

The Northern Cities Shift in Real Time: Evidence from Chicago

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1 Introduction

The *Atlas of North American English* (Labov, Ash, and Boberg 2006, henceforth LAB) provides a quantitative documentation of the progress of the Northern Cities Shift (NCS) throughout the Inland North region, as viewed in apparent time. The integrated movements of the NCS are illustrated in Figure 1. The authors also present an ordering of events: /æ/ 'cat' shifted prior to /ah~o/ 'cot'; they note, however, that "the raising of /æ/ and the fronting of /o/ were the initial movements, though both the geography and real time are ambiguous in regard to their ordering" (191). Although the NCS is a widely-documented phenomenon, our understanding of the emergence of the Shift, specifically which vowel made the first move, remains incomplete.

This paper attempts to shed light on two major issues regarding its emergence and development: 1) the temporal ordering of the early shifting events; 2) the age of each of these early shifting events. Here, we limit the discussion to the two earliest events: the raising of /æ/ 'cat' and the fronting of /ah/ 'cot,' and focus on the largest of the Northern Cities, Chicago. In order to investigate the chronology of the NCS, data are drawn from archived interviews recorded during the 1960s–1980s with speakers born in the 1890s–1910s. For Chicago, real-time data have the potential to reveal chronological ordering, whereas apparent-time data do not, as neither of these movements continue as a change in progress. For a discussion of apparent-time data drawn from sociolinguistic interviews with Chicagoans, the reader is referred to McCarthy (2007, 2009).

2 The Chronology of the Northern Cities Shift

Labov, Yaeger, and Steiner (1972) first described the Northern Cities Shift as a series of movements of five vowels; Eckert (1988) adds the backing of /ʌ/ 'but' to the picture. LAB provide apparent-time data from 71 speakers across the Inland North, and report that four of the six shifting vowels (/ah/, /oh/ 'caught,' /e/ 'bet,' and /ʌ/ 'but') show a significant correlation between young age and formant frequency, suggesting ongoing change in apparent time. For the F2 of /ah/, a relatively small but significant regression coefficient of –11 (versus –101 for the fronting of /uw/, and 75.9 for the backing of /e/, for example) indicates fronted nuclei for speakers under 25: a slow, continuing trend of fronting. The raising of /æ/, however, shows no advancement in apparent time. Of the two earliest developments, then, only /ah/ continues to shift; /æ/-raising appears to have stabilized. LAB note that these statistics are consistent with the ordering of /æ/ > /ah/.

Gordon (2001)'s apparent-time study of small-town Michigan comes to an entirely different conclusion: the raising of /æ/ and fronting of /ah/ may have been predated by the lowering and fronting of /oh/. This conclusion is based on a stronger age coefficient for /oh/ than for the other variables. The next strongest coefficient was found for /æ/. Gordon notes, however, that the ordering /oh/ > /æ/ > /ah/ is problematic as a chain shift, since /æ/ would have no reason to shift until /ah/ did so. In Chicago, however, /oh/ does not show any signs of early movement, nor does it show a trend toward movement in apparent time (McCarthy 2009), making it an unlikely candidate for the first NCS movement. LAB place /oh/ as the third element in the sequence.

Thomas (2001) presents real-time data that suggests a different ordering from LAB. An acoustic vowel plot of a speaker from Northern Ohio born in 1878 shows a moderately fronted /ah/, just under 1500 Hz. Her /æ/ has a mean F1 of over 650 Hz, remaining a lower vowel than /e/. Considering this speaker's vowel configuration, it appears that /ah/ is at least somewhat fronted, but /æ/ is not raised.

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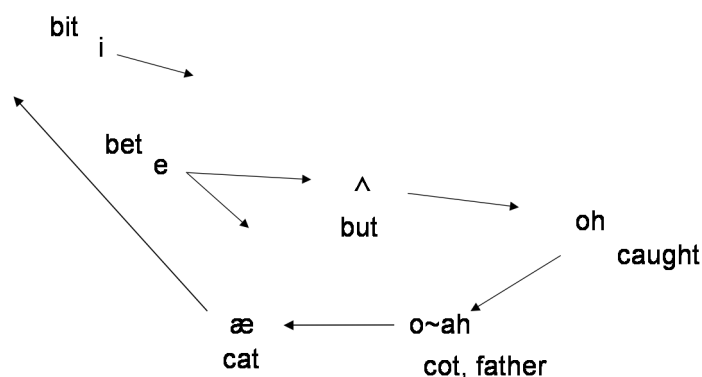


Figure 1: The Northern Cities Shift, based on Labov, Ash and Boberg (2006).

A major study of Chicago's vowels (Herndobler 1977) shows a higher incidence of fronted /ah/ than raised /æ/ among older speakers. This observation is consistent with the ordering /ah/ > /æ/. Pederson's (1965) study of Chicago English examines the vowel system, but does not uncover any characteristic shifting. McCarthy (2007, 2009) shows that neither /ah/ nor /æ/ shows any development in the direction of NCS shifting in apparent time in Chicago.

Regarding the age of these earliest shifting events, LAB conclude that "only the first two stages of the NCS were active in the 1960s" (2006:211). Even so, the age of these initial two stages is unknown. If Thomas's analysis of the 1878 speaker is representative of her age cohort, the fronting of /ah/ has existed in the Inland North since as early as the 1880s. A survey of linguistic atlas data in Upstate New York, the eastern end of the Inland North region, reveals sporadic participation in both events. Kurath and McDavid (1961), in the *Pronunciation of English in the Atlantic States*, note a slight raising of /æ/ in the speech of a Buffalo woman born in 1876; however, this raising is not consistent, as it is found in *ashes*, but not *glass*, for example. A woman born in 1879 from Fort Edward, about 50 miles north of Albany, has /ah/ fronted almost to [a], and slight, inconsistent raising of /æ/. Incipient forms of the earliest shifting events may have been present in the population in the 19th century.

Table 1 summarizes some of the major studies that directly address the issue of chronological ordering of the NCS variables. Thomas (2001) and Herndobler (1977) suggest /ah/ was the first to move. The rest conclude that /ah/ was not the instigator of the NCS, but do not reach consensus on whether the first to move was /æ/ or /oh/.

Previous study	Community	Method	Ordering inferred
Labov, Yaeger, and Steiner (1972)	Inland North	Apparent time	æ > ah > oh
Labov, Ash, and Boberg (2006)	Inland North	Apparent time	æ > ah > oh
Gordon (2001)	Rural MI	Apparent time	oh > æ > ah
Herndobler (1977)	Chicago	Apparent time	ah > æ
Thomas (2001)	N. Ohio	Real time case study	ah > æ

Table 1: Summary of research on the chronological ordering of the NCS.

3 Establishing a Target: Chicago's Vowels Today

The positioning of modern Chicago vowels provides a frame of reference for the comparison of older vowels. In order to understand whether a vowel is "fronted" or "raised," it is essential to know where it sits relative to its present-day counterpart. This section begins, therefore, with a

presentation of the present-day Chicago vowel system, as reported in an earlier pilot study (McCarthy 2007), and a case study of a Chicago woman.

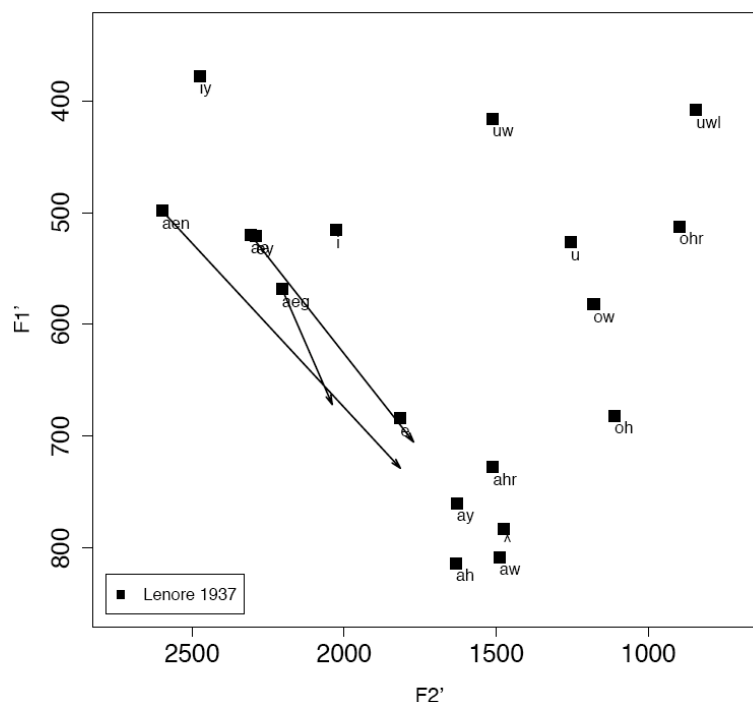


Figure 2: Mean formant values for Lenore (normalized).

Figure 2 displays the mean normalized F1 and F2 values of all the major vowels of English for Lenore, an older Chicagoan interviewed as part of a larger study on the Chicago dialect. Lenore unambiguously exhibits the first two stages of the NCS: her /æ/ is raised to a point above /e/ 'bet,' its nucleus sitting almost directly on top of the nucleus of /ey/ 'pay.' Her /ah/ is fronted to 1633 Hz, a point that is somewhat extreme even among Chicagoans. McCarthy (2007) reports that the mean normalized F2 of /ah/ is just over 1500 Hz, or phonetic [a]. Lenore's /oh/ remains a low-back vowel, and remains clearly distinct from /ah/, indicating the maintenance of the *cot-caught* distinction. Neither /e/ nor /a/ appear to exhibit any backing; instead, her /a/ is lowered near /ah/, a position which seems to be particular to this speaker, as it is not generally found among Chicagoans. /aw/ 'loud' and /ay/ 'pie' cluster around low-central position, alongside /ah/, with /ay/ slightly to the front of /aw/, a characteristically Northern feature (LAB:187). /ahr/ 'car' is in low-central position, whereas in most American dialects this nucleus is low-back. The back vowels /ow/ 'go' and /uw~uwl/ 'boot,' 'pool' remain back of center (although /uw/ shows moderate fronting, particularly before coronals, e.g., 'do'); these vowels do not show the radical fronting found in the South and Midland. The front vowels /iy/ 'see' and /ey/ 'pay' are conservative. The vowels of /ohr/ 'hoarse' and /ohr/ 'horse' are merged, represented as a single /ohr/ phoneme in Figure 2.

Briefly, let us compare Figure 2 and the mean values reported in McCarthy (2007) to the depiction of the NCS from LAB, shown in Figure 1. Although Lenore's /ah/ falls to the front of center, it is clear that /ah/ does not, as a rule, reach phonetic [æ] in Chicago. This is important to keep in mind, because if we incorrectly assumed the final target to be low-front (somewhere in the vicinity of, say, 1700 Hz), we would falsely identify an early Chicagoan with an F2 of 1500 Hz as non-fronted. One possible explanation for why Figure 1 and Figure 2 do not match precisely is that Chicago is more conservative in its degree of /ah/-fronting relative to the rest of the Inland North. Another possibility is offered by Thomas (2001), who suggests that Labov's depiction of the NCS may have overstated the extent to which /ah/ is fronted. Either way, we assume here that

a threshold of 1500 Hz is a sufficient criterion for /ah/ to be considered fronted.

As for the position of /æ/, its height varies significantly according to gender. Several sources report a large and significant difference in the height of /æ/ between men and women, both in Chicago and the Inland North generally (LAB). McCarthy (2007) reports that the mean F1 for Chicago women is 496 Hz, whereas for men it is 592 Hz. Thus the male target is arguably less raised than the female target. Higher position relative to /e/ will serve as a diagnostic for raising.

4 Method

4.1 Speakers

A total of six speakers (five women, one man) were analyzed from archival sources. Four of the recordings came from interviews conducted by the Dictionary of American Regional English (DARE) project. The DARE fieldworkers selected interviewees who were native to the area, making these informants fairly reliable sources of Chicago English. The remaining two speakers came from radio interviews with Chicagoans conducted during the 1970s and 1980s by radio host Studs Terkel; these interviews were gathered from a digitized archive made available to the public on the website of the Chicago History Museum (CHM). During the interviews, speakers talked about a range of topics including work, travel, Chicago's neighborhoods, life during the Great Depression, and race relations in Chicago. All of the speakers were white Chicagoans; in the case of DARE speakers, this information is documented in the printed dictionary, and for the CHM speakers, this information was revealed through the course of the interview. In selecting the CHM speakers, I was careful to exclude any speakers who did not explicitly say that they were born and raised in Chicago. Their demographic information is summarized in Table 2; pseudonyms are used for all.

Speaker	Birth year	Interview year and source	Location	Sex	Occupation
Willie	1891	1969 (DARE)	Winnetka (north suburbs)	F	Architect
Dorothy	1891	1966 (DARE)	Chicago (south side)	M	Teacher
Helen	1894	1969 (DARE)	South Holland (south suburbs)	F	Teacher
Eleanor	circa 1909	1971 (CHM)	Chicago (unknown)	F	Teacher
Shirley	1918	late 1980s (CHM)	Chicago (south side)	F	Teacher
Lucy	1919	1970 (DARE)	Chicago (north side) and Evanston (north suburb)	F	Teacher

Table 2: Speaker demographic information from archived recordings.

4.2 Token Selection and Acoustic Analysis

Words containing stressed tokens of all of the major vowels of English in a variety of allophonic contexts were extracted from speech. At least five tokens of each vowel were measured. For the vowels /æ/ and /ah/, however, approximately 20 tokens were extracted from each interview in order to sample a wide range of allophonic environments. An exception is Helen, whose interview was shorter and yielded only 13 and 8 measurable tokens of /æ/ and /ah/, respectively. The DARE interviews included a short reading passage ("Arthur the Rat"), and some of the tokens were drawn from this passage. For Lenore, the speaker who was interviewed in person, tokens were extracted both from spontaneous speech and from the reading of a word list.

Single-point synchronous measurements were taken. Vowels were measured according to guidelines set out by LAB. In general, measurements were taken at the point that best represented the central tendency of the vowel, usually the maximum F1, or the middle of a steady state of F1. In cases where the central tendency was movement inward from a front or rear peripheral nucleus, a point of inflection in F2 served as the locus of measurement. For /æ/, it was frequently the case

that the point of inflection in F2 came after the F1 nucleus steady state; in these cases, the measurement was taken at the highest F2 point that occurred within the F1 steady state. This was done in order to maximally capture the effect of /æ/-raising, as reflected in the vowel's steady-state F1 value. For /æ/ alone, an additional measurement was taken approximately 25 ms before the end of the vowel in order to measure the endpoint of the vowel's trajectory. In some cases, /æ/ was articulated as a short vowel with no obvious nucleus/glide distinction; despite the lack of a glide, these second measurements were still taken.

Tokens of /æ/ were separated into four categories, according to the conditioning environment of the following segment: 1) nasal, as in *hand*, *family*; 2) velar, as in *bag*, *back*; 3) alveopalatal fricatives, as in *crash*, *Ashland*; 4) elsewhere. Alveopalatal fricatives were isolated because of some speakers' tendency to insert a front glide following the vowel nucleus. Pre-lateral tokens (e.g., *pal*, *alley*) were excluded from the analysis, because of the known tendency for laterals to inhibit tensing.

4.3 Normalization

Measurements are normalized in order to minimize variation in formant frequencies attributable to factors of vocal tract size. Data were normalized using the speaker-extrinsic normalization formula with TELSUR's G, or the logarithmic grand mean of all TELSUR participants. This formula allows for a direct comparison to the results reported in LAB. The computation was carried out in the NORM online vowel normalization and plotting suite.

5 Results

Individual vowel plots for all six of the archived speakers are presented in Figures 3–8. Phoneme symbols follow the notation described in Labov (1994:160–166). For /æ/, squares represent the mean nucleus measurement, and the arrow endpoint represents the mean glide measurement. The four conditioning environments are represented separately: /æ_n/ represents pre-nasal, /æ_g/ pre-velar, /æ_S/ pre-alveopalatal fricative [ʃ], and /æ/ elsewhere. In some cases, /æ_S/ is absent from the vowel plot: for some speakers no tokens were produced.

The earliest speakers are Willie (Figure 3) and Dorothy (Figure 4), both born in 1891. Willie appears to be the most conservative; his /æ/ tokens show very little distance between the position of the nucleus and the glide, indicating that the modern inglide is absent from his speech. There is no evidence of raising, even by the conservative standard set by Chicago men. His /ah/ is moderately fronted, clustering with /aw/ and /ay/. Dorothy's /æ/s are similarly not raised, although there is an increase in F2 relative to Willie. This movement along the F2 dimension may be indicative of tensing, likely a precursor to raising. Dorothy's pre-alveopalatal tokens contain a front glide, which is particularly strong in two of the four tokens analyzed, such that *crash* is articulated with a phonetic [ɛ']. Although Willie's /æ_S/ tokens show a slight front glide, his tokens are essentially short vowels. The mean F2 of Dorothy's /ah/ is the lowest of all speakers, although she shows a wide range of F2s. In fact, some of her tokens are fronted past central position; the words *not*, *odd*, and *bottom* are all around 1560 Hz. Helen (Figure 5), born in 1894, has the most fronted /ah/ of all the archival speakers. Her /æ/, however, is similar to Dorothy's: not raised, although it is perhaps showing signs of tensing. Helen's and Dorothy's vowel plots lend support to the ordering of /ah/ > /æ/, as both speakers show /ah/-fronting, but neither shows /æ/-raising.

Unlike the early speakers, the late speakers exhibit not only /æ/ tensing, but raising. Eleanor's /æ/ shows evidence of a weak alveopalatal front glide (Figure 6). Her /æ/ nucleus is fronter, and about equal in height to /e/; she is probably the earliest-born speaker to show unambiguous /æ/-raising. She lacks the /æ_n/ advantage seen in most modern Chicago speakers. Her fronting of /ah/ is complete. Shirley's /æ/ is higher than /e/ and quite tense, as reflected in the high F2 value (Figure 7). Importantly, her pre-alveopalatals are ingliding, making her the earliest-born Chicagoan to exhibit the modern inglide in all environments. She is also the only speaker from the sample to show a later stage of the NCS, the backing of /e/. Her /e/ is positioned just over the nucleus of /ah/.

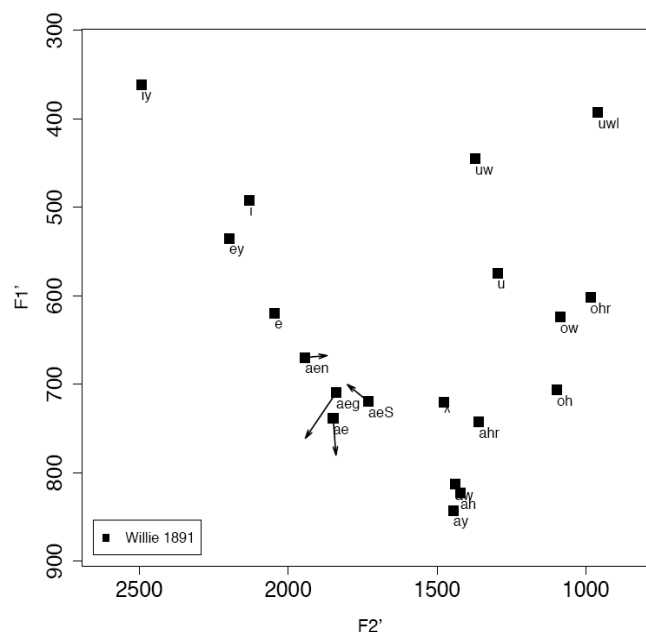


Figure 3: Mean formant frequencies for Willie (normalized).

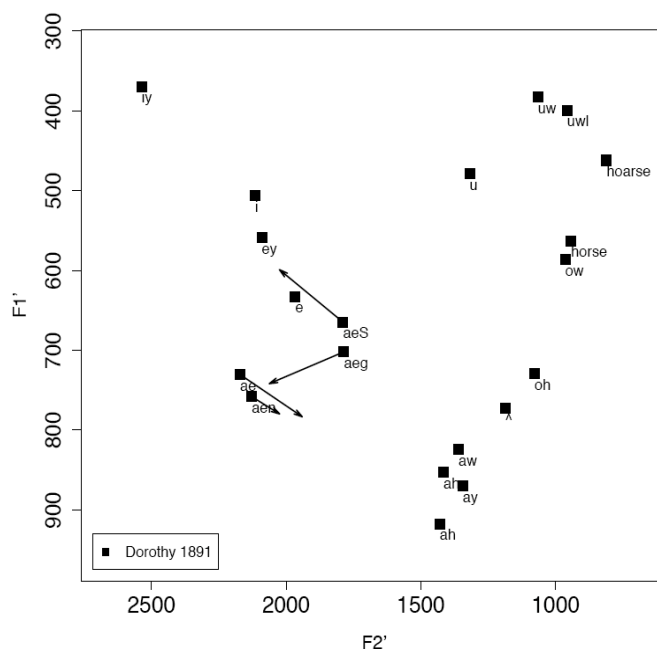


Figure 4: Mean formant frequencies for Dorothy (normalized).

Shirley's backed /e/ may be counterevidence to LAB's claim that only the first two stages of the NCS were active in the 1960s. Since she is the only speaker in the sample to exhibit backed /e/, it is unclear whether this is a general pattern found among her age cohort. It is also not known whether she adopted the community's development later in life, which would serve as an example of Sankoff and Blondeau's (2007) notion of lifespan change. Lucy's /æ/ is very strongly raised, with all environments ingliding, and with an advantage for pre-nasal tokens (Figure 8). Her /ah/ is moderately fronted.

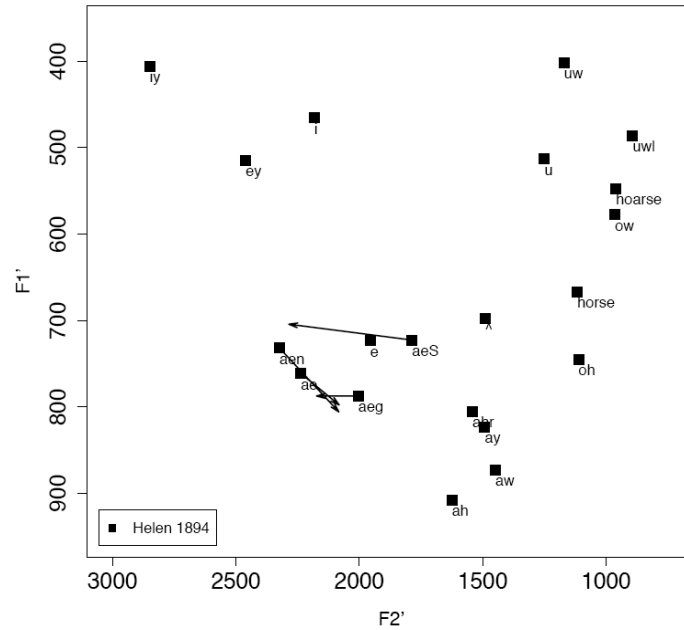


Figure 5: Mean formant frequencies for Helen (normalized).

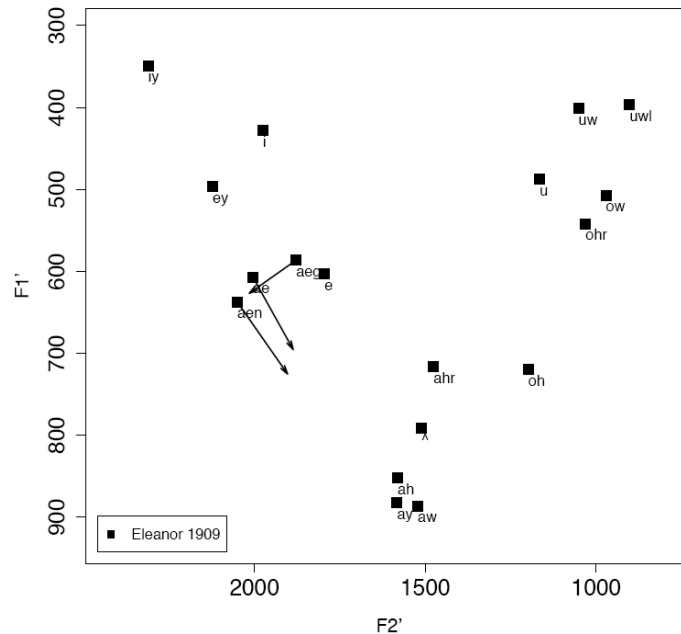


Figure 6: Mean formant frequencies for Eleanor (normalized).

The conditioning of /æ/ before the alveopalatal fricative is a surprising finding for the Inland North; it is totally absent from modern Chicago speech. Of course, even if these speakers are deemed to be representative of Chicago speech, we still do not know whether this variant is particular to Chicago, or reflective of early Inland Northern speech in general. Thomas (2001:83) notes that before /ʃ/ and /ʒ/, /æ/ is frequently pronounced with a front upglide (as [æe]) in the speech of Central Ohioans born before 1930. This pronunciation was not limited to the Midland, however. In the *Pronunciation of English in the Atlantic States*, Kurath and McDavid (1961) note the presence of an upglide before *ashes* and *bag* in the speech of (mainly) elderly informants from Connecticut and New Hampshire. For example, an elderly, educated male informant from

Litchfield, Connecticut (aged 75 in 1931), has an upglide in *bag* and *ashes* but not *half*, *glass*, or *aunt*. A similar pronunciation is found for *bag* in the speech of an elderly, educated woman from Concord, New Hampshire (aged 70 in 1932). Chicago's early settlers came primarily from New England; it is not surprising then, that they might have brought this pronunciation with them. Sometime after 1920, however, this pronunciation seems to have died out, just as it did in Central Ohio. Curiously, the upglide is absent from the speech of PEAS informants from Upstate New York, at the eastern end of the Inland North boundary. It is unknown whether Chicago would be unique among Inland Northern cities in its retention of what could be a relic form from New England and/or the Midland.

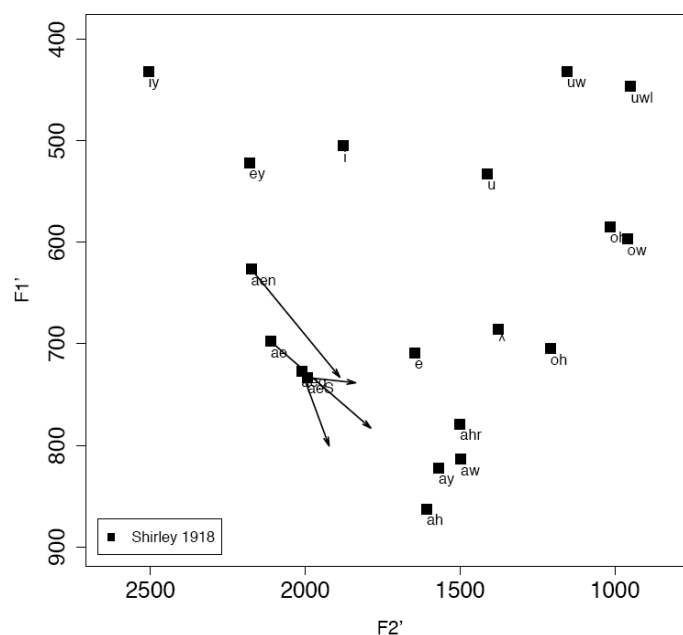


Figure 7: Mean formant frequencies for Shirley (normalized).

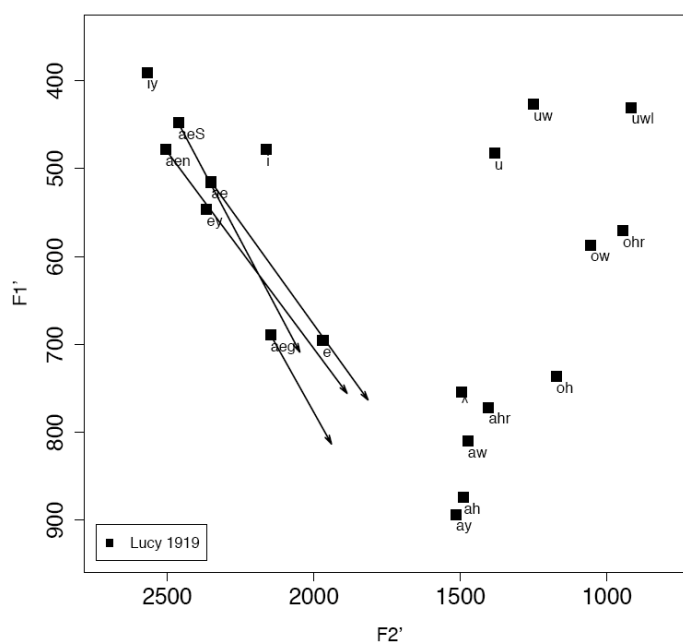


Figure 8: Mean formant frequencies for Lucy (normalized).

Briefly, a few more observations beyond the NCS are worth mentioning. First, two of the speakers (Dorothy and Helen) maintain a distinction between the vowels in *horse* and *hoarse*. The remaining speakers have merged these vowels, as do all of today's native Chicago English speakers. The phonemic distinction apparently disappeared around the first half of the 20th century (see also Pederson 1965). The merger of these two vowels in a far back position may be a precursor to a more recent development, the backing of /ahr/ 'car,' a development in apparent time recently documented by McCarthy (2007). Second, all six of the archival speakers show a conservative position of /uw/ 'boot.' LAB show /uw/-fronting to be a widespread phenomenon across North America. Lenore (born 1937), who was interviewed as part of the larger study, has a fronter /uw/ than all of the archival speakers. This early fronting indicates that it might have started as early as the 1930s or 1940s. It continues today as a development in apparent time in Chicago (McCarthy 2007, 2009).

6 Conclusion

In this paper I have set out to address two questions. The first question concerns the ordering of shifting events. Some generalizations can be made on this point based on the six speakers analyzed in the previous section. Given 1500 Hz as a target for /ah/, there is evidence for its fronting in the earliest-born speakers, particularly Helen (born 1894). Furthermore, there appears to be a development in the degree of /æ/-raising from the earliest speakers to the latest ones. Only the speakers born in the 1910s show raising beyond /e/. Together, these observations suggest the ordering /ah/ > /æ/, consistent with the proposal of Thomas (2001). It should be noted, however, that another possible analysis cannot be ruled out. It could be that /æ/'s tensing and fronting preceded /ah/'s fronting, and /ah/'s fronting in turn preceded /æ/'s raising. This analysis is entirely consistent with the data presented, as both Dorothy and Helen's /æ/s are quite fronted, though not particularly raised. In sum, the claim that the *raising* of /æ/ preceded the fronting of /ah/ is not supported; the *fronting* of /æ/ and /ah/, however, are most likely the earliest developments in the chronology of the NCS.

The second question concerns the age of the NCS. The rapid change along the F1 dimension between the oldest speakers and the youngest suggests a development in the pronunciation of /æ/ between the point at which the oldest speakers acquired Chicago English, and the point at which the younger ones did. Growing up in the 1920s, Lucy shows radical /æ/-raising; growing up earlier, in the 1910s and 1920s, Eleanor shows only slight raising. Tentatively, and assuming they didn't merely late-adopt these community changes, we can estimate that /æ/-raising began around the 1920s. This raising appears to have happened very rapidly; this may partially explain why apparent-time studies and real-time studies do not necessarily come to the same conclusions regarding their ordering. The tensing/fronting of /æ/, however, is probably much older than its raising. The age of /ah/ cannot be estimated based on the present data because it is present in the very oldest speakers, who acquired Chicago English circa 1900.

On a final note, if the conclusions I have drawn are right, the age of the NCS renders implausible Van Herk's (2008) argument that the earliest stages of the NCS constitute a response to the migration of African Americans between 1916 and the 1960s. While the claim that the Great Migration triggered or caused the NCS is not supported, it could be the case that the NCS was *intensified* by whites' desire to differentiate themselves from African Americans. The raising of /æ/ from its already-tensed position, for example, could have intensified for the social motivations Van Herk discusses.

To conclude, the real-time data examined here suggests that the NCS is old, probably older than estimated by apparent-time studies. And considering the lack of apparent-time change, the earliest developments may have run their course, at least in Chicago.

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