/. New York City and the West are shifted to the left, showing a slightly stronger tendency to front the nucleus of /ow/. Opposed to these regions is a cluster of five at upper left, with strong fronting of both /ow/ and /uw/. The fronting of /uw/ is well in advance of the fronting of /ow/. For /uw/, only one dialect shows values back of center (1550 Hz in the normalized system) and the great majority are well above 1700 Hz; none of the mean values for /ow/ is above the center value.<sup>48</sup> Within this range, /ow/ means are sharply dichotomized at the 1300 Hz line.

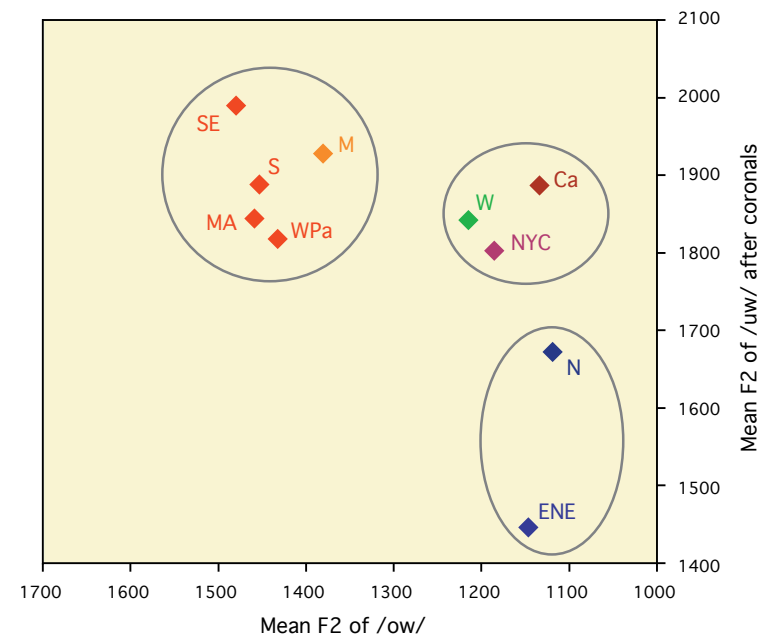


Figure 11.5. Mean values for the fronting of /uw/ after coronals and the fronting of /ow/ for North American regions

Figure 11.6 gives a more detailed view by charting /ow/ against /uw/ for the 20 dialects established in the previous maps. The two extremes at upper left and lower right are now occupied by Charleston and Providence, respectively. These cities are each represented by only three speakers, and it might be expected that their extreme positions will be modified by more detailed studies to follow.<sup>49</sup> The Boston dialect area is in the lower range of Figure 11.6 but shows more fronting of /uw/ than the rest of Eastern New England, comparable to that found in Western New England. Moving up the diagram, it appears that the strongest fronting of /uw/ among those dialects that do not front /ow/ is to be found in Canada. At upper left central are dialects that show substantial fronting of /ow/, including the main body of Midland and Southern dialects.

The characteristic fronting of /ow/ in the South and the Midland is part of a generalized fronting of the nuclei of back upgliding vowels, affecting /uw/, /ow/, and /aw/. It has already appeared that the fronting of /aw/ is associated with the Southern Back Upglide Chain Shift /oh/ → /aw/ → [æo]. It remains to be seen what connection exists between the resistance to the fronting of /ow/ in the North and the activation of the Northern Cities Shift in the core of the Northern area.

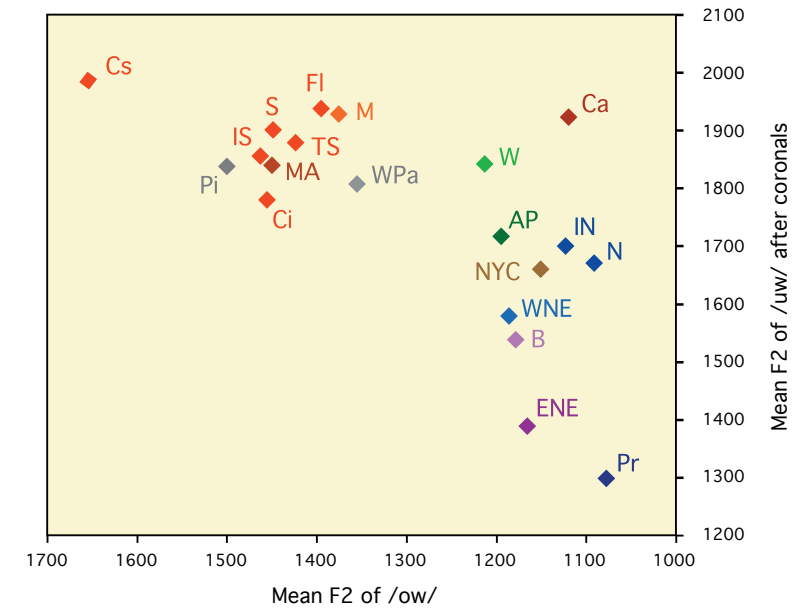


Figure 11.6. Mean values for the fronting of /uw/ after coronals and the fronting of /ow/ for North American dialects

### 11.3. Regions and dialects of North America

In Maps 11.1 to 11.13, Telsur speakers are located in areas that are categorized by “region” and “dialect”. The categories established are listed in (2), and the smaller regions – dialect areas – are indented below the region in which they are contained. Within most regions, there are areas for which “dialect” is the same as “region” along with dialects that are more specifically marked. Dialect definitions are brief abbreviations of the more detailed discussions above. Dialect definitions in parentheses indicate features that are declining. Individual cities, such as Charleston and Providence, are included as examples of the local variations on the regional themes with their traditional features in parentheses. The Southeast is a super-region that includes the South, the Midland, Florida, and other areas marginal to the South.

<sup>48</sup> However, 39 individual speakers do show mean values above 1550 Hz, ranging up to 1710.

<sup>49</sup> However, Baranowski’s detailed study of Charleston (2005) confirms in striking detail the extreme fronting of /ow/ in that city.



(2) Region / Dialect	Defined by
North	Conservative /ow/, no low back merger
Inland North	Northern Cities Shift
St. Louis Corridor	Northern Cities Shift
Western New England	Less advanced Northern Cities Shift
Eastern New England	Vocalization of /r/, short- <i>a</i> nasal system
Boston	Fronting of /ah/ distinct from /o/, low back merger
Providence	Conservative /uw/ and /ow/, no low back merger
New York City	Vocalization of /r/, split of short- <i>a</i>
Mid-Atlantic	No vocalization of /r/, split of short- <i>a</i>
Western Pennsylvania	Low back merger
Pittsburgh	Glide deletion of /aw/
South	Glide deletion of /ay/
Inland South	Southern Shift
Texas South	Southern Shift
Charleston	(Monophthongal /e:/ and /o:/; r-lessness)
Midland	Transitional low back merger, fronting of /ow/
Cincinnati	(short- <i>a</i> system like NYC)
St. Louis	(/ah/ and /oh/ merged)
Southeast	Fronting of /uw/, /ow/,
West	Low back merger, fronting of /uw/ but not /ow/, no Canadian Raising
North Central	Low back merger, conservative /uw,ow/, no Canadian Shift or raising
Canada	Low back merger, fronting of /uw/ but not /ow/
Canada	Canadian Shift and Canadian raising of /aw/
Atlantic Provinces	Canadian raising, fronting of /ahr/

## 11.4. Principal components analysis of North American regions

The selection of dialect boundaries presented so far involves a certain degree of subjective choice, particularly influenced by knowledge of where boundaries have been located in the past. Efforts have been made to develop a systematic algorithm for constructing isoglosses, as described in Chapter 6. Another approach to developing objective methods is to determine the relations of speakers to each other without reference to geography or social attributes, purely on the basis of vowel measurements.

In the determination of the major regional boundaries for North American English, reference was made to a total of 21 measures of the vowel system: F1(e), F2(e), F1(æ), F2(æ), F2(o), F2(ʌ), F1(ey), F2(ey), F1(ay0), F2(ay0), F2(Tuw), F2(ow), F1(aw), F2(aw), F1(æh), F2(æh), F1(oh), F2(oh), percent monophthongization of /ay/ before voiced obstruents and finally, percent monophthongization of /ay/ before voiceless consonants, and percent back upglides with (oh). The mean values of these variables were entered into a principal components analysis of the 439 Telsur subjects. The first two components, U1 and U2, accounted for 21.8 percent and 14.4 percent of the variance respectively. Figure 11.7 is a two-dimensional plot of the Telsur subjects' values for U1 and U2. Dialects are identified by colors and symbols.

The display is sharply divided into two distributions along the U2 axis. The dialects with a split short-*a* system, New York City and the Mid-Atlantic region, are segregated at the right, and the main series is at the left.<sup>50</sup> The vertical axis U1 evidently reflects a North–South dimension, the Northern and Southern Telsur speakers are almost completely separated by U1. Furthermore, the most advanced Northern speakers are segregated at upper left, where the dark blue circles indi-

cate the Inland North. The most advanced Southern speakers, from the Inland South, are segregated at lower left (magenta circles). The Texas South speakers (magenta x) are in the lower part of the Southern distribution, closer to the rest of the South than the Inland South. Western New England, marked by a less advanced form of the Northern Cities Shift, occupies an intermediate position between the Inland North and the rest of the North. The West, Canada, and the Midland are in the center of this distribution and not so clearly separated. Their overlap in this display corresponds to the lower consistency figures of Appendix A. In Figure 11.7, the yellow circles representing Midland speakers are concentrated in the lower part of the Canada–West–Midland grouping, while Canada occupies a higher position, reflecting the features it shares with the North, and is shifted towards the right. Eastern New England speakers are high in U1 values but spread out across the U2 axis, probably reflecting the lack of uniformity in Map 11.1 for the low back merger, among other variables.

On the whole, Figure 11.7 shows that these vowel measurements are sufficient to separate the major regional dialects identified in the maps of this chapter, although the West, the Midland and Canada are not as clearly distinguished as other regions. If one were to recognize a type of North American English to be called “General American”, it would be the configuration formed by these three dialects in the center of Figure 11.7.

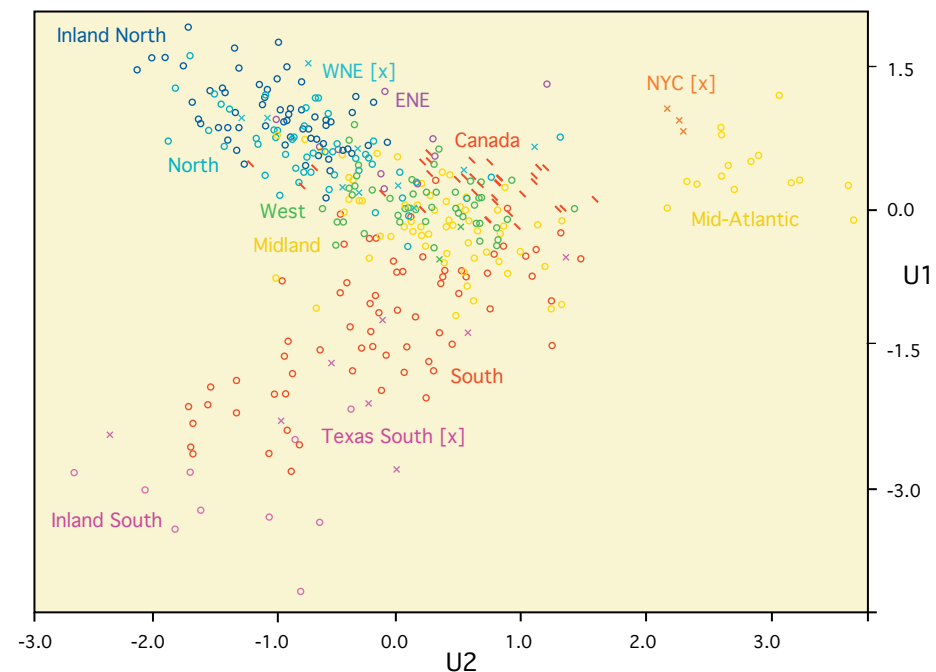


Figure 11.7. Scattergram of first two principal components of mean values of 21 vowel measures for 439 Telsur subjects

Figure 11.8 simplifies this display by a principal components analysis of the same variables based on the means of the major regional dialects. All of the distinctions made in Figure 11.7 are displayed here. Though the means of ENE and WNE are very close, reference to Figure 11.7 shows that ENE is distinguished by a range of tokens that extends considerably to the right and left. In contrast, the distributions of means for the closely approximated Midland and West are compact.

<sup>50</sup> This dichotomy is in part a result of the qualitative nature of the feature; those dialects on the left that do not have a tense /æh/ category have zero values for both F1 and F2.



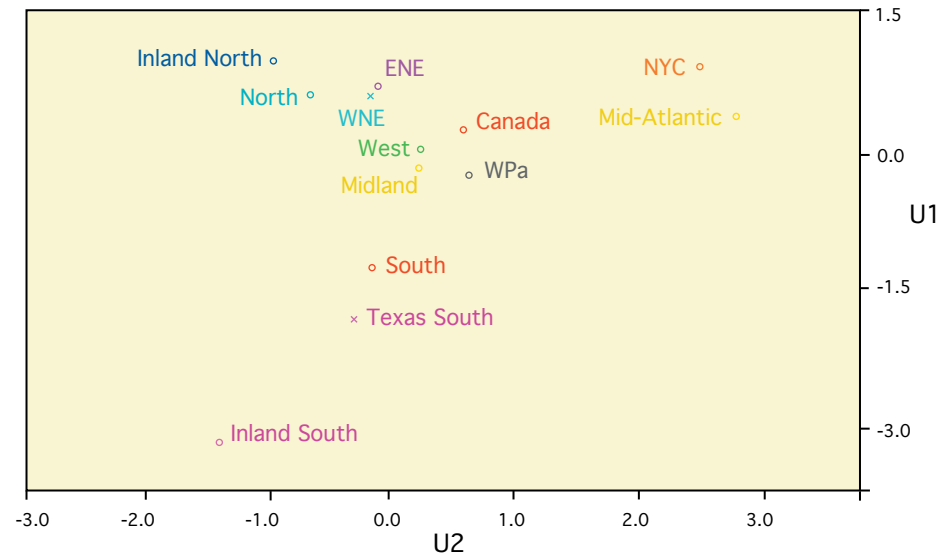


Figure 11.8. Scattergram of first two principal components of mean values of 21 vowel measures for 13 regions and dialects

Map 11.15 assembles all of the dialect isoglosses described in this chapter, presenting the best current answer of the Atlas to the questions, “How many dialects of North American English are there?” and “Where are their boundaries located?” Since the Atlas samples only two speakers in most cities or urbanized areas, the location of these boundaries cannot be taken as definitive at any one point. A dialect area is defined by the overall consistency of patterning, as shown in Maps 11.1 to 11.14.

Several isoglosses on Map 11.15 are adjusted to take into account the findings of chapters to follow. The outer isogloss that defines the North (light blue) is not extended into New England, in consideration of the distinct characteristics of New England that are developed in Chapter 16. Providence is distinguished from Eastern New England and separated from the northeastern area that is centered around Boston. The Inland North is a continuous area, since the city of Erie in northwestern Pennsylvania is divided on the defining ED criterion. Chapter 14 will show that most Inland North features show a discontinuous distribution, with Erie plainly located in the Midland.

### 11.5. The hierarchical structure of North American dialects

Figure 11.9 displays the differentiation of the dialects of North American English by the sound changes that are in active progress in each region (indicated by arrow heads). The upper part of the diagram is a hierarchical structure that is generated by linguistic changes in progress. It begins with the division of all dialects into two groups: those that show a strong fronting of /ow/ and /aw/ and those that do not. This sets the Midland and the South against the North, the West, and Canada. The active sound changes are shown with the colors that have been associated with them in the preceding maps. On the left, the Northern Cities Shift differentiates the Inland North from the rest of the North and affects Western New England to a lesser extent. The process of *r*-vocalization marks three of the other Northern dialects, Providence, Eastern New England, and New York City.

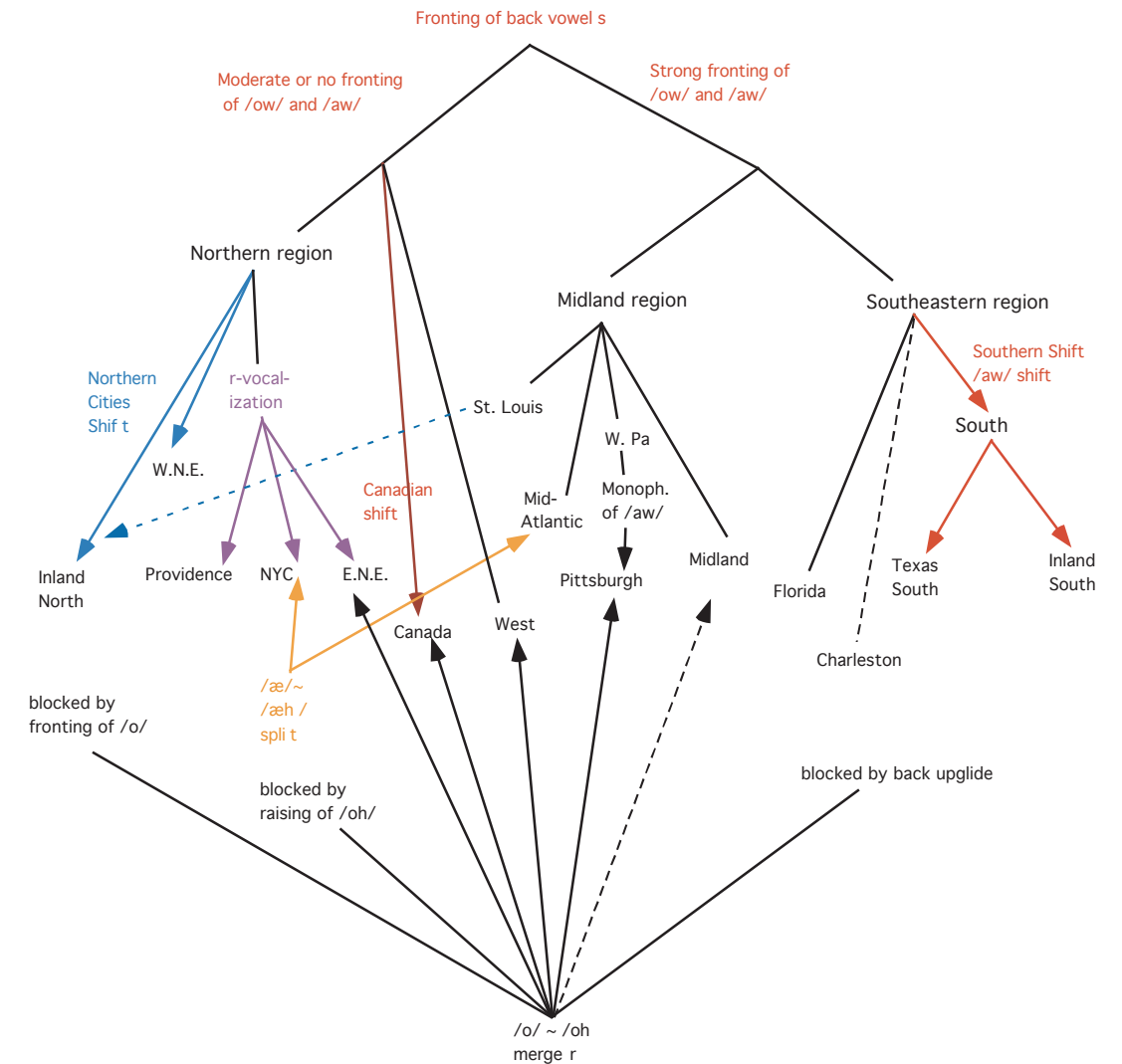


Figure 11.9. Differentiation of the dialects of North American English

The right half of the diagram splits immediately into the Midland and the larger Southeastern region. Charleston and Florida are at present marginal members of the latter group; the main line of development is dictated by the Southern Shift that defines the South as a whole, as well as two more advanced subsections of it. The original Midland area is here labeled “Midland region”, which breaks into Mid-Atlantic, Western Pennsylvania, and the Midland, as defined in Map 11.9. Within Western Pennsylvania, Pittsburgh is defined by the monophthongization of /aw/. St. Louis is adjoined to the North by its participation in the Northern Cities Shift.

The lower half of the diagram shows the interaction of the vowel chain shifts with the low back merger and short-*a* split. The split of the short-*a* class unites New York City and the Mid-Atlantic region. The merger of /o/ and /oh/ affects all dialects except those where it is blocked by some specific result of the sound changes in progress. In the Inland North, it is blocked by the fronting of /o/; in New York City and the Mid-Atlantic dialect, by the raising of /oh/; and in the South, by the development of the back upglide which forms part of the /aw/ shift shown in the upper part of Figure 11.9. Five dialects in the center are shown to be governed by the low back merger: ENE, Canada, North Central, the West, and Western Pennsylvania, with the Midland area shown to be in transition. The



Map 11.15. An overall view of North American dialects

The various regions and dialects defined in previous maps are here displayed by the isoglosses that define them. Some regions include smaller dialect areas in which the sound changes in progress are most advanced. This is seen most clearly in the relation of the Inland North to the North and in the relation of the Inland South and Texas South to the South as a whole.

North Central region is not connected to any node on the upper half of the diagram, since it does not participate in any of the sound changes shown.

This overall view of North American dialects is a description of the dialects studied by Telsur, that is, the urbanized areas sampled by the methods of Chapter 4. It does not include many rural and local dialects that are a distinctive and important part of the linguistic ecology of North America. It does not deal with the Outer Banks or the adjoining dialects of eastern North Carolina, the isolated dialects of the Chesapeake Bay area, the Iron Range of Minnesota, the Pennsylvania German area, and many others. Given this concentration on urbanized areas, it is important to specify the sizes of the populations that have been sampled. A total of 297 speech communities are represented by the 762 subjects interviewed. Table 11.3 shows the aggregate populations of the Metropolitan Statistical Areas that were sampled by Telsur, grouped by region and dialect.

The total population of the MSAs represented by the Telsur sample is more than 203,000,000. The sample represents 68 percent of the population of 300,000,000 of the U.S and Canada in 1997. Table 11.2 also shows the heavy concentration of the Northern population in the Inland North (45 million), and the relatively small population of the Midland (16 million) compared to the North and the South (36 million). The Inland South is a small fraction of the South as a whole, just 8 percent. This underlines the contrast between North and South: the most advanced speakers of the Northern Cities Shift are concentrated in the many

Table 11.3. Aggregate populations of Metropolitan Statistical Areas (MSAs) represented in the Telsur sample (in thousands)

	Region	Dialect
Eastern New England	5,319	
ENE		228
Boston		3,966
Providence		1,124
Canada	13,500	
Canada		9,235
Atlantic Provinces		956
North	45,330	
Inland North		34,000
WNE		2,601
St. Louis		2,548
North		6,179
NYC	8,643	
Mid-Atlantic	9,046	
Western PA	4,054	
Pittsburgh		2,379
WPA		1,674
Midland	16,820	
South	36,456	
Inland South		3,096
Texas South		5,167
South		28,192
Charleston	495	
Florida		5,952
West	38,852	
Transitional	14,273	
TOTAL	203,625	

big cities of the North, while the leading edge of the Southern Shift is found in a few medium-sized cities in a limited area.

The large populations of the eastern seaboard are reflected in the population of 22 million of the conurbation that stretches from Boston to Baltimore, a comparatively small area with a heavy concentration of large cities. Though much of the West is sparsely inhabited, the large cities of the Pacific coast contribute to a sizeable total of 38 million. The proportion of the population sampled in Canada is less than that for the United States, only 45 percent of the 30 million people in the country as a whole.<sup>51</sup>

## 11.6. Relation to previous studies

Map 11.16 superimposes on Map 11.15 the dialect boundaries that were determined by Carver in his 1987 study of the lexical data of DARE. The Carver boundaries are shown by the broken black-and-white lines. The shaded areas and the labeling show the dialect areas identified by Carver and can be compared with the colored isoglosses determined by the phonological systems examined by ANAE.

There is a great deal of agreement in these two sets of isoglosses, particularly in the major divisions between Inland North, Midland, and South. First, it can be seen that the North–Midland boundary of ANAE (represented by the dark blue boundary) coincides almost exactly with the Upper North–Lower North boundary of Carver. The minor boundaries separating Eastern and Western New England are not much different from the ANAE boundaries, and the westward extension of the Upper Midwest is very close to the western limits of the North. The major difference in the Carver and ANAE views of the North is that Carver does not identify the core area of the Inland North in which the Northern Cities Shift is active. In addition, the North Central residual region is not recognized in Carver’s maps.

The Midland/South boundary along the Ohio River also coincides for a good part of its length with the Lower North/Upper South boundary of Carver. In the eastward portion of this boundary, Carver follows the Mason–Dixon line, while the ANAE’s northern limit of the South is below that line. Florida is included in the South by Carver, but not by ANAE. The South proper for Carver does not include Texas, though another Carver isogloss, running north to south through New Mexico, comes close to the westward extension of the South in ANAE terms. Within the South, there is little agreement on the identification of sub-areas. The Inland South of ANAE does not appear on the Carver map as a distinct region and the Carver division between the Upper and Lower South is not recognized in the ANAE data.

The Midland necessarily shows similar agreement in its northern and southern boundaries. Carver does not identify a distinct Mid-Atlantic or Western Pennsylvania area, and his Lower North does not extend as far west as the ANAE Midland. ANAE does not identify the distinct “Hoosier Apex” which is a major feature of Carver’s Upper South.<sup>52</sup>

None of the subdivisions of the West found by Carver appear in the ANAE data. It is not surprising that the least agreement between the two views of American dialects is found in the West. In the principal components diagrams of Figures 11.5 and 11.6, the West is not clearly distinguished from the Midland as a whole, although the distinctions drawn in Maps 11.9 and 11.10 seem fairly clear.

<sup>51</sup> This is in part due to the fact that Canada’s 7 million native speakers of French, almost a quarter of the population, do not form part of our target population.

<sup>52</sup> The Hoosier apex is identified in ANAE Map 9.5 for the merger of /in/ and /en/.







Map 11.16. Comparison of the ANAE dialect boundaries with Carver's lexical boundaries based on DARE

The black-and-white and hatched areas and the barred black-and-white isoglosses are the dialect regions defined by Craig Carver in his 1987 summary of the lexical evidence of the *Dictionary of American Regional English*. These are superimposed on the dialect boundaries of ANAE as given in Map 11.15. For the most part, there is good agreement. Carver's Upper North corresponds quite closely

to the ANAE North, and his Lower North corresponds to the ANAE Midland. ANAE does not make the distinction between Upper South and Lower South but defines instead the core Southern areas of the Inland South and Texas South. The ANAE South extends farther west than Carver's, including almost all of Texas. The divisions in Carver's analysis of the West are not supported by ANAE data.

Since DARE does not include Canada, Carver's boundaries cannot be compared to the ANAE definitions of Canada.

The lexical boundaries in Carver's work are built upon the original regional vocabulary identified by Kurath and represent the effects of settlement patterns which date from the eighteenth and nineteenth centuries for most of the country. The ANAE definitions of dialect are built upon sound changes that originated at the very end of the nineteenth century (for the South) and the middle of the twentieth century (for the North and Canada). The coincidence of these two sets of boundaries is striking.

## Appendix A. Isogloss parameters

			Total marked	Total inside	Marked inside	Marked outside	Homo- geneity	Consis- tency	Leak- age
Map 11.2	F1(æ) < 700 <sup>1</sup>		91	86	72	19	.84	.78	.05
	ED < 375 <sup>2</sup>	Inland North	99	70	61	38	.87	.62	.10
		Great Lakes		51	44		.86		
		Western NY		10	10		1.00		
		St. Louis corridor		9	7		.78		
	Midland and South (oh) back upglide	Over 0%	67	62	54	13	.87	.81	.03
		Over 20%	35	44	29	6	.66	.83	.02
		Over 50%	22	20	16	6	.80	.73	.01
Map 11.3 – South	GDel (ay) <sup>3</sup>		76	83	75	1	.90	.99	.003
Map 11.4 – South	/e/ & /ey/ reversed		47	49	41	6	.84	.87	.02
	/i/ & /iy/ reversed		11	10	8	3	.80	.73	.01
Map 11.5 – South	GDel (ay0) > 0% <sup>4</sup>		49	62	42	7	.68	.86	.02
	GDel (ay0) > 50%		14	18	13	1	.72	.93	.00
Map 11.7	Canadian Shift <sup>5</sup>		62	25	21	41	.84	.34	.10
	ENE r-vocalization <sup>6</sup>		11	11	10	1	.91	.91	.002
Map 11.8	The North <sup>7</sup>		123	117	96	27	.82	.78	.08
Map 11.9	Midland <sup>8</sup>		108	73	48	60	.66	.44	.16
Map 11.10	The West <sup>9</sup>		73	50	33	40	.60	.59	.05
Map 11.11	Southeast <sup>10</sup>		206	180	156	50	.87	.76	.19
Map 11.14	UOD <sup>11</sup>		105	102	89	16	.87	.85	.05

1 and no monophthongization of /ay/

2 and no vocalization of /r/, split of /æ/, or monophthongization of /ay/

3 monophthongization of /ay/ before voiced obstruents (/b, d, ʒ, g, v, ð, z/) and finally

4 monophthongization of /ay/ before voiceless consonants

5 F2(e) < 650 Hz and F2(æ) < 1825 Hz and F2(o) < 1275 Hz

6 and no split of /æ/ and no monophthongization of /ay/

7 F2(ey checked) < 2200 Hz and F2(ow) < 1275 Hz

8 F2(ow) > 1200 Hz and /o/ ~ /oh/ transitional and F2(e)-F2(o) < 375 Hz and no split of /æ/ and monophthongization of /ay/ < 50%

9 F2(uw)-F2(ow) > 500 Hz and /o/ = /oh/ in either production or perception, no Canadian raising and no Canadian Shift

10 F2(ow) > 1200 Hz and /o/ ~ /oh/ not merged in both production and perception

11 F2(ow) < F2(o) and F2(λ) < F2(o)