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Abstract

This article examines the status of the Northern Cities Shift (NCS) as a change in progress in Chicago, the largest city within the Inland North. The progression of the NCS in Chicago and its social implementation have never been fully explored. Labov, Ash, and Boberg (2006) report that, for the Inland North as a whole, the NCS remains a vigorous change in progress. The present study finds only limited support for ongoing shifting within Chicago. Acoustic data from thirty-six speakers indicate that none of the three earliest shifting events, BAT, BOT, and BOUGHT, continues to shift in the expected direction in apparent time. Instead, BOT shows a marginal trend toward reversal of the NCS pattern. The three remaining vowels, BET, BIT, and BUT, shift in the expected direction. However, extensive phonetic overlap between BUT and BOUGHT is problematic for the NCS model as a single, integrated chain shift.

Keywords

Northern Cities Shift, vowels, sound change, American English

One of the major findings of the *Atlas of North American English* (henceforth ANAE; Labov, Ash, & Boberg 2006) is that the broad, regional patterns that distinguish dialects are holding steady. The authors note that "the diversity of regional dialects in North America is not diminishing, but is increasing over time" (2006:304)—a surprising observation given the widespread exposure to broadcast English via the mass media. One instance of this increasing diversity is the continued development of the Northern Cities Shift (NCS), a series of integrated vowel movements taking place in the Inland North region of the United States. Out of the five vowels that are implicated in the NCS, ANAE reports that four show evidence of an ongoing change in progress in the Inland North region as a whole (Labov, Ash, & Boberg 2006:211), lending support to the claim for increasing divergence.

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The largest of the Northern cities is Chicago, with a population of 9.7 million people; it far eclipses the next largest city, Detroit, at 5.4 million. As the region's largest city, it might be expected to have the most advanced version of the Shift: following the logic of Callary (1975), the larger the city, the more advanced the change. Yet the status of the NCS within the largest of the Northern Cities, Chicago, remains unelaborated. Since the initial documentation by Labov, Yaeger, and Steiner (1972), the development of the NCS has been the subject of numerous studies within the state of Michigan (including, e.g., Eckert 1988, 1989, 1991, 2000; Ito 1999; Evans 2001; Gordon 2001; Roeder 2006). Herndobler (1977) is the only major study that directly examines the vowels involved in the Shift within Chicago, and even that includes just two of them, BAT and BOT.[1]

The elaboration of the Shift in Chicago is especially important in light of recent studies showing substantial variation in how individual cities and subregions realize their particular versions of regional chain shifts. To take an example, the Canadian Shift has been variably defined as involving either the lowering of BET and BIT (Clarke, Elms, & Youssef 1995) or their backing (Boberg 2005). The Southern United States similarly shows considerable interregional variation, to the extent that individual locales differ as to how extensively they adopt elements of the Southern Shift (e.g., Fridland 1999; Baranowski 2007). The major goal of this article, therefore, is to shed light on Chicago's participation in the Shift. Does Chicago's vowel system match the broad, regional pattern described in ANAE? In particular, is there evidence for an ongoing change in progress for the vowels involved in the NCS, as indicated by ANAE? The second major goal is to examine the role of social factors: what role do age, sex, and education level play in the realization of Chicago's vowels?

The Inland North

The Region as a Whole

The Inland North distinguishes itself from the rest of North America on the basis of phonemic inventory: the distinction between BOT and BOUGHT is maintained, whereas in the West and large swaths of the Midland this distinction is lost. The Inland North has a single phoneme, represented by BAT. Mid-Atlantic dialects, on the other hand, show a lexical split with CAT-class words lax and CAST-class words tense. Labov (1991, 1994) and Labov, Ash, and Boberg (2006) argue that the tensing of this single BAT phoneme is the first stage of the shift.[2] The resulting phonetic vacancy in low-front position allowed BOT to move forward, thereby maximizing its margin of security relative to the other low-back vowel, BOUGHT, in accordance with the principles of chain shifting (Martinet 1955; Labov 1994). The advancing of BOT allowed BOUGHT to fill the low-back or low-central position. Subsequently, BET, BUT, and BIT all moved backward, with BUT occupying the midback position vacated by BOUGHT. The changes involved in the NCS, adapted from Labov, Ash, and Boberg (2006), are illustrated in Figure 1.

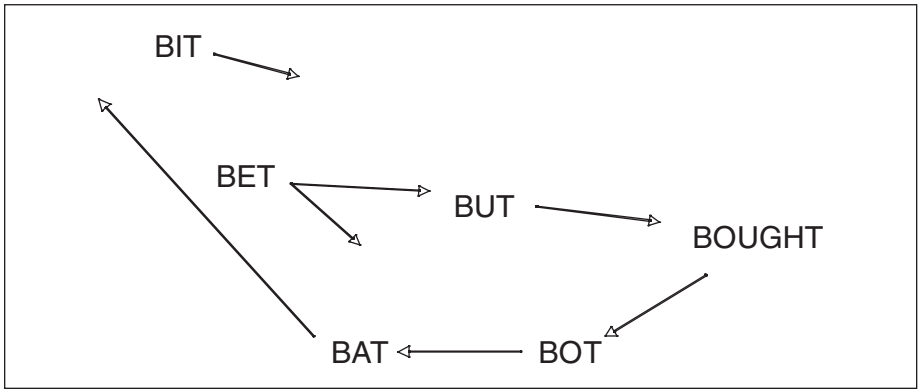

Figure 1. The Northern Cities Shift
Source: Based on Labov, Ash, and Boberg (2006).

Labov, Ash, and Boberg (2006) also report on social variables involved in the adoption of vowel shifting in the Inland North. Four of the shifting vowels show significant correlations between age and vowel position, suggesting ongoing change in apparent time in the Inland North. Of the two earliest developments, only BOT continues to shift; BAT-raising appears to have stabilized. BOUGHT shows an effect of lowering, but not fronting; BET and BUT show retraction. An effect of sex is seen for three shifting vowels: women lead in the lowering of BOUGHT and retraction of BET, and men lead in the fronting of BOT. Although BAT no longer shows movement in apparent time, women's productions are higher, suggesting stable variation according to gender. An effect of education is found for BOT, BOUGHT, BET, and BUT, such that higher education levels are correlated with decreased shifting. No effect of education is found for the earliest stage, the raising of BAT, whereas no effect of sex is found for one of the later stages, the backing of BUT. This pattern generally supports Eckert's (1989) findings that the earliest stages of the NCS in Detroit are correlated with gender and the later ones with social class. The latest stage in the NCS, the shifting of BIT, shows no movement in apparent time at the regional level.

Previous Studies of Chicago English

Prior to Labov and colleagues' acoustic work, two major studies of the Chicago dialect presented impressionistic data. Pederson's (1965) study of the Chicagoland area provides a broad view of the Chicago phonological system as a whole, but it fails to document any of the characteristic vowel shifting that is now associated with the NCS. Herndobler's (1977) study of the (South)east side of Chicago analyzes a range of lexical, morphosyntactic, and phonological variables, among which are two of the shifting vowels, BAT and BOT. Her sample included eighty-two speakers from three age groups. Herndobler reports the highest percentage of innovative forms (raised BAT and fronted BOT) in the middle group, rather than the youngest. This finding is surprising,

given the assumption that the NCS is a change in progress; the expected result would show younger speakers adopting more innovative forms. Herndobler also finds an effect of sex: similar to ANAE, women's productions of BAT are more advanced than men's, but men's productions of BOT are more advanced.

The vowel spaces of individual Chicago speakers are also reported in larger-scale studies of the Inland North. Labov, Yaeger, and Steiner (1972) and Labov (1994) present evidence from speakers interviewed between 1968 and 1988 that supports the ordering of the NCS as presented in Figure 1, although questions still remain regarding the directionality of the shifting of short vowels BET and BIT. Labov (1994:187) reports acoustic data from a speaker named Carol M., a teenager who was interviewed in the late 1960s. Carol exemplifies the early stages of shifting in Chicago: she displays a raised BAT that approximates the height of BET and a radically fronted BOT that reaches low-front position (phonetically [æ]). Carol's BET is lowered toward BOT. Debbie, reported in Labov (1994:120), shows BET retraction to the point that her production of her own name is misheard as *Dubbie*. The final stage, the backing of BUT, emerges later, during a 1988 interview with a young woman named Jackie H. Just as BET potentially moves in more than one direction, BIT was found to be moving in different directions for two of the Chicago women: backward but not downward for Jackie H. and downward for Carol M. Similarly, Gordon (2001) notes that multiple directions are attested for BET and BIT shifting in Michigan.

In addition to the NCS vowels, the pronunciation of BAR is also examined.[3] Fronted BAR is a traditional feature to the Inland North region (e.g., Thomas 2001:77), perhaps because of its relationship to fronted BOT (Labov, Ash, & Boberg 2006:111).

Method

Speakers

Data come from sociolinguistic interviews with thirty-six Chicagoans born between 1927 and 1988. Their demographic information, including age (represented as birth year), sex, occupation, and highest level of education attained, is listed in Table 1; the distribution of these social variables is shown in Table 2. The speakers were white Americans of various ethnic backgrounds (primarily Irish, Polish, German, Italian, and various combinations of these) who were born and raised in the greater Chicago area and whose parents were also born and raised in the area. They therefore met a rigid standard of localness. English was reported as the language of the home during the participants' childhood; none of the participants were raised in a bilingual or multilingual household. Speakers were recruited via personal connections, which then led to "snowball" sampling; the first thirty-six people who met these standards were included in the sample.

Although the purpose of this study was not to focus on the speech of one particular neighborhood, the majority of participants came from the South and Southwest Sides of the city and suburbs: Bridgeport and Mount Greenwood in the city and Oak Lawn

Table 1. Demographic Characteristics of Individual Speakers

	Birth year	Sex	Education	Occupation	Interview context
1	1988	F	University	Student	F
2	1987	M	University	Student	T
3	1984	M	University	Student	T
4	1984	M	High school	Construction management	T
5	1983	F	High school	Car wash attendant/student	F
6	1983	M	University	House painter/business owner	F
7	1981	M	High school	Casino cashier	F
8	1981	M	High school	Office manager/artist	T
9	1981	M	High school	House painter	F
10	1980	F	High school	Hair stylist	F
11	1979	F	University	Academic coordinator	F
12	1979	F	University	Teacher	F
13	1975	F	University	Administrative assistant	T
14	1975	F	High school	Medical technician	F
15	1975	F	High school	Day care worker	F
16	1974	M	University	Account manager	T
17	1973	F	University	Television producer	F
18	1969	F	High school	Homemaker	F
19	1969	M	University	Plumber	T
20	1968	F	University	Nurse	F
21	1965	F	High school	Police officer	T
22	1964	F	University	Teacher	T
23	1964	M	High school	Electrician/business owner	T
24	1961	M	High school	Business owner/local politician	T
25	1961	M	High school	Construction company owner	F
26	1960	F	High school	Administrative assistant	F
27	1953	F	University	HR management specialist	F
28	1950	F	University	Teacher	F
29	1947	F	University	Teacher	F
30	1946	M	University	Teacher	F
31	1944	F	High school	Travel agent	F
32	1943	F	High school	Retired bank teller	T
33	1943	M	High school	Retired electronic technician	F
34	1938	M	University	Retired jewelry buyer	T
35	1936	F	High school	Registered nurse	F
36	1927	M	High school	Retired business owner	T

F = face to face; T = telephone.

Table 2. Demographic Breakdown of Speakers by Age, Sex, and Education Level

	Younger than 35		35–50		Older than 50	
	M	F	M	F	M	F
College	3	4	2	3	2	3
High school	4	4	3	3	2	3

and Orland Park in the suburbs. One feature that these communities have in common is their relatively low rate of in-migration from other states; as an indicator of out-of-state in-migration, I examined the percentage of population that had been born in another state, as measured by the 2000 U.S. census and reported by the Metro Chicago Information Center (2010). For each of these communities, the rate was under 10 percent, ranging from 6.7 percent in Mount Greenwood to 9.4 percent in Bridgeport. This relatively low rate contrasts markedly with a number of North Side communities, such as the city neighborhood of Lincoln Park, in which 43.4 percent of the population reported having been born in another state (Metro Chicago Information Center 2010). I did not deliberately avoid sampling from these more "mobile" communities, but they were perhaps naturally excluded as a result of the requirement that participants have two locally born parents. This relatively low rate of out-of-state immigration made it less likely that speakers would have engaged in regular interaction with non–Inland Northern varieties of American English.

University education was defined as having completed a bachelor's degree or being enrolled in a bachelor's degree program at the time of the interview. In general, speakers with academic degrees beyond a bachelor's degree were excluded (although participants with applied graduate degrees, such as a master's in business or education, were retained).

Interview

All sociolinguistic interviews were conducted by the same native Chicagoan, either in person or by telephone; the context of each interview (telephone vs. face to face) is included in Table 1. First, participants provided demographic information about themselves and their parents. Next, participants read a word list, which was designed to capture careful, monitored speech. Finally, the interview continued with conversation intended to elicit spontaneous speech: participants were asked questions about their views on city life, their jobs, their hobbies, national and local politics, and so on. They were also asked what they knew about the "Chicago accent," and what this might involve. Interviews lasted between thirty minutes and an hour. Approximately half were recorded on a Marantz PMD 221 analog cassette recorder; they were then digitized using Kay Elemetrics's Computerized Speech Lab hardware and software at a sampling rate of 22050 Hz. The other half were recorded on a Marantz PMD 670 digital solid state recorder, at a sampling rate of 44.1 KHz. In-person interviews were recorded using an Audiotechnica AT 803b lavalier microphone, which was pinned to the participant's clothing. Telephone interviews were conducted on land-line phones

and recorded using a telephone recording device from Radio Shack.[4] Interviews were conducted in two phases: the first in 2005–2006 and the second in 2008.

The analysis presented here is based exclusively on word list measurements, in the mode of Peterson and Barney (1952) and Hillenbrand et al. (1995). The use of a word list provides a consistent set of data for each speaker, thereby tightly controlling for the factor of phonological environment. Of course, a word list provides a view of careful, highly monitored speech in which speakers might be expected to avoid vernacular forms. It should be noted, however, that a preliminary comparison across speech styles (word list vs. spontaneous speech) in a subset of speakers suggests that shifted BAT and BOT are generally not avoided in word list style; it was therefore anticipated that the word list would provide a reliable measure of these vowels. Nevertheless, the use of a word list makes the comparison to ANAE somewhat less direct, as ANAE data were drawn from a variety of methods, including spontaneous interview speech.

Materials

The word list consisted of 160 common English words, representing all of the stressed vowels of English. Among these were the NCS vowels BAT, BOT, BOUGHT, BET, BUT, and BIT, in addition to BAR. Each vowel appeared in a variety of allophonic environments. Prenasal and prelateral tokens were excluded from analysis. Allophonic effects are not the focus of this study, but they were controlled for by having each subject read an identical set of words.[5] Words appeared in random order in the list. The list of words analyzed is included in the appendix.

Acoustic Analysis

The recordings were analyzed using Praat for Macintosh (Version 4.6.21). For all 160 words, single-point synchronous F1 and F2 measurements were taken from the vowel's nucleus according to guidelines set out in Labov, Ash, and Boberg (2006). The 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 vowels that were expected to shift only on the front–back dimension, data on F2 are presented; these vowels were BOT, BUT, and BAR. The remaining vowels were potentially expected to shift along two dimensions, both height and frontness; for these, both F1 and F2 are presented. The analysis presented here therefore includes the following measurements as dependent variables:

- The F1 and F2 of BAT
- The F2 of BOT
- The F1 and F2 of BOUGHT
- The F2 of BUT
- The F1 and F2 of BET and BIT
- The F2 of BAR

Table 3. Mean Formant Values (Normalized) and Standard Deviation for All Dependent Variables

Measure	*M*	*SD*
F1 BAT	547.5	64.1
F2 BAT	1856.0	127.0
F2 BOT	1364.8	68.2
F1 BOUGHT	660.8	60.0
F2 BOUGHT	1086.3	89.5
F1 BET	671.9	76.6
F2 BET	1584.7	91.6
F2 BUT	1229.8	74.0
F1 BIT	488.1	41.7
F2 BIT	1713.4	118.1
F2 BAR	1249.0	78.6

Each speaker's mean F1 and F2 values were then calculated for each vowel class, and the statistical analysis was conducted using those means. Data were normalized within the data set collected for this project to minimize interspeaker frequency differences because of differences in vocal tract size. Normalization was completed using Labov's G method (using NORM, the online normalization suite; Thomas & Kendall 2007), which allows for direct comparison to ANAE.

Normalized means for each vowel were statistically analyzed using SPSS Version 16 for Macintosh (with p set at .05 for all tests). Dependent variables were the acoustic measures described above; independent variables were age group, sex, and education level of the participants.

Overview of the Chicago Vowel System

The mean F1 and F2 values across all speakers are given in Table 3 and plotted in Figure 2. These mean values satisfy all three of the structural criteria for diagnosing the NCS, as proposed by Labov, Ash, and Boberg (2006), indicating that Chicago does, overall, participate in the Shift. The first of these criteria, the EQ measure, states that BAT is both higher and fronter than BET as a result of the raising of BAT; this criterion is met for Chicago as a whole. The second criterion, the ED measure, states that the F2 distance between BOT and BET is less than 375 Hz; this criterion is met, as the mean difference is 220 Hz, indicating that the combined effect of BOT fronting and BET backing brings them into close proximity. The third criterion, the UD measure, states that BUT is farther back than BOT as a combined result of BUT backing and BOT fronting; this criterion is also met.

In comparing Figure 2 to Figure 1, however, two differences emerge. First, although BOT is somewhat fronted and the UD criterion is satisfied, the mean value of Chicago's

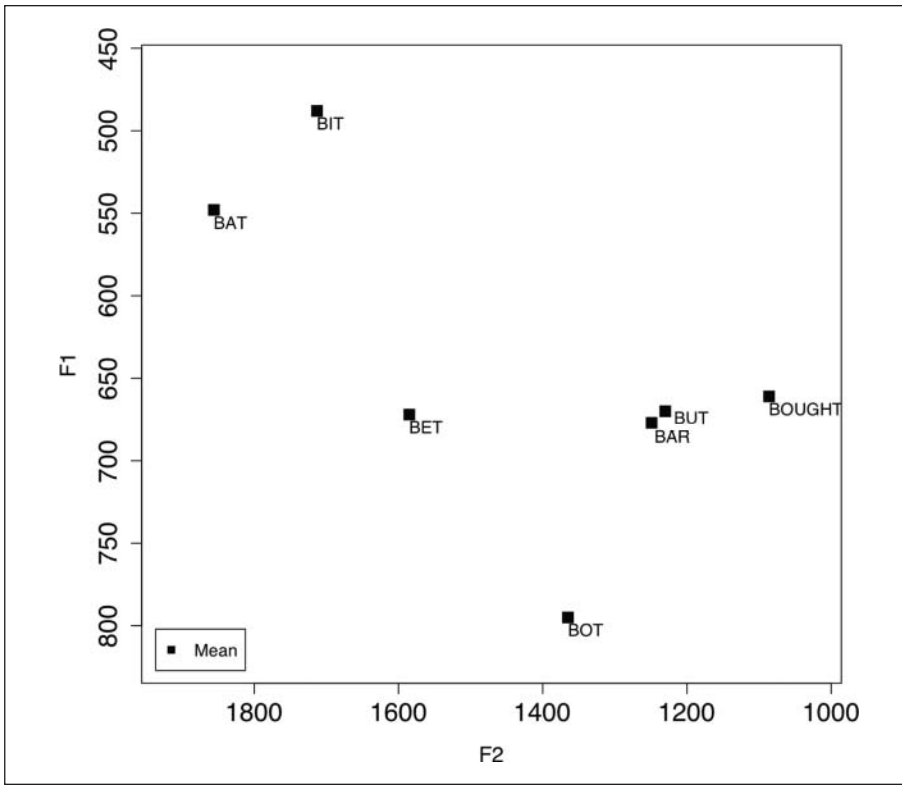

Figure 2. Mean vowel space for all speakers (normalized)

BOT does not reach low-front position. ANAE finds that normalized vowel spaces have a midpoint at approximately 1550 Hz; the mean F2 value for BOT in Chicago is 1365 Hz, or nearly 200 Hz lower than what is expected. Second, BOUGHT remains a back vowel. The mean F1 and F2 values of 661 Hz and 1086 Hz make Chicago's BOUGHT a solidly low-midback vowel, contrary to its portrayal as a low-central vowel in Figure 1. Although Chicago qualifies as a Northern city based on these criteria, the conservative nature of BOT and BOUGHT indicates that, on the whole, Chicago's version of the NCS is somewhat different from the predicted pattern based on Figure 1.[6] The following section examines the status of ongoing shifting, as measured by the analysis of acoustic data and speaker age.

Results and Analysis

The first step in the statistical analysis was to see whether the data showed an overall effect of age group that might indicate the presence of a change in progress—in other

Table 4. Analysis of Covariance of Age Group with Sex and Education Held Constant

Measure	*F*	Significance
F1 BAT	0.018	.982
F2 BAT	0.147	.246
F2 BOT	3.05	.062
F1 BOUGHT	2.78	.077
F2 BOUGHT	1.16	.326
F1 BET	4.774	.016
F2 BET	9.814	.000
F2 BUT	4.452	.020
F1 BIT	4.473	.020
F2 BIT	7.759	.002
F2 BAR	5.754	.007

words, to test whether there was evidence that the NCS is (still) active in Chicago. To this end, a multivariate analysis of covariance (MANCOVA) was conducted with age group as the fixed factor and sex and education held constant as covariates. The multivariate effect of age is significant, Pillai's Trace = 0.918, $F(20, 46) = 1.953$, $p = .031$.[7] This result indicates that there is a significant relationship between age and the formant values independent of the other factors, which makes it appropriate to test for which dependent variables might be responsible for this effect.

An ANCOVA analysis, with the same design as the MANCOVA previously described, was conducted to determine which of the measures shows a correlation with age group. The results are displayed in Table 4. Age group has a significant independent effect on the following variables: both the F1 and F2 of BET and BIT and the F2 of BUT and BAR. In Chicago, both BET and BIT appear to be lowering and backing, whereas ANAE reports only backing of BET along the F2 dimension in the Inland North and no significant apparent time movement for BIT. The results for BUT converge with those of ANAE, where backing toward BOUGHT was found. Marginal results were obtained for F2 of BOT, indicating backing, and F1 BOUGHT, indicating lowering; ANAE reports significant results for the Inland North on both of these measures. The backing of BAR may be related to the marginal trend of BOT backing; the scatterplot in Figure 3 shows a negative correlation between birth year and the F2 of these two nuclei. Both measures of BAT fail to show any significant correlation with age; this finding is consistent with ANAE.

To more closely examine the generational differences in each of the vowels, a multivariate MANOVA was carried out to test the effect of age group without the covariates of sex and education held constant. This analysis also shows a significant effect of age group, Pillai's Trace = 1.07, $F(24, 46) = 2.206$, $p = .01$, consistent with the findings of the MANCOVA. A set of ANOVAs was performed on each dependent variable, with the same design as the MANOVA. The results, shown in Table 5, are consistent with the results of the ANCOVAs, in that they identify the same age correlations as significant.

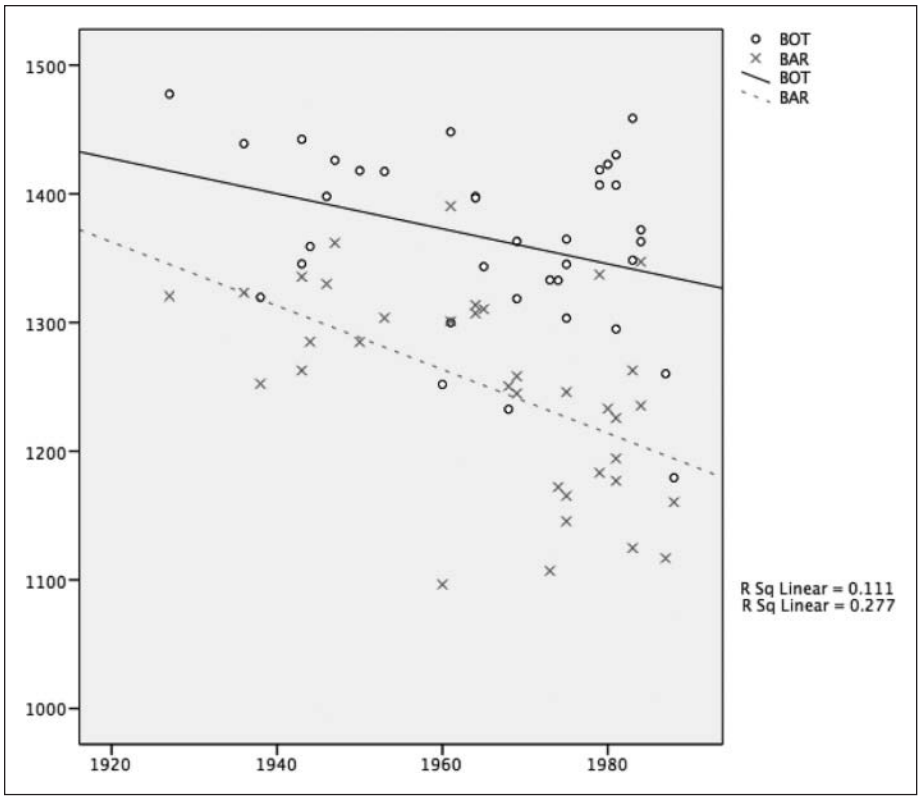

Figure 3. Scatterplot between birth year (horizontal axis) and F2 of BOT and BAR (vertical axis)

Table 5. Analysis of Variance of Age Group with F1 and F2 of Vowels

Measure	*F*	Significance
F1 BAT	0.040	.961
F2 BAT	1.056	.359
F2 BOT	2.864	.071
F1 BOUGHT	2.437	.103
F2 BOUGHT	1.277	.292
F1 BET	4.076	.026
F2 BET	8.317	.001
F2 BUT	4.174	.024
F1 BIT	4.794	.015
F2 BIT	7.706	.002
F2 BAR	5.618	.008

Table 6. Descriptive Statistics (Mean and Standard Deviation) for Significant (and Marginal, for F2 of BOT) Age Results, Based on the ANOVA Results Reported in Table 5 (1 = *oldest*, 2 = *middle*, 3 = *youngest*)

Measure	Age group	*M*	*SD*
F2 BOT	1	1404	49
	2	1338	63
	3	1358	74
F1 BET	1	619	46
	2	684	82
	3	698	75
F2 BET	1	1669	74
	2	1553	104
	3	1552	51
F2 BUT	1	1283	70
	2	1209	55
	3	1210	75
F1 BIT	1	457	22
	2	498	43
	3	502	41
F2 BIT	1	1812	69
	2	1642	145
	3	1700	75
F2 BAR	1	1306	34
	2	1250	91
	3	1210	69

Following the significant results from the ANOVAs, a set of post hoc Scheffé tests for age group differences (see Table 6) was performed, the results of which are shown in Table 7.[8] As can be clearly seen, none of the differences between the middle and youngest groups are significant, suggesting that the bulk of phonetic change on these measures within Chicago took place prior to the mid-1970s. Beginning with the low front vowels BET and BIT, the oldest group differs from the youngest group on both F1 and F2 dimensions, indicating the youngest group's BET and BIT are lower and backer. It is only on the F2 dimension, indicating backness, that the middle group differs from the oldest group; this result suggests that for both vowels, backing may be an older development than lowering. This finding is inconsistent with Labov (1994:195), who proposes that the initial course of BET shifting was lowering toward [æ], which later switched to backing because of its impending overlap with BOT. The parallel result for BET and BIT is surprising, given the ANAE finding that BET shifting is an older, more established pattern. For the remaining measures, the F2 of BUT and BAR, only the oldest versus youngest group

Table 7. Post Hoc Scheffé Tests for Age Group Differences Based on Significant Age Results in the ANOVA (Group 1 = *oldest*, 2 = *middle*, 3 = *youngest*)

	Group comparisons		
Measure	1 vs. 2	1 vs. 3	2 vs. 3
F1 BET	.120	.032	.880
F2 BET	.006	.003	.999
F2 BUT	.059	.045	.999
F1 BIT	.060	.022	.959
F2 BIT	.002	.035	.361
F2 BAR	.204	.008	.369

differences are significant, indicating that the youngest group's nuclei are farther back relative to the oldest group's.

Sex and Education Level as Social Correlates

To test the effect of sex and education on the NCS, a MANCOVA was conducted for each factor, holding the others constant as covariates. The result for sex is significant, Wilks's Lambda = .316, $F(12, 21) = 3.76$, $p = .04$. The result for education is not, Wilks's Lambda = .504, $F(12, 21) = 1.72$, $p = .134$. The NCS therefore appears to vary according to the sex of the speaker, while education appears not to play a very active role, with one possible exception. Although the effect of education was not significant in the multivariate test, one of the univariate measures, the F2 of BAT, returns a significant result for education ($F = 10.93$, $p = .002$). University education appears to be negatively correlated with BAT fronting or tensing (high school $M = 1904$, $SD = 100$ vs. university $M = 1802$, $SD = 135$). ANAE reports no effect of education on BAT shifting in the Inland North. The education results do not align with ANAE results for the other vowels; a negative effect of education was found for the four other shifting vowels (BOT, BOUGHT, BET, and BUT).[9]

To more closely examine the effect of sex on the NCS vowels, an ANCOVA was carried out with sex as the fixed factor and age and education held constant. The results are shown in Table 8. Three of these measures show a significant effect of sex: F1 and F2 of BAT and F2 of BET. The descriptive statistics for these three measures are shown in Table 9. The F2 of BET did show evidence of a change in progress, and women lead in its retraction; this finding is consistent with ANAE. Although previous studies report a correlation BETween BOT fronting and male sex in the Inland North (e.g., ANAE; Herndobler 1977), such a correlation was not found here. These data also show that women have a higher, tenser BAT than men; this vowel does not indicate a significant correlation with age, suggesting a state of stable variation correlated to sex of the speaker. The correlation between female sex and raised BAT is supported by previous studies of the Inland North, from the early studies of Labov, Yaeger, and Steiner (1972)

Table 8. Analysis of Covariance of Sex with F1 and F2 of Vowels, with Age Group, Sex, and Education Held Constant

Measure	*F*	Significance
F1 BAT	13.60	.001
F2 BAT	11.40	.002
F2 BOT	0.86	.361
F1 BOUGHT	1.77	.193
F2 BOUGHT	0.54	.468
F1 BET	2.61	.116
F2 BET	4.58	.040
F2 BUT	1.11	.301
F1 BIT	0.35	.561
F2 BIT	0.47	.496
F2 BAR	0.86	.361

and Herndobler (1977) to more recent work (e.g., ANAE; Gordon 2001), indicating a consistent pattern that has existed for at least a few generations. It should be noted that the results for sex and education for BAT raising are somewhat puzzling when viewed together. In general, women lead in the adoption of forms that are overtly prestigious (Labov 1990); yet if shifted BAT were truly prestigious, one would expect a positive correlation between BAT shifting and education level. The relationship between BAT raising and these demographic characteristics is merely a starting point for explaining the attested variation. Many questions remain surrounding the social perception of BAT raising, some of which may be answered by a more detailed examination across a range of speech styles.

Finally, a set of ANOVAs was conducted to test for interaction effects between each pair of independent variables. Because of the low number of speakers per cell, three-way interactions were not examined. Of these analyses, only Sex × College returned significant results, which were found for the F2 of BET ($F = 5.61$, $p = .026$), the F1 of BIT ($F = 4.60$, $p = .026$), and the F2 of BIT ($F = 5.69$, $p = .025$). The descriptive statistics for these interactions are shown in Table 10. For the F2 of both BET and BIT, among women, university education is negatively correlated with backing. Among men, this relationship is reversed: university education is positively correlated with backing. For the F1 of BIT, among women, university education is negatively correlated with lowering; the reverse relationship holds for men. For all three of these measures, a parallel result is found: university education is associated with less shifting among women but more shifting among men. The women's pattern can be explained by the emulation of a nonlocal standard among the university-educated group. However, it is not immediately clear why men would show the opposite effect. For the sake of comparison, a summary of ANAE's and the present study's results is shown in Table 11.

Table 9. Descriptive Statistics (Mean and Standard Deviation) for Significant Sex Effects, Based on the ANCOVA Results Reported in Table 8

Measure	Sex	*M*	*SD*
F1 BAT	Women	518	62
	Men	584	45
F2 BAT	Women	1905	111
	Men	1795	122
F2 BET	Women	1562	84
	Men	1613	95

Table 10. Descriptive Statistics (Mean and Standard Deviation) of Significant Interactions between Sex and Education

		Men		Women	
Measure	Education	*M*	*SD*	*M*	*SD*
F2 BET	High school	1640	91	1543	98
	University	1578	96	1581	66
F1 BIT	High school	480	39	494	32
	University	511	44	474	48
F2 BIT	High school	1764	83	1686	136
	University	1678	150	1720	101

Discussion

The first goal of this article was to consider whether the view of the NCS in Chicago presented here is consistent with the broad, regional view presented in ANAE. In some respects, the Chicago data do support this view. The average vowel space, shown in Figure 2, confirms that Chicago, on the whole, participates in the NCS. Both sets of data confirm that BAT shifting is no longer a change in progress, and instead this vowel shows stable variation (which is linked to sex and education level). The vowels BET and BIT were shown to be shifting in more than one direction, both down and back, which is consistent with the model in Figure 1. Recall, however, that ANAE finds that BET, but not BIT, shows movement at the regional level and that its primary direction is backing, a change that implicates F2 alone. On this dimension—the occurrence of bidirectional shifting of BET and BIT—Chicago's NCS looks even more like Figure 1 than the results reported in ANAE. Bidirectional shifting of these vowels is likewise observed in Michigan (Gordon 2001). It is worth noting, however, that the retraction of BET and BIT is observed outside of the Inland North, meaning that the NCS is not the only trigger for their shifting. Similar retraction patterns are reported

Table 11. Summary of Comparisons between *Atlas of North American English* (ANAE) and Present Study

	ANAE			Chicago		
	Direction of change	Sex	Education	Direction of change	Sex	Education
BAT	None (stable)	Female (raising)	—	None (stable)	Female (fronting, raising)	Nonuniversity (fronting)
BOT	Fronting	Male	Nonuniversity	Marginal backing		—
BOUGHT	Lowering	Female	Nonuniversity	Marginal lowering		—
BET	Backing	Female	Nonuniversity	Backing, lowering	Female (backing)	—
BUT	Backing	—	Nonuniversity	Backing	—	—
BIT	None (stable)	—	—	Backing, lowering	—	—

for Canada (e.g., De Decker & Mackenzie 2000; Boberg 2005) as well as Northern California (Eckert 2008), two regions with very different phonological systems from that of the Inland North.

At the same time, there are several important points on which the Chicago view differs from ANAE. In the former, both BOT and BOUGHT are conservatively positioned relative to their portrayal in Figure 1. Furthermore, while ANAE found evidence for an ongoing change in progress for four of the NCS vowels in the Inland North (BOT, BOUGHT, BET, BUT), the Chicago data suggest ongoing change for only three: BET, BIT, and BUT. BAT, BOT, and BOUGHT are apparently stable. Of the presumed early changes, the Chicago data and ANAE agree on the stability of BAT; BOT and BOUGHT, however, appear to be very active in ANAE but stable in Chicago. The stability of these early shifting events in Chicago, considering that the Chicago data are more recent than ANAE's (which were collected during the 1990s) is easily reconciled with ANAE's results.

However, one finding that is difficult to reconcile with ANAE is the marginal trend toward BOT backing, which may be related to the robust backing of BAR. Although the nonsignificant result for BOT must be interpreted with caution, it could signal the extension of a trend found at the eastern end of the Inland North region in Upstate New York, where the merger between the phonemes BOT and BOUGHT appears to be expanding (Dinkin 2009). An impending low-back merger in any Inland Northern community would have major phonological implications since the maintenance of this particular phonemic contrast is assumed to be a precondition for the NCS. Of course, before any conclusions about the future of the NCS can be drawn, future research will need to reexamine the position of BOT and its relationship to BOUGHT in Chicago as well as in other Inland Northern communities.

The lack of clear evidence for BOUGHT shifting in Chicago is perhaps tied to the conservative positioning (and possible backing) of BOT. To avoid merger, BOUGHT must remain unshifted to avoid collision with BOT. Strong BOUGHT shifting is found, for example, in Gordon's (2001) sample of Michigan speakers, who shifted BOUGHT more frequently than any other NCS vowel and who also showed continued BOT fronting. The position of BOUGHT, therefore, is simply not consistent across the Inland North, and it may be partially explained by the degree of BOT fronting within a community. The assumption that Chicago would lead in the extent of its shifting because of its size, however, is simply not supported overall (see note 6). It may be the case that large cities adopt regional changes prior to smaller cities (e.g., BIT shifting), but this does not necessarily mean that large cities show the most extreme version of shifting.

Regarding the positioning of BOUGHT, Labov, Ash, and Boberg (2006:197) note that although a significant trend toward lowering was found across the Inland North, it was not found for the larger North region, leading the authors to conclude that "the shift of BOUGHT is not as tightly integrated into the NCS as its other elements." Of course, if BOUGHT is not (fully) integrated into the NCS, serious problems arise for the chain shift model proposed in Figure 1. The lack of BOUGHT shifting highlights the fact that regional chain shift patterns are not necessarily universal within individual locales. Furthermore, the stability of BOUGHT is especially problematic given the robust backing of BUT in Chicago. These two vowels, as part of a single chain shift, should demonstrate Labov's "basic chain-shifting principle": "When the phonetic space between two members of a subsystem is increased by the shifting of one member (the leaving element), the other member will shift its phonetic position to fill that space (the entering element)" (Labov 1994:184). In the context of a drag chain in which the exiting precedes the entering, we would expect to see evidence of the leaving of BOUGHT first, followed by the entering of BUT. However, the evidence supports only the entering of BUT. Could the resulting phonetic overlap mean an incipient merger of pairs like *cut* and *caught*? This is not likely because BOUGHT is generally classified as a long, ingliding vowel, whereas BUT is a short one (Labov, Ash, & Boberg 2006:13-14). Furthermore, evidence indicates that length can play a contrastive role when elements in a chain shift overlap in phonetic space; this was shown for the overlap between BET and BOT in the Inland North (Labov & Baranowski 2006). A larger question takes aim at the core of the chain-shifting principle: To what extent are vowels that maintain systematic phonetic differences in length and/or trajectory, and that belong to separate phonological subsystems, able to influence one another? If it is indeed the case that these two vowels are getting closer, but remaining distinct phonemes, the Chicago pattern poses a serious problem for the NCS model as a single, integrated chain shift. The status of BUT and BOUGHT, and the cues speakers use to distinguish them, clearly warrants closer examination.

The second goal of this article was to examine the social embedding of the NCS in Chicago. Although three of the NCS vowels, plus BAR, were found to be shifting in apparent time, only BET appears to be led by women. This is surprising, given the well-documented generalization that women lead in change from below (e.g., Labov 1990). Among high-school-educated Chicagoans, women lead in BET and BIT shifting, as was

shown by the significant interaction effects. It is not clear why this pattern does not extend to the university-educated speakers. One speculative answer is that since Chicago, as the largest city in the region, attracts people from all across North America, the university-educated simply have more opportunity to come into contact with speakers with a range of American dialects. Through this contact, women in particular come to emulate nonlocal speech. The negative effect of education extends to BAT shifting, but unlike BET or BIT shifting, this effect was found to be independent of sex. A contact-based explanation for the negative effect of education seems plausible, especially for BAT; seven of the speakers offered the pronunciation of this vowel as an instance of the "Chicago accent," and most of them had learned about the particularity of this vowel while attending university.[10]

Though BAT is a stable variable, the results confirm the Inland Northern correlation between female sex and raising. Herndobler's (1977:147) Chicago study found this pattern at a time when BAT was presumably undergoing change; she suspects that raised BAT "has been taken as citified and sophisticated" by urban women in Chicago, which led to their adoption of the variant. This claim complements Callary's (1975) observation that shifting within Northern Illinois is positively correlated with the town's population. Eckert (2000:224) argues, however, that raised BAT in the Detroit area, as an established and widespread change, no longer acts as an "urban symbol." The negative correlation between BAT raising and education may indicate a shift in perspective, such that educated, mobile speakers may orient themselves to a nonlocal norm. It is likely, therefore, that a change in social meaning has taken place since the 1970s, when Herndobler and Callary first related BAT raising to urban character.

Conclusion

This study examined the status of the vowels involved in the NCS in Chicago and found evidence for ongoing shifting as a change in progress in three vowels (BET, BUT, BIT). The three other vowels (BAT, BOT, BOUGHT) do not show clear evidence of shifting in the expected direction. The prerhotic vowel BAR, which was previously fronted because of its association with fronted BOT, shows strong evidence of backing in apparent time. The changes in progress that are outlined in this study only partially replicate the broad, regional chain shift outlined by ANAE. While certain patterns converge—specifically the stability of BAT and the backing of BET and BUT—the overall picture of the Inland North is complicated by the patterns observed in Chicago. The possible trend toward the backing of BOT and the phonetic overlap between BUT and BOUGHT are unexpected based on the predictions of the NCS chain shift model. These observations reinforce the need for a closer examination of chain shifting at the local level, as the anticipated patterns may not be universal. The role of sex and education as social variables was also examined, and it was found that women lead in one of the shifting variables (BET) and one of the stable variables (BAT); education negatively affects the shifting of BAT. For BAT in particular, a closer look at speech style and the perception of the local variant across social groups is the next step toward explaining its variation.

Appendix

Word List Tokens Included in the Analysis

BAT: bad, cast, sack, sad, sat, stab, staff, tap, bag, tag
BOT: cot, dot, sob, stock, top
BOUGHT: caught, paw, saw, soft, stalk, toss
BET: bed, dead, deaf, deck, set, step, test
BUT: cup, cut, duck, dust, stud, tough, tub
BIT: did, kiss, rib, sick, sit, stiff, tip
BAR: bar, car, dark, harp, start, tar

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Notes

1. The keywords adopted in Yaeger-Dror and Thomas (2010:9) are used throughout this article to represent vowel classes. BOT is used to represent the merged /o~ah/ phoneme (*cot*, *father*).
2. The ordering of the two earliest events in the Northern Cities Shift (NCS) is somewhat controversial. Thomas (2001), for example, presents acoustic data from speakers born in the late nineteenth century that suggest that BOT fronting predates BAT raising. For a review of the evidence on chronological ordering, see Gordon (2001). For an acoustic study of early NCS speakers, see McCarthy (2009).
3. The author would like to acknowledge Malcah Yaeger-Dror and William Labov for pointing out the importance of BAR within the overall scheme of the Inland Northern dialect region. It is in part because of their comments that I have included this variable in the list of dependent variables.
4. The incorporation of telephone interviews into the data set alongside face-to-face interviews is a confound and is acknowledged as a methodological flaw, given the effects that the medium of telephone communication can have on F1 values (see Künzel 2001). The

interviewer did not perceive any substantial differences in the level of comfort between telephone and face-to-face interviews.

5. The effect of following velars on BAT raising is not discussed here, though it is worth noting that two prevelar BAT tokens were included in the measurements. See Bauer and Parker (2008) and Purnell (2010) for a discussion.
6. Labov (1994:185) notes that "following the logic of Callary (1975), we would expect to find the Shift in its most advanced form there." In Callary's (1975:168) analysis of the distribution of raised BAT throughout Northern Illinois, he notes that "as community size increases, vowel height increases proportionately." Extending the analogy from "largest city within Illinois" to "largest city within the Inland North," Chicago should, indeed, have the most extreme version of the shift of all the Northern Cities.
7. The Box's M test of equality of covariance matrices was significant ($M = 167.63$, $p = .006$), indicating a nonequivalence of variance across levels of the dependent variable. Under such a condition, Pillai's Trace is an appropriate multivariate statistic (Meyers, Gamst, & Guarino 2006:378). When Box's *M* test is nonsignificant, Wilks's Lambda is reported here instead.
8. For each ANOVA, a Levene's test of equality of error variances was conducted; none of the results was significant. Therefore, the Scheffé test, which assumes equality of variances, was determined to be an appropriate post hoc test.
9. As an anonymous reviewer points out, it is possible that the difference between the *Atlas of North American English* and Chicago results for BAT results from the different elicitation methods. University-educated speakers may be more likely to avoid shifted BAT while reading, especially if the local variant enters awareness and becomes stigmatized (see the discussion section). It was hoped that the interviewer's (Chicago) accent might help counter any effects of correction toward a nonlocal standard.
10. An awareness of BAT shifting was not expected, given the consistent view in the literature that NCS speakers believe that they have no accent. Niedzielski and Preston (2003:263) note that the NCS "is a classic example of change from below . . . in general, residents of those areas where it is taking place (or has taken place) have no awareness of its progress." Gordon (2004:298) agrees with this assessment, and notes further that "the lack of salience of these very distinctive vowel shifts among the native speakers of the Inland North may be related to the traditional position of the dialect as a kind of national norm in the form of 'General American.'" The knowledge that speakers have of the NCS is an area that needs further exploration.

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