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The Acoustic Vowel Space of Central Minnesota English in Light of the Northern Cities Shift

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THE ACOUSTIC VOWEL SPACE OF CENTRAL MINNESOTA ENGLISH IN LIGHT OF THE NORTHERN CITIES SHIFT

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ABSTRACT

English vowels have been in a state of flux since the 1400s (Fromkin et al. 2014:342). Around that time mid tense vowels shifted upward and high tense vowels became diphthongs. This is known as the Great Vowel Shift (GVS). English vowels have not stopped their restlessness ever since. In 1972 Labov and a group of sociolinguists "discovered" another shift that had been taking place in the cities of the Great Lakes region of the US. This shift has been nicknamed the "Northern Cities Shifts" (NCS) because it was first noticed in Detroit, Rochester, and Syracuse. Gordon (2006:109) writes that NCS has now spread well beyond its epicenter and is moving across other cities in the upper Midwest and even to rural areas as far west as Minnesota. The goal of this paper is to determine whether or not, and to what extent NCS has reached Central Minnesota, a semi-rural area that is culturally conservative, demographically, and ethnically fairly homogeneous. To this effect, a total of 1,122 vowel tokens produced by 12 male and 22 female Central Minnesotans are studied. The data are compared and contrasted acoustically with the vowels of General American English (GAE) in Peterson and Barney (1952) and those of NCS areas in Labov et al. (2006).

1.0 Introduction

Since Koffi (2013) has already provided the demographic and sociolinguistic backgrounds of Central Minnesota English (CMNE), there is no need to repeat the same information here. Readers who are not familiar with Central Minnesota are invited to refer to the said article. Suffice it to say that the area under investigation is not heavily urbanized. Its biggest city, St. Cloud, has less than 70,000 people. According to Google Map, downtown St. Cloud is only about 67 miles away from downtown Minneapolis, and 75 miles away from St. Paul, the capital of the state of Minnesota. The Central Minnesota area in Figure 1 is divided into East Central and West Central. However, this distinction is not relevant for this study because the participants were selected from the Greater Central Minnesota area.

Figure 1: The Map of Minnesota[1]

The fact that Central Minnesota is both rural and located in close proximity to the metropolises of Minneapolis and St. Paul makes it an interesting sociolinguistic area because NCS started as a big city phenomenon and is now spreading into rural areas. Labov et al. (2006:21-22) limited their study of vowels for the *Atlas of North American English* (ANAE) to "Zones of Influence" and "Central Cities." This is a socio-geographical designation for areas that exert economic, demographic, and cultural influence over other areas. Central Minnesota is technically not a zone of influence area. As a result, the vowels from this area were not recorded for the ANAE study. However, the location of Central Minnesota in the vicinity of the Twin Cities makes it the beneficiary of influences emanating from there. From a sociolinguistic point of view, if NCS has reached Minneapolis and St. Paul, one would expect its effects to be felt in Central Minnesota. Unfortunately, to date there has not been a sociophonetic study devoted to NCS in the Twin Cities. Consequently, we have no data with which to compare the different pronunciation patterns observed in Central Minnesota. This explains why the data from Central Minnesota English (CMNE) are being compared directly with the NCS data found in Labov et al. (2006).[2]

2.0 Participants Profile and Data Collection

A total of 34 Central Minnesota speakers, 12 males and 22 females, participated in this study. During the times of the data collection, from 2005 to 2012, the participants were all enrolled in my undergraduate Laboratory Phonology or my graduate sociolinguistics courses at St. Cloud State University. The vowel data obtained from

[1] Retrieved from Google images on March 13, 2014.

[2] The authors encourage researchers in other parts of the country to compare local data to their findings saying, "The Atlas is designed to produce an overall view of the regional patterns that will guide and stimulate local studies to provide a more detailed view of the sociolinguistic and geographic variation in a given area," p. 3.

these courses are very large. They include acoustic measurements of L1 and L2 Englishes. However, for this study the data that are used are those provided by students who identified themselves as having lived in Central Minnesota for the first 17 years of their lives. Labov et al. (2013:30, 39) consider age 17 to be the age when a talker's dialect is fully stabilized and unlikely to undergo significant changes. The participants recorded themselves saying the words <*heed, hid, hayed, head, had, hod, hawed, hoed, hood, who'd, hud*> three times.[3] It is the same list of words that Peterson and Barney (1952) used in their seminal paper on the acoustics of American vowels. Some 40 years later, Hillenbrand et al. (1995) replicated their methodology to study Midwest vowels. The findings reported in this study are based on 1,122 vowel samples (34 x 11 x 3). The phonetic data analyses are done with PRAAT, while the plotting is done through Norm.

3.0 Gender and the Diffusion of NCS

It has been reported by many authorities that gender is a pertinent variable in the spread of NCS. Nearly all the contributors to *American Voices: How Dialects Differ from Coast to Coast* make this claim one way or another. Kaiser's (2011:24) extensive review of the literature makes the same point. She summarizes the relevance of gender in the spread of NCS as follows: "As expected, women have usually been found to display the fullest adoption of the NCS before men do (Eckert, 1989b; Herndobler, 1977; Gordon 1997)." For this reason, most of the analysis focuses on female speech. Male data, though provided, will be referred to here and there only if there is a significant gender difference in rate of adoption of an NCS pattern:

Words		fleece	kit	face	dress	trap	lot	thought	goat	foot	goose	strut
Vowels		[i]	[ɪ]	[e]	[ɛ]	[æ]	[ɑ]	[ɔ]	[o]	[ʊ]	[u]	[ʌ]
GAE	F1	270	390	NA	530	660	730	570	NA	440	300	640
GAE	F2	2290	1990	NA	1840	1720	1090	840	NA	1020	870	1190
CMNE	F1	289	542	434	577	709	753	699	600	516	485	616
CMNE	F2	2298	1963	2185	1781	1737	1289	1296	1464	1467	1541	1365
NCS[4]	F1	381	450	487	709	564	956	868	548	578	450	760
NCS	F2	2313	1741	2215	1585	2097	1579	1368	1027	1283	1005	1216

Table 1: Male Vowel Measurements

Words		fleece	kit	face	dress	trap	lot	thought	goat	foot	goose	strut
Vowels		[i]	[ɪ]	[e]	[ɛ]	[æ]	[ɑ]	[ɔ]	[o]	[ʊ]	[u]	[ʌ]
GAE	F1	310	430	NA	610	860	850	590	NA	470	370	500
GAE	F2	2790	2480	NA	2330	2050	1220	920	NA	1160	950	1640
CMNE	F1	385	573	508	754	848	855	851	569	626	417	743
CMNE	F2	2609	2232	2487	2028	1951	1462	1420	1117	1519	1230	1643
NCS	F1	381	450	487	709	564	956	868	548	578	450	760
NCS	F2	2313	1741	2215	1585	2097	1579	1368	1027	1283	1005	1216

Table 2: Female Vowel Measurements

[3] The word <heard> is excluded from this study because [ɚ] is not a phoneme in English.

[4] The F1 and F2 formants of NCS vowels are identical for males and females because they are gender normalized (Labov et al. 2006:39-40).

3.1 Historical Overview

The most well known acoustic phonetic study of American English is Peterson and Barney (1952). Labov et al. (2006: 8, 37) borrowed from their methodology to insure that their findings are valid and reliable:

> Problems of reliability and validity were a major issue in planning the Telesur survey. In the early stages, strenuous efforts were made to increase the reliability of impressionistic transcriptions, especially when the analysts' judgments of "same" and "different" differed from the subject's judgments. It was finally concluded that acoustic analysis must be added to impressionistic judgments to obtain satisfactory reliability levels, … No means of instrumental analysis can be considered reliable without some degree of auditory confirmation.

The telephone survey (Telesur) data that led to the publication of ANAE initially involved 805 participants. However, this number dwindled down to 762. In the final analysis, the data reported in ANAE are based on 134,000 vowel tokens produced by 439 participants. The acoustic vowel space of NCS in Figure 2 represents the plot of the mean of F1 and F2 formants that I obtained from the descriptions of the various color-coded schemes found on pages 77-116 of the *Atlas of North American English: Phonetics, Phonology and Sound Change*. Other plots of NCS vowels are found in Ladefoged and Johnson (2015:235) and Ladefoged and Disner (2012:45). However, theirs are difficult to use to interpret the spread of NCS because they fail to provide the necessary acoustic measurements on which their plots are based. Furthermore, Figure 2 aligns better with Labov's (2007:373) and Labov et al.'s (2006:187-205) accounts of the six stages of NCS (see the quote in 4.0).

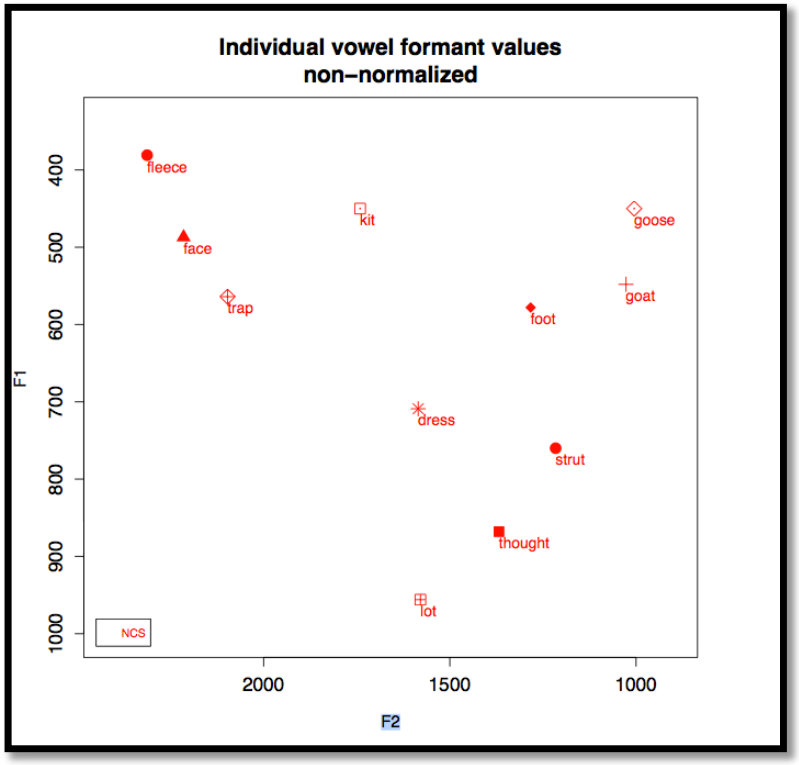

Figure 2:The Acoustic Vowel Space of NCS

Words are used instead of IPA symbols in the vowel quadrant in Figure 2 because there is a growing trend among phoneticians to use Wells' lexical set. Ladefoged and Johnson (2015:89-90, 103) explain that this new approach is better because it affords researchers who speak different dialects of English a way of referring to vowel sounds without having to pronounce them. Each word in Well's lexical set contains the vowel sound it represents.

4.0 The Modus Operandi of NCS

Labov (2007:373) provides a succinct description of the vowel sounds involved in NCS, their trajectories, and their overall significance to the acoustic vowel space of the residents of the Great Lakes cities where the shifts are happening:

> The Northern Cities Shift (NCS) is a rotation of six vowels … NCS was initiated by the general tensing and raising of the short-*a*[5] to mid and high position. The absence of vowel tokens in low front position led to a shift of two neighboring vowel classes into that vacant space: short-*o* shifted forward and short-*e* shifted downward. This was followed by the lowering and fronting of long open-*o*. In later developments, short-*e* shifted back towards / ʌ /, and / ʌ / moved back to the position formerly occupied by long open-*o* (/oh/), while / i / moved down and back. The NCS has developed incrementally in all cities in the Inland North, including Syracuse, Rochester, Buffalo, Cleveland, Toledo, Detroit, Flint, Grand

[5] The short-*a* corresponds to [æ] in IPA, short-*e* to [ɛ], short-o to [ɔ], long open-*o* to [ɑ]. Also, in Labov et al.'s notation /i/ corresponds to [ɪ], and /u/ to [ʊ].

> Rapids, Kalamazoo, Gary, Chicago, Kenosha, Milwaukee, and Madison. The most remarkable fact about the NCS is its uniform distribution across the vast area surrounding the Great Lakes.

Labov et al. (2006:121) summarize pictorially the modus operandi of NCS with the diagram in Figure 3:

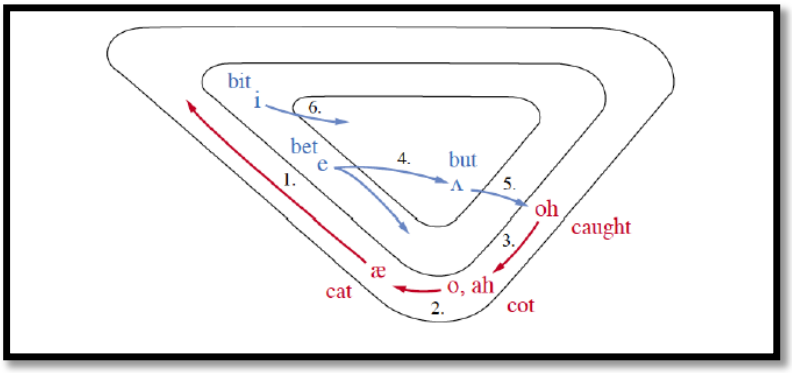

Figure 3: Modus Operandi of NCS

Gordon (2006:109) describes the new areas into which NCS is spreading as follows:

> The Northern Cities Shift is heard across a broad swath of the Northern US from upstate New York throughout the Great Lakes region and westward into at least Minnesota. As its name suggests, it is most strongly rooted in large cities including Buffalo, Cleveland, Detroit, and Chicago, but it is spreading beyond the urban centers into more rural areas.

Here is how Cameron (2006:115) describes the pattern of spread of NCS:

> A curious thing about vowel shifts is their pattern of dispersion throughout the region. They spread from the major center of population to neighboring areas by jumping first to towns of intermediate size and then to smaller areas in a pattern that cultural geographers call hierarchical diffusion.

These quotes are relevant to our study for two reasons. First, Morgan includes Minnesota among the areas into which NCS is spreading westwardly. Secondly, Cameron provides an excellent insight into how NCS spreads.

To determine whether or not, and to what extent, NCS has spread to Central Minnesota, we need to plot the F1 and F2 formant information in Table 2 inside the same acoustic vowel space. Ladefoged and Disner (2012: 39, 44) highly recommend this method for the following reasons:

> The most useful representation of the vowels of a language is a plot showing the average values of formant one and formant two for each vowel as spoken by a group of speakers. We can also get this plot to reflect the approximate positions

> in vowels by arranging the scales appropriately. … Vowel charts provide an excellent way of comparing dialects of a language.

With this in mind, we will now compare GAE, CMNE, and NCS vowels. GAE is used as the "reference" dialect because it purports to represent the vowel system of speakers from different dialect backgrounds. Therefore, statements about how far vowels have shifted or not shifted are based on GAE. Figure 4 provides a general overview of GAE, NCS, and CMNE vowels. Subsequent vowel quadrants are presented with arrows and circles that highlight each one of the six stages in NCS.

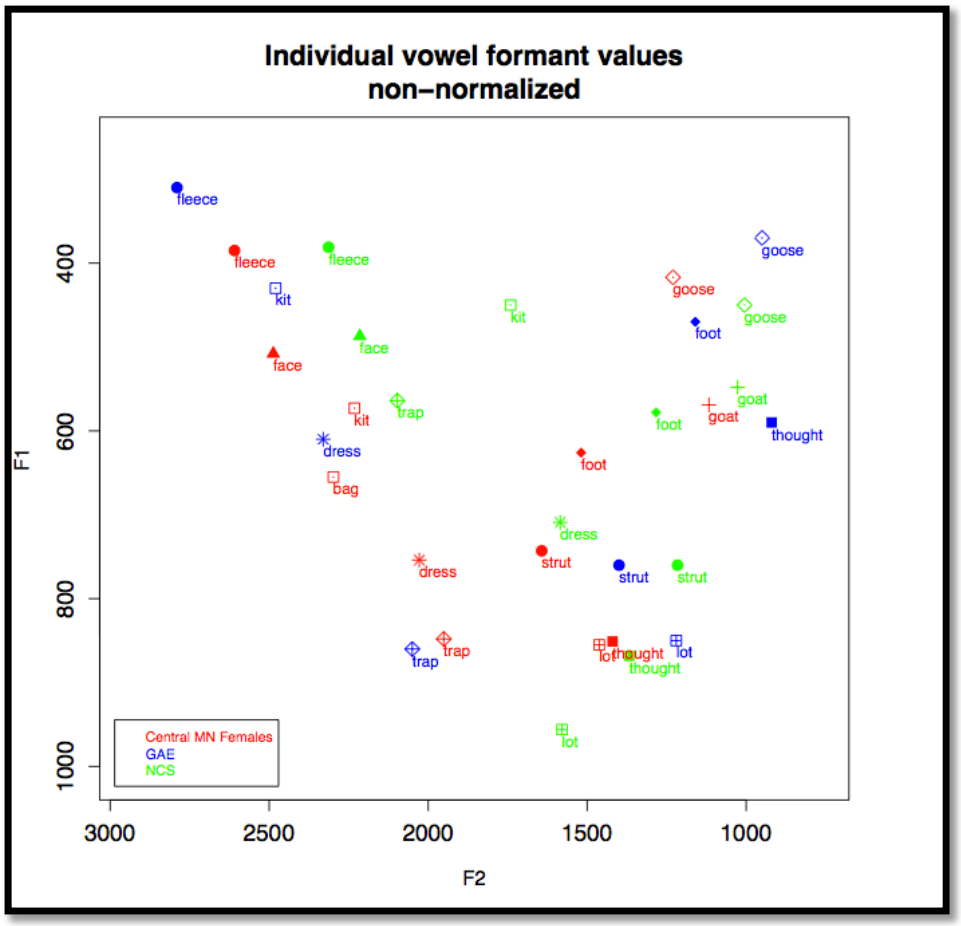

Figure 4: Comparative Acoustic Vowel Spaces

4.1 Stage 1: The Raising of the "trap" Vowel [æ]

Labov (2007:373) notes that NCS "was initiated by the general tensing and raising of the short-*a*." Thus, the vowel sound found in "trap" is said to be the trigger of the chain reaction in NCS (Labov 2006:87). The arrows in Figure 5 show that the "trap" vowel in NCS has moved up very high in relation to its counterparts in GAE and in CMNE.

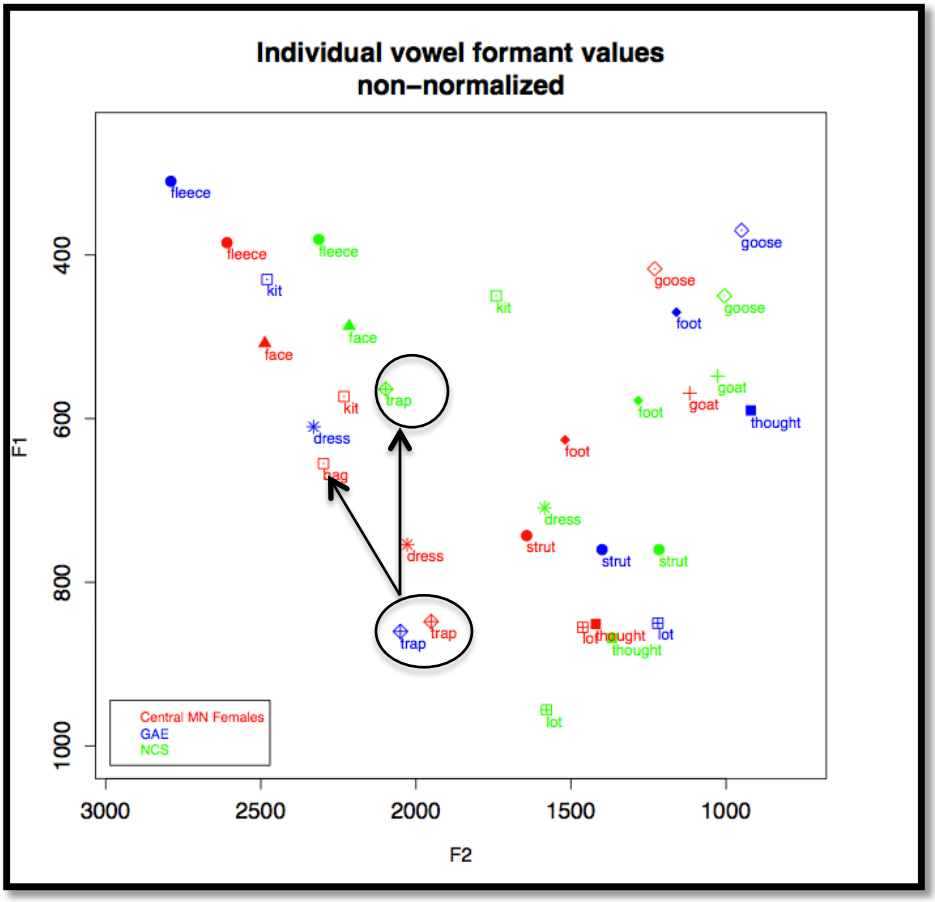

Figure 5: Stage 1-The Raising of [æ]

The F1 distance between the "trap" vowel in GAE (860 Hz) and NCS (564 Hz) is 296 Hz. The distance between the "trap" vowel in NCS and CMNE (848 Hz) is 284 Hz. Conversely, the distance between the "trap" vowel in GAE and CMNE is only 12 Hz. The "trap" vowel in CMNE has not changed in relation to its position in GAE. In other words, the raising of the "trap" vowel which triggers NCS has not yet taken place in CMNE. However, this statement needs to be qualified. The position of the "trap" vowel in a word such as <bag> produced by CMNE talkers tells a different story. We see that the "trap" vowel has risen significantly (595 Hz). It is only 31 Hz lower than the "trap" vowel in NCS. Koffi (2013:10-11) has demonstrated that when [æ] occurs immediately before [g] in a tautosyllable, that is, when [æ] and [g] belong to the same syllable, it raises significantly to such an extend that the words <*bag, hag, brag, nag, flag, Mag, sag, lag, gag, tag, Prague*> are pronounced and perceived in this region as <*beg, heg, breg, neg, fleg, Meg, seg, leg, geg, teg, Pregue*>. The phonological rule that accounts for this pronunciation is stated as follows:

$$[\ æ\ ] \rightarrow [\ ɛ\ ] /\ \_\_\_\_\_\ [+\text{cons},+\text{ velar, +voice}]$$

Dustin (2010: 80, 87) provides the acoustic data in Table 3 that helps us to quantify the extent to which the "trap" vowel has raised in Central Minnesota:

Words		heck	hag	hack
Vowels		[ɛ]	[æ]	[æ]
Male	F1	644	595	741
Male	F2	1731	1829	1712
Female	F1	788	655	927
Female	F2	2074	2298	1937

Table 3: The Raising of [æ]

When the "trap" vowel (848 Hz) occurs before [g] it raises by 253 Hz. For the "trap" to qualify as raised, Labov et al. (2006:84-85) stipulate that its F1 should be between 575 Hz and 647 Hz. The information in Table 3 shows that the "trap" vowel is indeed raised before [g] in CMNE.

Now, let's turn our attention to the raising of the "trap" vowel before [k]. In this environment, it raises by 107 Hz. In other words, the "trap" vowel raises twice as much before [g] as before [k]. Perceptually, the "trap" vowel before [k] still sounds like [æ]. However, recently, I overheard a Central Minnesota resident pronounce it almost like the vowel sound in "dress." Cameron (2006:114) reports that Chicagoans pronounce "Mack" as "Meck." It is just a matter of time before [k] pulls the "trap" vowel up higher. Once this is done, words such as <back, hack, track, flack, sack, tack> will sound like <bek, hek, trek, flek, sek, tek>. For the time being, impressionistically at least, the "trap" vowel sounds like a lax [æ].

The raising of the "trap" vowel before nasals is a *fait accompli* in CMNE. We see this even in how college educated residents of the area spell <than>. In online discussion boards and in e-mail that I receive, <than> is spelled as <then>, as in *"This chapter is easier then the previous one."* This raising can be accounted for by the following phonological rule:

$$[\text{ æ }] \rightarrow [\text{ ɛ }] / \_\_\_\_\_ \ [+\text{cons},+\text{ nasal}]$$

When Labov et al. (2006:84-85) talk about the raising of the "trap" vowel, they exclude the nasal environment because, as they put it, "the raising of / æ / before nasals is a more general phenomenon than raising before oral consonants."[6]

4.2 Stage 2: The Fronting and Lowering of the "lot" Vowel [ɑ]

The second stage in the NCS process involves two trajectories for the "lot" vowel: fronting and lowering. Let's first focus on fronting. Labov et al. (2006:200) consider that a back vowel has fronted if its F2 is higher than 1450 Hz. Table 2 shows that the F2 of the "lot" vowel in NCS areas is 1579 Hz. Figure 6 below (also Figure 2) shows that the "lot" vowel has fronted so far that it now qualifies as a "central" vowel because in the Telesur system, a normalized F2 value of 1550 Hz qualifies a vowel as "central" (Labov et al. 2006:195). The "lot" vowel has fronted by 359 Hz in relation to its counterpart in GAE (1220 Hz). This is probably the reason why Fromkin et al. (2014:207), the authors

[6] Labov et al. discuss the raising of /æ/ before nasals further on pp. 174-175.

of the tenth edition of the popular *"An Introduction to Language,"* made the ill-advised decision to classify it as a central vowel. They should not have opted for this classification because this pronunciation is not representative of the whole US. In CMNE (1462 Hz), we see that the "lot" vowel has embarked on a forward progression and moved by 242 Hz in relation to GAE. However, it has not progressed as far as its counterpart in NCS, which trails by 117 Hz.

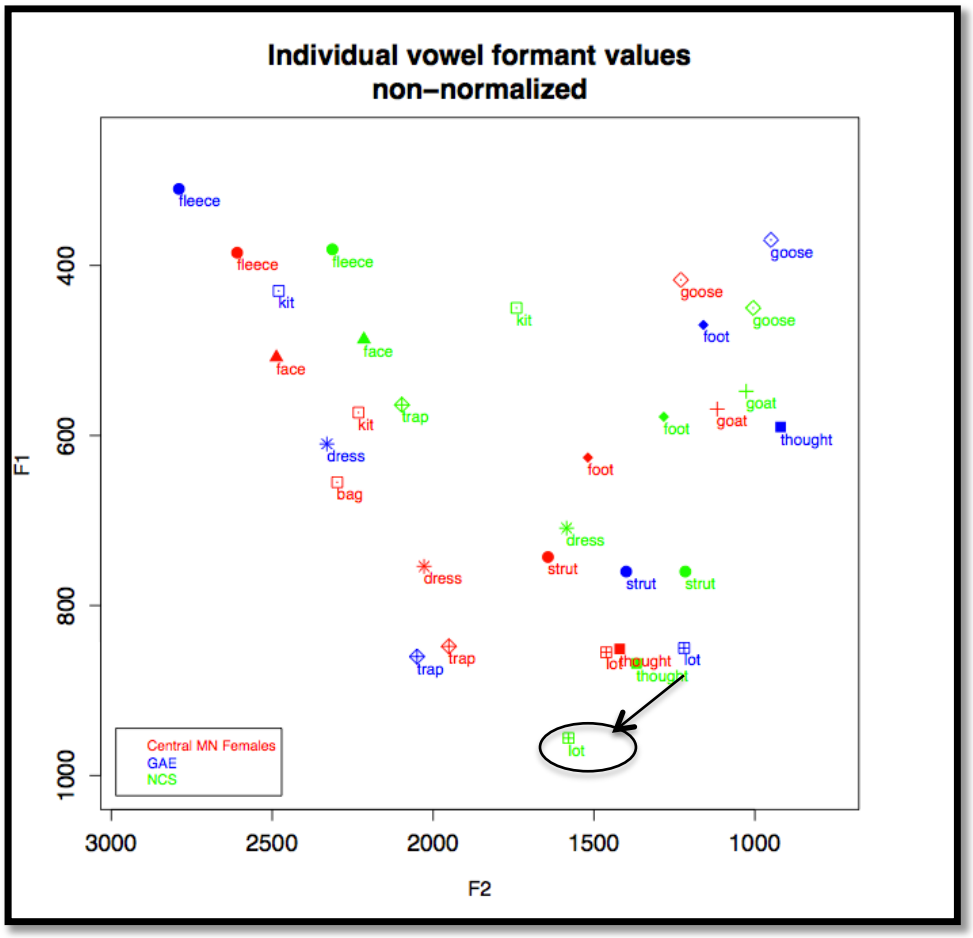

Figure 6: Stage 2-The Fronting of [ɑ]

The F1 value of the "lot" vowel has dropped by 106 Hz in NCS (956 Hz) compared to its position in GAE (850 Hz). The "lot" vowel has practically not changed between GAE and CMNE (855 Hz) because the 5 Hz difference is insignificant. Whereas the "lot" vowel has dropped significantly in NCS areas, it has not changed in CMNE. In other words, the fronting process of NCS has taken place in CMNE, but the lowering process has not.

4.3 Stage 3: The Fronting and Lowering of the "thought" Vowel [ɔ]

The F2 difference between the "thought" vowel in NCS (1368 Hz) and its counterpart in GAE (920 Hz) is 448 Hz. In other words, the "thought" vowel has fronted by 448 Hz in relation to its position in GAE. The "thought" vowel in CMNE (1420 Hz) has fronted by 52 Hz more than NCS, and by 500 Hz more in relation to GAE. On the F1

continuum, the "thought" vowel has dropped precipitously both in NCS (868 Hz) and in CMNE (851 Hz) in relation to its position in GAE (590 Hz). The lowering is 278 Hz and 261 Hz respectively.

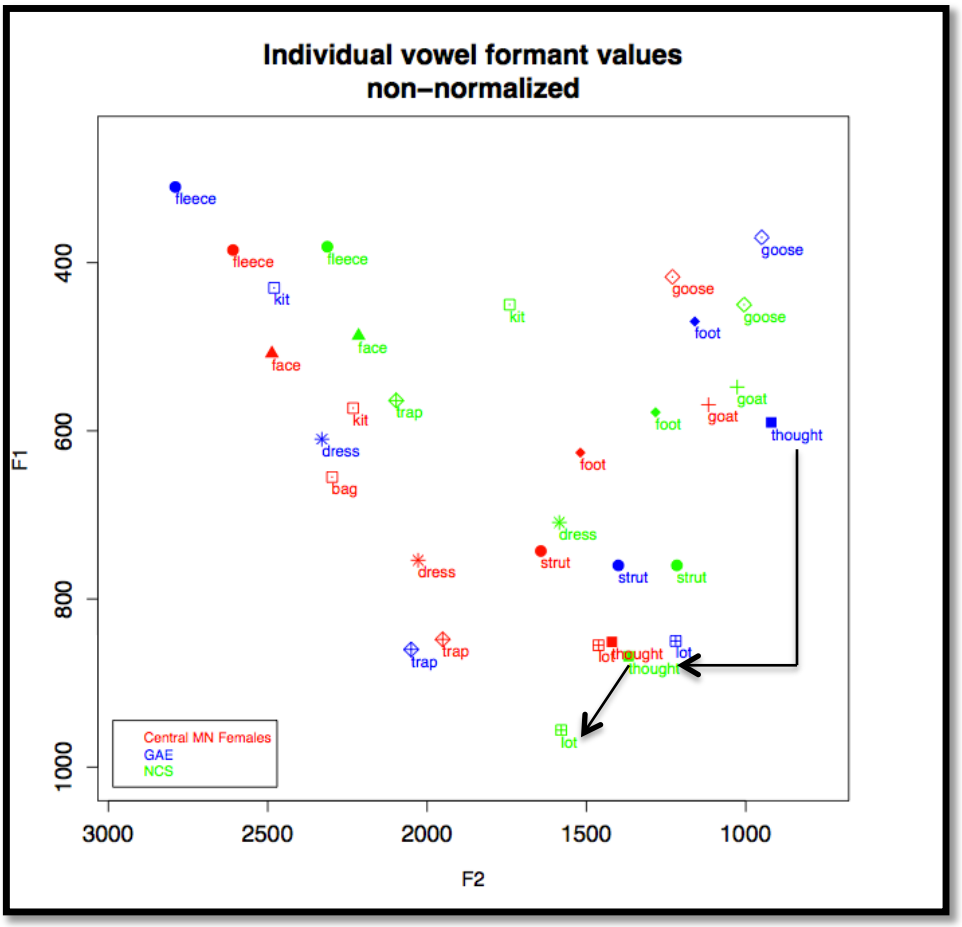

Figure 7: Stage 3-The Lowering and Fronting of [ɔ]

The F1 and F2 measurements indicate that lowering and fronting of the "thought" vowel has spread to Central Minnesota.

4.4 The Low Back Merger of the "lot" and "thought" Vowels

Labov et al. (2006:58) list three conditions for the low back merger to take place. These three requirements are satisfied in CMNE. We see that in CMNE the "thought" (851 Hz) and the "lot" (855 Hz) vowels have the same F1 values. An acoustic difference of 4 Hz is insignificant because at least 20 Hz is required for humans to distinguish two different sounds (Ladefoged 1996:21, Ferrand 2007:34). The two vowels are also identical with respect to their F2. The "thought" vowel is 1420 Hz while the "lot" vowel is 1462 Hz. The acoustic difference of 42 Hz is also insignificant as far as F2 is concerned. In a nutshell, the "thought" and "lot" vowels have merged in CMNE, as shown in Figure 8:

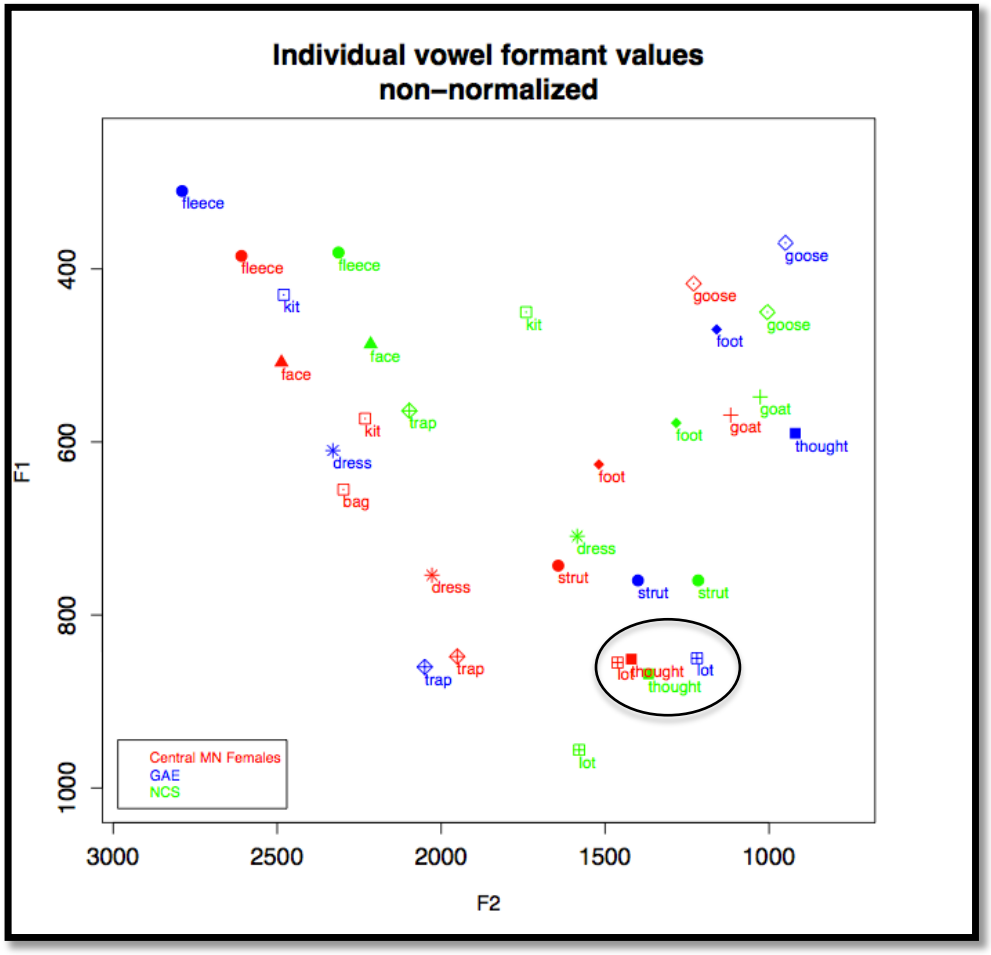

Figure 8: Stage 3-The Low Back Merger of [ɑ] and [ɔ]

Technically, the merger is not fully complete in male speech in CMNE because the F1 distance between the "lot" vowel (753 Hz) and the "thought" vowel (699 Hz) is 54 Hz, while the F2 difference is 7 Hz (1289 Hz vs. 1296 Hz). Both the merger and the near merger are independently confirmed by the ANAE map in Figure 9.[7]

[7] Retrieved from http://www.ling.upenn.edu/phono_atlas/maps/Map1L.html on March 14, 2014. The circle indicates the location of Central Minnesota.

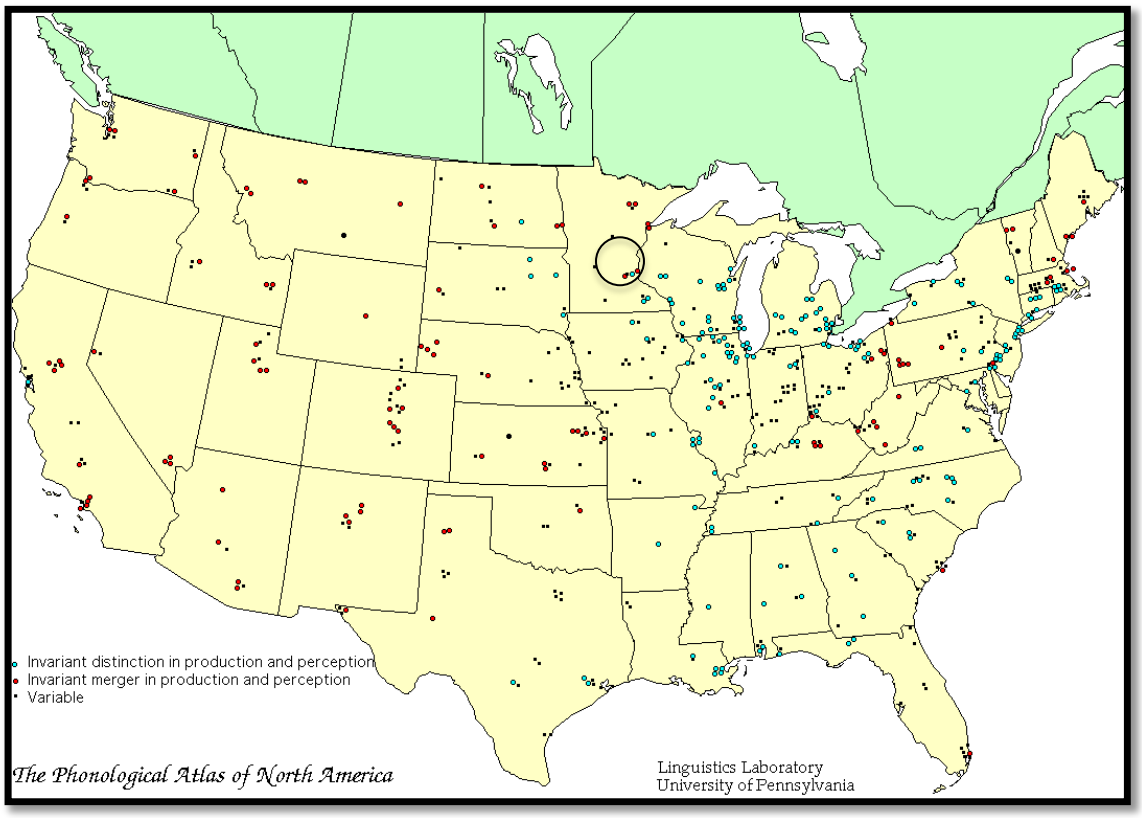

Figure 9: Nationwide Map of the Merger of [ɑ] and [ɔ]

The green dots indicate areas in the US where the merger of the "lot" and the "thought" vowels is not yet complete, while the red dots indicate that the merger has fully taken place. The lone green dot in the midst of the two red dots supports my findings that the low back merger is complete among Central Minnesota females but not yet complete among male speakers.

4.5 Resistance to the Low back Merger in NCS Areas

Labov et al. (2006:59, 61, Map 9.2) show areas where there is some resistance to the low-back merger. The cities at the epicenter of NCS keep the "lot" and "thought" vowels distinct whereas, cities all around them are merging these two vowels. Gordon (2006:107-108) writes that it is only a matter of time before all NCS areas and other parts of the country succumb to the low back merger:

> The cot/caught merger is a fairly recent development in the Midwest. Dialectologists have for some time known it as a feature of western Pennsylvania (especially Pittsburg) and of the eastern New England, though it has a slightly different form there. It is very widespread across Canada and is also heard throughout western US. The latter seems to be the source of its introduction into the Midwest as it appears to be spreading eastward. A recent survey by William Labov of the University of Pennsylvania has shown that the merger can be found today among younger generations (roughly, people under 40) in Kansas, Nebraska, and the Dakotas. It is also heard across much of Minnesota, Iowa, and

Missouri. Similarly, the merger affects central portions of Illinois, Indiana, and Ohio, though its acceptance in these areas may represent a westward expansion of the change in Pennsylvania.

Ladefoged (1999:42), Ladefoged and Johnson (2015:235) do not even bother including the "thought" vowel in vowel charts of California. The "lot" vowel has completely overtaken the "thought" vowel there.

4.6 Stage 4: The Lowering and Backing of the "dress" Vowel [ɛ]

Labov (2007: 373) describes the behavior of the "dress" vowel in NCS areas as follows "short-*e* shifted downward …. In later developments, short-*e* shifted back towards / ʌ /." This is exactly what we see in Figure 10:

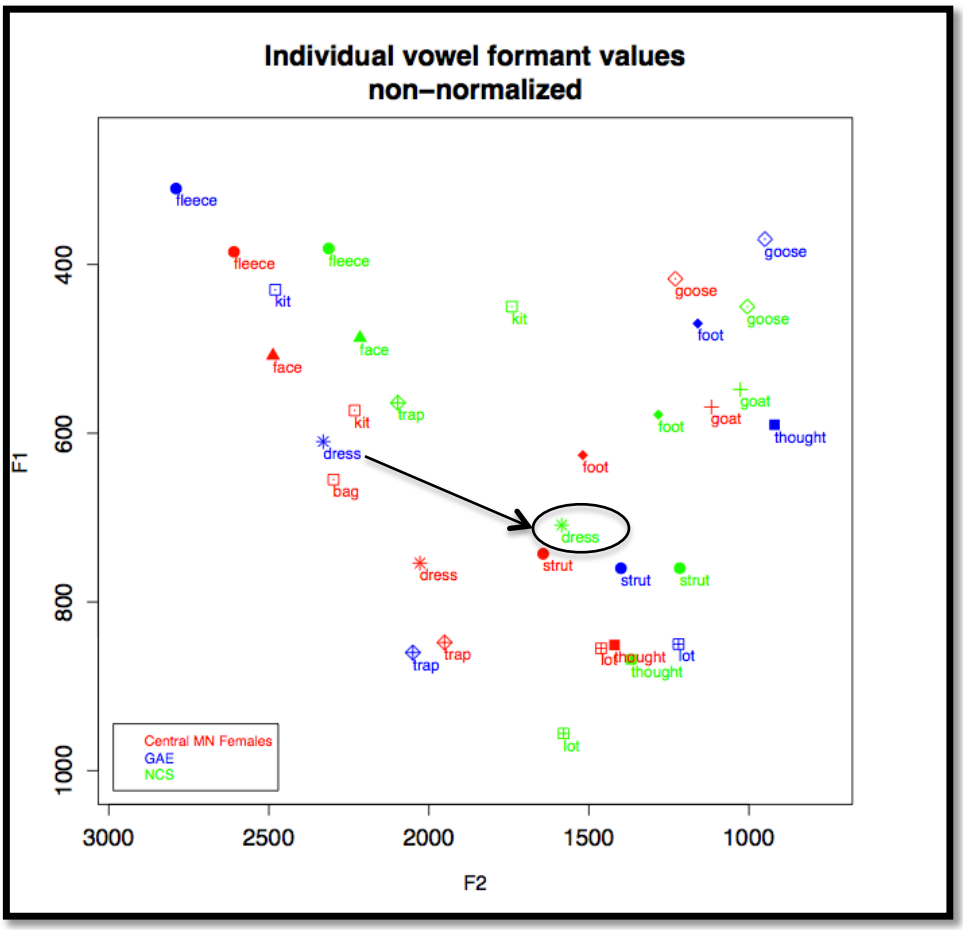

Figure 10: Stage 4-The Lowering and Backing of [ɛ]

The F1 value of the "dress" vowel in GAE is 610 Hz, as opposed to 709 Hz in NCS areas. This means that the "dress" vowel has lowered by 99 Hz in NCS areas. On the F2 continuum, the "dress" vowel has backed by 745 Hz in relation to GAE (2330 Hz vs. 1585 Hz). By the Telesur criterion mentioned in 4.2, the "dress" vowel now qualifies as a central vowel in NCS areas. In Central Minnesota, on the other hand, the "dress" vowel is still a front vowel even though it is less fronted than its counterpart in GAE (2330 Hz

vs. 2028 Hz). Its F2 is 443 Hz more fronted than the one in NCS (1585 Hz). This means that it still has some distance to travel before it catches up with its counterpart in NCS. On the F1 continuum, the "dress" vowel in CMNE (754 Hz) is still 45 Hz higher than its counterpart in NCS (709 Hz). By this criterion, the "dress" vowel in CMNE is becoming more like the one in NCS. In other words, the "dress" in CMNE has lowered but has not yet backed as far as the one in NCS areas. This being the case, we can deduce that this stage of the NCS process is in its infancy in CMNE.

4.7 Stage 5: The Lowering and Backing of the "strut" Vowel [ʌ]

Labov et al. (2006: 191) hesitate a lot regarding the role of the "strut" vowel in relation to the overall NCS scheme. They acknowledge that "there are still unresolved questions of ordering involved." Labov (2007:373) summarizes the fifth stage as follows, "…/ ʌ / moved back to the position formerly occupied by long open-*o* (/oh/)." This is seen in Figure 11:

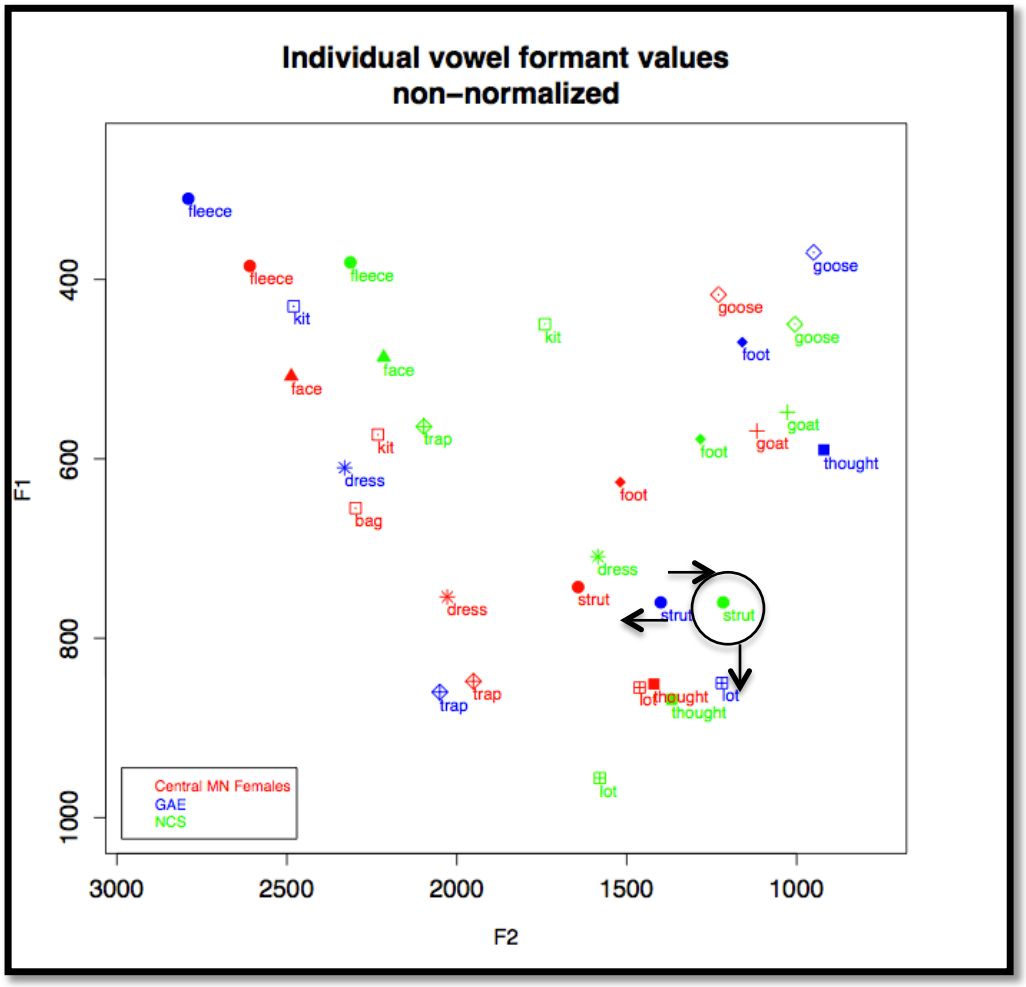

Figure 11: Stage 5-The Backing of [ʌ]

On the F2 continuum, we see that the "strut" vowel in NCS (1216 Hz) has backed by 424 Hz in relation to its counterpart in GAE (1640 Hz). It now qualifies as a back vowel

according to the Telesur criterion. However, the "strut" vowel in CMNE (1643 Hz) is more fronted by 427 Hz than its counterpart in NCS areas. In other words, it has remained stable in both GAE and CMNE, but it has moved further back in NCS. On the F1 continuum, the "strut" vowel in CMNE (743 Hz) and NCS (760 Hz) resemble each other because only 17 Hz separates them. We are now faced with two competing criteria for judging whether the "strut" vowel in NCS has spread to Central Minnesota or not. If backing is the main criterion used for judging the spread of this NCS feature (as Labov 2007:373 seems to suggest), then NCS has not had any effect in CMNE. However, if lowering is the main criterion, then it can be said that NCS is already at work in Central Minnesota. Yet, according to Ladefoged and Johnson (2015:207), F1 plays a more robust role in the acoustics of vowels because it contains 80% of the acoustic energy of the vowel. These conflicting pieces of evidence in favor or against the spread of the "strut" vowel in CMNE remind us that the unresolved issues surrounding this vowel are not yet settled.

4.8 Stage 6: The Lowering and Backing of the "kit" Vowel [ɪ]

Labov (2007:372) describes the process involved in the final stage of NCS simply as follows, "… / i / moved down and back." We see this trajectory clearly in Figure 12:

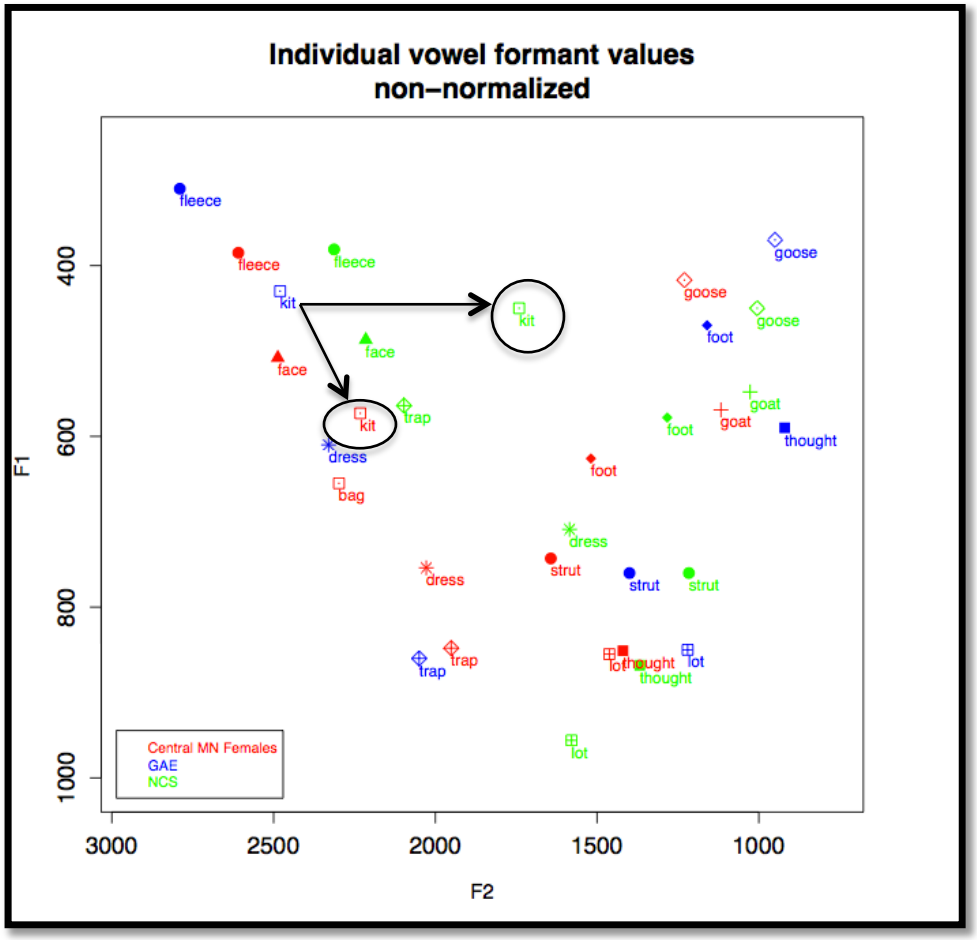

Figure 12: Stage 6-The Backing of [ɪ]

In GAE the "kit" vowel is clearly a front vowel. Its F2 is 2480 Hz whereas in NCS, it is 1741 Hz. This means that the "kit" vowel has backed by 739 Hz. In NCS areas, the "kit" vowel is on its way to becoming a central vowel, as indicated by the arrow in Figure 12. On the F1 continuum, it has lowered by a mere 20 Hz in relation to GAE (450 Hz vs. 430 Hz).

The situation of the "kit" vowel is much different in CMNE. It has lowered significantly in relation to both GAE and NCS. It has dropped by 143 Hz in relation to GAE (573 Hz vs. 430 Hz), and by 123 Hz (573 Hz-450 Hz) in relation to NCS. On the F2 continuum, it has backed by 248 Hz in comparison with GAE (2480 Hz vs. 2232 Hz), but it is still more fronted than its counterpart in NCS by 491 Hz (2232 Hz vs. 1741 Hz). In other words, the "kit" vowel has lowered more steeply in CMNE compared to NCS, but it has not backed nearly as much as its counterpart in NCS areas. Another important fact about the "kit" vowel in CMNE that we will gloss over in this paper but that will be taken up in another paper is that it lowered so much in CMNE that it can no longer be classified as a high vowel.[8]

5.0 Summary

The westward progression of NCS is observed for some vowels, but not for others. As a result, it cannot be stated conclusively that NCS has spread to Central Minnesota. The raising of the "trap" vowel that triggers the whole shift is still in its infancy in CMNE. In this region it is limited only to when it occurs before [g]. However, in NCS areas the raising rule applies unconditionally. The fronting and lowering of the "lot" vowel are completed in NCS areas but not in Central Minnesota. The fronting process seems to have stalled, while the lowering process never took place. The lowering of the "thought" vowel has taken place in CMNE, but fronting has not followed, in opposition to what has happened in NCS areas. Furthermore, the lowering of the "thought" vowel in CMNE has not caused the "lot" vowel to drop down. As a result, both vowels have merged or are in the process of merging in CMNE, whereas the merger is for the time being avoided in NCS areas. The "dress" vowel has lowered both in NCS and in CMNE areas, but backing has not yet fully taken place in the latter. Additionally, there are unresolved issues regarding the "strut" vowel in NCS and in CMNE. It remains a central vowel in CMNE, but it is now a back vowel in NCS areas, even though lowering has taken place in both dialects. To confuse matters even more, the "kit" vowel in CMNE behaves markedly differently from its counterpart in NCS. It has dropped so precipitously in CMNE that it now qualifies as a mid vowel. However, in NCS it has lowered only moderately. Consequently, what is going on in NCS does not seem to have any effect on the "kit" vowel in CMNE. Table 4 summarizes the main findings about the spread of NCS or lack thereof to Central Minnesota vowels:

[8] The same behavior has been described in the California Shift by Ladefoged and Johnson (2015:235), Ladefoged (1999:42), Ladefoged and Disner (2012:44), and at http://en.wikipedia.org/wiki/California_English, retrieved on December 10, 2013. Penny Eckert's web page shows a diagram and some explanations of California Shift: http://www.stanford.edu/~eckert/vowels.html, retrieved on December 10, 2013. Boberg (2005:140) also writes that "[ɪ] and [ɛ] are fairly low" in Canadian English.

Phonological Processes	Status in NCS	Status in CMNE
Stage 1: The raising of the "trap" vowel	Raising: unconditional	Raising: conditional, only before [g].
Stage 2: Fronting and lowering of the "lot" vowel	Fronting: completed Lowering: completed	Fronting: moderate fronting Lowering: not applicable
Stage 3: Lowering and fronting of the "thought" vowel	Lowering: completed Fronting: completed	Lowering: completed Fronting: completed
Stage 4: Backing and Lowering of the "dress" vowel	Backing: completed Lowering: completed	Backing: in progress Lowering: completed
Stage 5: Lowering and backing of the "strut" vowel	Lowering: completed Backing: completed	Lowering: completed Backing: not applicable
Stage 6: Backing and lowering of the "kit" vowel	Backing: completed Lowering: completed	Backing: not applicable Lowering: completed
Merger of the "lot" and "thought" vowels	Resisted	Completed in female speech Near completion in male speech

Table 4: Phonological Processes of NCS and CMNE

The acoustic vowel space of CMNE is hard to characterize because this dialect is at the confluence of many ongoing phonetic and phonological processes. The behavior of the "kit" vowel in CMNE is reminiscent of the California Shift (alluded to in footnote # 6), while the behavior of other CMNE vowels bears the imprints of the Canadian Shift (due to geographical proximity). Upcoming publications will compare and contrast the acoustic vowel spaces of CMNE with those of California and Canada to help us understand how, and to what extent, the vowels from these two major zones of influence impact the ways in which Central Minnesotans speak.

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