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Arguing against Northern Cities Shift reversal: Counter-shifting in Michigan

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Abstract. I have analysed the vowels /i, ɪ, ɛ, æ, ʌ, u, ʊ, ɔ, ɑ/ across multiple regions in the state of Michigan. By organizing them by demographics of age, region, population-density, and sex, I identified that the Northern Cities Vowel Shift (NCS) is reversing as indicated in other areas of the Inland North, but its distribution among the demographic categories and the mechanism of reversal are inconsistent across Michigan and the rest of the Inland North. On account of this, I propose that we are not observing a "reversal" of the NCS, but a series of "counter-shifts."

Keywords. Northern Cities Shift; sociolinguistics; sociophonetics; vowel shift; counter-shift; Michigan vowels; Michigan phonetics

1. Introduction.

1.1. BACKGROUND FOR THE NCS & ITS REVERSAL. The NCS is a six-stage chain vowel shift affecting the positions of /ɪ, ɛ, æ, ʌ, ɔ, ɑ/ characteristic of the Inland North dialect region of American English (Labov et al., 2005). The NCS is believed to be a product of the movement of peoples coinciding with the construction of the Erie Canal in the 1800s, and has been documented in Rochester, Syracuse, Buffalo, Detroit, Kalamazoo, Grand Rapids, Cleveland, Toledo, Gary, Hammond, Chicago, Rockford, Milwaukee, Madison, as well as other periphery cities to those (Hillenbrand, 2003).

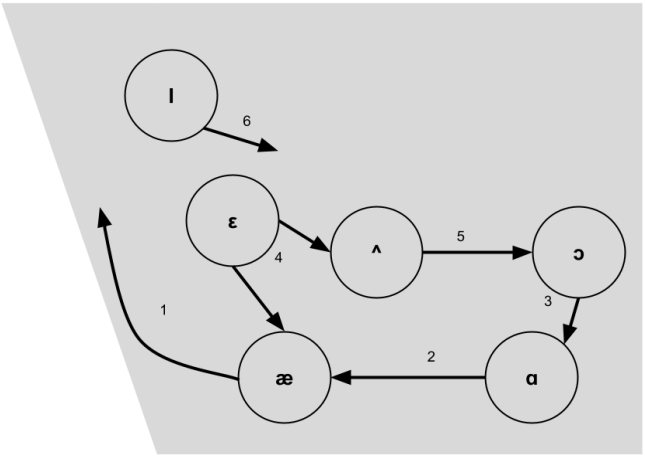

Figure 1. The Northern Cities Shift

The NCS has been a phenomenon of study since the 1960's. A sizable portion of its study concerning the shift's progression was conducted by William Labov and his associates. Labov (2007) determined that the NCS is passed between adult speakers borne out of these speakers reflecting the vowels of their peers. This transmission is described as the mechanism of the shift being passed on, rather than any particular set of vowels. A transmission between a speaker with fully shifted vowels and a speaker with unshifted vowels will result in the unshifted speaker adopting the first stage in the mechanism with the potential to advance the mechanism rather than the entire set of shifted vowels possessed by their peers (See Figure 1). Labov, Ash and

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Boberg (2005) provide an overview of the NCS and its geographic distribution in *The Atlas of North American English (ANAE).*

However, more recent studies have been documenting the reversal of the NCS, indicating that in a growing number of speakers we are no longer seeing vowels characteristic of the shift in areas where we historically expect to see them. Driscoll & Lape (2015) document a reversal shift /æ, ɪ, ɛ, æ, ʌ, ɑ/ among younger speakers in Syracuse, NY. They also determined that areas of higher population densities maintained the shift in /æ/ and /ɑ/ better than less dense areas. In Chicago, D'Onofrio & Benheim (2019) documented that both the NCS and its reversal were ongoing, the status of individual speakers being the opposite of whatever speaker-group they perceived negatively. Speakers from racially and ethnically diverse neighbourhoods reversing the NCS to sound less like speakers from less diverse neighbourhoods and those neighbourhoods advancing their NCS in what is often referred to as "white-flight," (D'Onofrio & Benheim, 2019).

Evidence of the NCS and reversal can be seen as far west as the Twin Cities, MN. While not directly attributing it to reversal, Chapman (2017) noted that the NCS was present in adult males but absent in adult females and younger speakers. With female speakers often leading sociolinguistic change (Labov, 2007; Roeder, 2010; Wagner et al., 2016), this is likely indicative of both the NCS and reversal coexisting in the Twin Cities.

In Lansing, Michigan, Roeder (2010) documented a shift that was "well advanced and may still be in progress, with young women showing more advanced stages of the shift than their male counterparts." This was followed up by Wagner et al. (2016), who added new components to the shift and its reversal. Wagner describes three movements in Lansing vowels. While /ɛ/ continues to shift, /ɑ/ begins to reverse back and /æ/ reorganises by reversing in younger speakers but splitting allophonically to a raised position in a prenasal environment. This separates Lansing vowels each into three different patterns. /ɛ/ belongs to the NCS pattern, /ɑ/ to reversal, and /æ/ to both reversal and an otherwise common splitting event across North American English (Labov, Ash, Boberg, 2005).

1.2. AIMS. This study is part of an ongoing sociophonetic survey of Michigan that I am conducting. The current project intends to document the vowels of Lower Peninsula Michiganders of different areas and ages. The project intends to expand the geographic range of speakers previously studied, and focuses not only on the population centres that are commonly observed, but also speakers from areas of lower population density. Through this usage of a broad range of speakers, I intend to develop a geography and a chronology for sociophonetic change in the Lower Peninsula in multiple regions and demographics.

This paper is a narrow focus of this larger project in discussion of NCS reversal. The range of phenomena observed in all these cities points to a discrepancy in our description of NCS reversal. In one city, we see different groups pursuing different vowel phenomena (NCS, reversal, other changes). While that may not be a very evocative statement, more interestingly we can also see multiple vocalic phenomena in individuals such as in Lansing (NCS, NCS reversal, /æ/ nasal raising). This warrants investigation, both into what changes are occurring and in whom they are occurring.

I have three goals for this study. With the first, I have and will continue to survey the population of Michigan's Lower Peninsula. This includes not only the previously studied urban centres (such as Metro-Detroit and Lansing), but also in the lesser known territory of suburbia and into the insofar terra incognita of rural Michigan.

Secondly, I will identify the vocalic phenomena occurring in this population. Furthermore, I

will exhibit the mechanisms by which they operate, as well as how they are distributed throughout the population.

Finally, I will demonstrate how different regions just within the Lower Peninsula of Michigan differ in the distribution and mechanisms of these vocalic phenomena. These regional findings are then considered in conjunction with what has been documented in other states affected by the NCS. In doing this, I will argue for the dispensing of the term "reversal" when describing the abbation of the NCS. I further propose that the phenomenon be called "counter-shifting," while providing my evidence and rationale as to why this change in nomenclature is necessary.

2. Methods.

2.1. THE PILOT SURVEY. This paper is built off of two surveys. The first pilot survey was conducted in 2020-2021, and tested both the methods and exploring the types of data the project might find interesting. The survey was conducted with 23 white participants who were born in the Lower Peninsula of Michigan of 18 years of age or older and ranged in year of birth from 1941-2002. Participants were demographically divided in terms of sex (Male/Female), age (eldest age group 1940-1958, middle age group 1960-1980, and youngest age group 1990-2002), geographic region (East/West Michigan), and the population density of where they resided between ages 3-15. Note that a North Michigan area was attempted in the pilot survey, but its results were sparse and inconclusive.

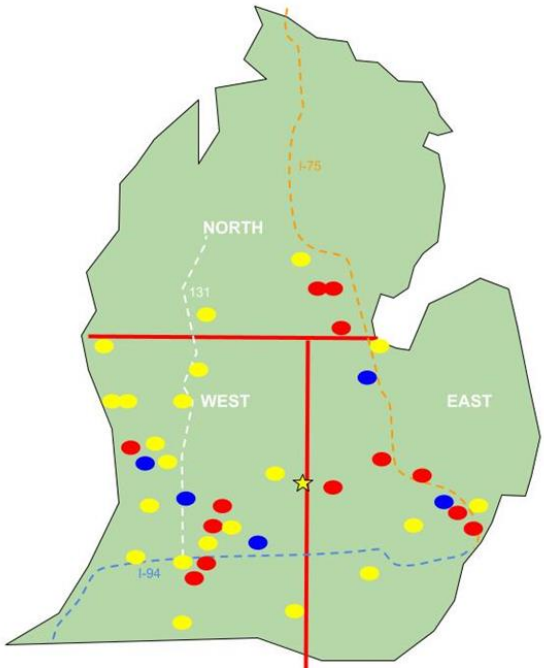

Figure 2. Map of participants

The target vowels of the survey were /i, ɪ, ɛ, æ, ʌ, u, ʊ, ɔ, ɑ/, which are traditionally considered monophthongal in Mainstream American English (MAE). Participants were presented with a stimuli set of 173 monosyllabic words and 2 disyllabic words. The stimuli were selected in an attempt to provide maximal phonological environments. The intention was to provide every test vowel either an onset or coda with bilabial, alveolar, and velar sounds (both voiced and unvoiced) in the manner of both plosives and fricatives (including the glottal and

paleto-alveolar fricatives /h/ and /ʃ/). There were additionally both pre-nasal and post-nasal environments, and in the same distributions with glides and liquids.

Participants were administered the stimuli through an automated slideshow with transitions between stimuli at intervals of 1.30 seconds. The quick timing between stimuli was intended to prevent a participant from altering their speech and prompt a quick, gut-reaction response. Due to the onset of the 2020 pandemic, it was not possible to test participants in a laboratory setting nor with standardised equipment and audio settings.

The data extracted were the positions of a vowel's first and second formants (F1, F2) which indicate the overall position of the vowel in a speaker's vowel space. This in turn was analysed in relation to the speaker demographics.

2.2. THE SECOND SURVEY. The second survey was a follow-up to the pilot survey which added to the population size, with the intent to help confirm some of the exploratory findings from the pilot. The survey was conducted with 17 additional Michigander speakers belonging to the same specifications as the pilot survey, who were subsequently mapped to the same test demographics. A breakdown of both surveys is in Table 1.

	Totals			Eldest Age-group (1940-1958)			Middle Age-group (1960-1980)			Youngest Age-group (1990-2002)		
N=40		Male	Female	N=6	Male	Female	N=23	Male	Female	N=11	Male	Female
East	N=14	7	7	3	1	2	5	2	3	6	4	2
West	N=26	9	17	3	1	2	18	6	12	5	2	3

Table 1. Test population for the pilot survey & second survey

Whereas the initial survey was concerned with a broad coverage of Michigan monophthongs, the second survey focuses more on that active vowels seen in the pilot, and thus only targeted /i, ɪ, ɛ, æ, ʌ, u, ɔ, ɑ/, omitting /ʊ/. Using the findings of the pilot survey, the second survey's stimuli were refined down to 40 monosyllabic words expressed over 5 minimal sets: /s_t/, /b_t/, /h_d/, /m_t/, /b_n/. In all other instances, the second survey was conducted in the same method and manner as the pilot.

2.3. DEMOGRAPHIC & GEOGRAPHIC ANALYSIS. I compiled the data from both surveys, where each participant is organised on the basis of their age, sex, region, and population density. While participant data from different regions are not mixed, other combinations of the demographic categories were analysed for similarities in their vowel spaces.

Common tools for evaluating vowels for NCS characteristics are the EQ, ED, and UD measures. The EQ evaluates the positions of /æ/ to /ɛ/, tracking the fronting and raising of /æ/, the first stage of the NCS. The ED measure evaluates /ɑ/ (fronting) and /ɛ/ (backing), which together represent the second and fourth stages of the NCS respectively. The UD measure evaluates /ɑ/ compared to /ʌ/, with the latter backing to embody the fifth stage of the NCS. I used these diagnostics along with visually evaluating the positions of participant vowels. I then arrayed the 6 stages of the NCS in order from top to bottom, and based on these evaluations designated each stage as either present (black), absent (white), or in transition (grey) for each participant. These tables could then be arrayed by different demographic groups in chronological order to demonstrate the progression or regression of the NCS (see Figures 5-8).

3. Results.

3.1. East Michigan.

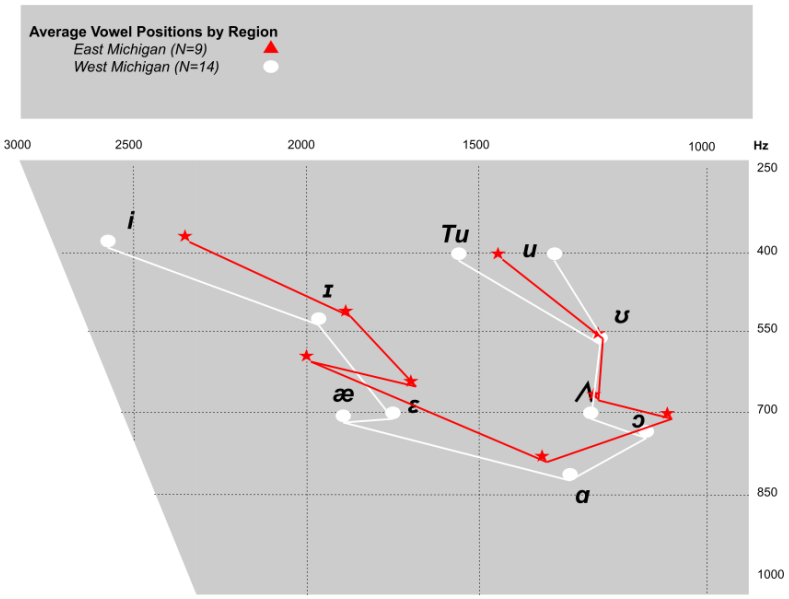

Figure 3. Average vowel positions by region

As a whole, the average East Michigan vowel system indicates an NCS in progress (see Figure 3). /æ/ is fronted, showing some raising, and /ɑ/ is not quite in line with the other back vowels, but all other vowels are unshifted. However, a clearer picture is realised once we sort by the other demographics.

In the eldest age group (1940-1956), /æ/ is both fronted and raised over /ɛ/, /ɑ/ is central and /ɪ/ is backed. With the inclusion of the late stage /ɪ/, the eldest group is clearly shifted. With the middle age group (1960-1980), we can begin to see some of the reversal. /æ/ is still shifted but less raised over /ɛ/ than in the previous group and /ɪ/ remains somewhat backed. All other vowels are unshifted. The trend of reversal continues with the youngest age group (1990-2002), where /æ/ descends below /ɛ/ and /ɪ/ has reversed back towards the front of the vowel-space.

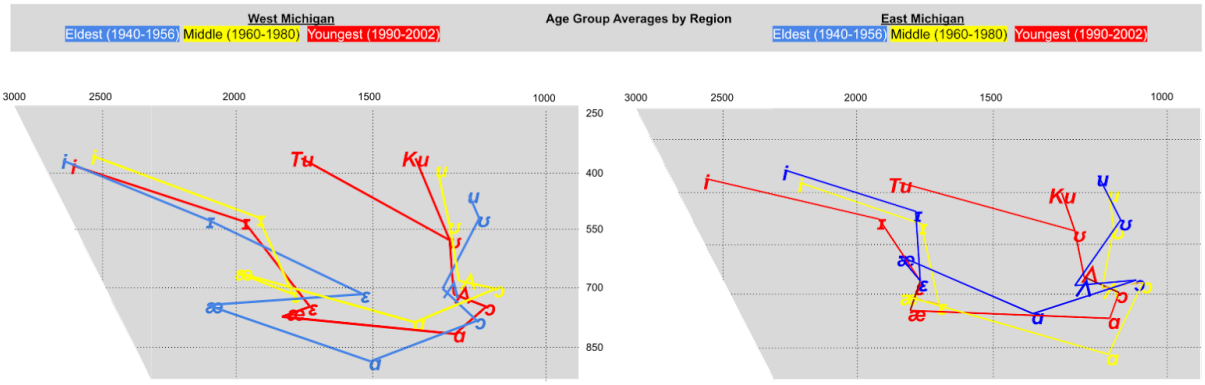

Figure 4. East & West Michigan vowels by age group

Breaking things down further by population density, it indicates that NCS characteristics are rooted in terms of a speaker's population density environment. In areas of high density, the eldest age group exhibits a mid to late stage NCS, which both Figures 5 and 6 corroborate. The middle age group obtains the furthest extent of the NCS with most stages either present or transitional before we see some late-stage reversal in the youngest age group.

In areas of lower population density, we lack data for the eldest group but can infer from their successors that they had very few NCS characteristics. The middle age group begins to obtain the shift in its early stages. While the youngest age group has the greatest extent of the shift, across speakers there is potentially some ongoing late stage reversal.

East Michigan High Population Density			
Stage	Eldest	Middle	Youngest
æ <,^			
ɑ <			
ɔ v			
ɛ >v			
ʌ >			
ɪ v>			

Figure 5. NCS chronological summary for East Michigan high population density speakers

East Michigan Low Population Density			
Stage	Eldest	Middle	Youngest
æ <,^			
ɑ <			
ɔ v			
ɛ >v			
ʌ >			
ɪ v>			

Figure 6. NCS chronological summary for East Michigan low population density speakers

3.2. WEST MICHIGAN. West Michigan exhibits an average shift in progress similar to East Michigan but with /æ/ even in height to /ɛ/, potentially indicating a stronger tendency towards shifted forms in contemporary speakers.

Looking across the age demographic, the eldest age group (1940-1956) has an ongoing shift less advanced than their counterparts in East Michigan. /æ/ is fronted but not raised above /ɛ/, /ɑ/ is central and /ɔ/ is lowered. While /ɛ/ is somewhat backed, /ɪ/ shows little indication of backing. Like in East Michigan, West Michigan middle age group participants showed signs of reversing;

however, the position of /æ/ above and in front of /ɛ/ indicates that there was an achievement of a shifted vowel space not explicitly represented at the border of the eldest and middle age groups. But elsewhere the middle age group shows reversal with /ɑ/ inhabiting a less central position than before and /ɔ/ and /ɛ/ having returned to their unshifted positions. Again, the youngest age group continues the trend of reversal by fully backing /ɑ/ and lowering /æ/ below /ɛ/, while /ɔ/ and /ɛ/ remain in their unshifted positions.

Chronological analysis reveals that unlike East Michigan, where NCS or lack thereof varies by population density, in West Michigan these traits are associated with speaker sex, with different distributions across male vs. female speakers. In Figure 7, the eldest male speakers have a mid-stage shift. There is some variation between NCS progression in middle high-density males and middle low-density males having late-stage and mid-stage transitional vowels respectively, but this levels by the youngest group where most participants exhibit the later stages of the shift advancing while the mid-stages appear to be undergoing some reversal.

Figure 7. NCS chronological summary for West Michigan males

This mid-stage leading reversal is corroborated by the female speakers (Figure 8). Their eldest age group has a mid/late stage NCS, with the middle age group demonstrating a strong mid-stage reversal followed by the reversal of later stages in the youngest age group.

Figure 8. NCS chronological summary for West Michigan females

4. Discussion.

4.1. PILOT SURVEY RESULTS VS SECOND SURVEY RESULTS. Given that the stimuli for the second survey are significantly fewer in number and altered from those of the pilot survey, it is important to establish that the simplification was neither arbitrary nor inhibitory to obtaining accurate results. The pilot survey utilised a large set of stimuli because the intention was to survey maximal environments in order to catch any ongoing phenomena in the Michigan vowel space. Provided the results of the pilot survey, I could observe which environments are active in the vowel space (and in the calculation of the average position of vowels) and which are redundant.

For the second survey, I stripped away excess stimuli that fulfilled phonological roles already represented by other stimuli and strove to maintain a stimulus set that maintained the results of the pilot study both in individuals and in groups. The 40 stimuli set used by the second survey represents this distillation. When comparing the results of the pilot survey to those of the second survey, there appears to be no appreciable difference between the two, nor when their data is combined into a multi-study average (Figures 9 and 10).

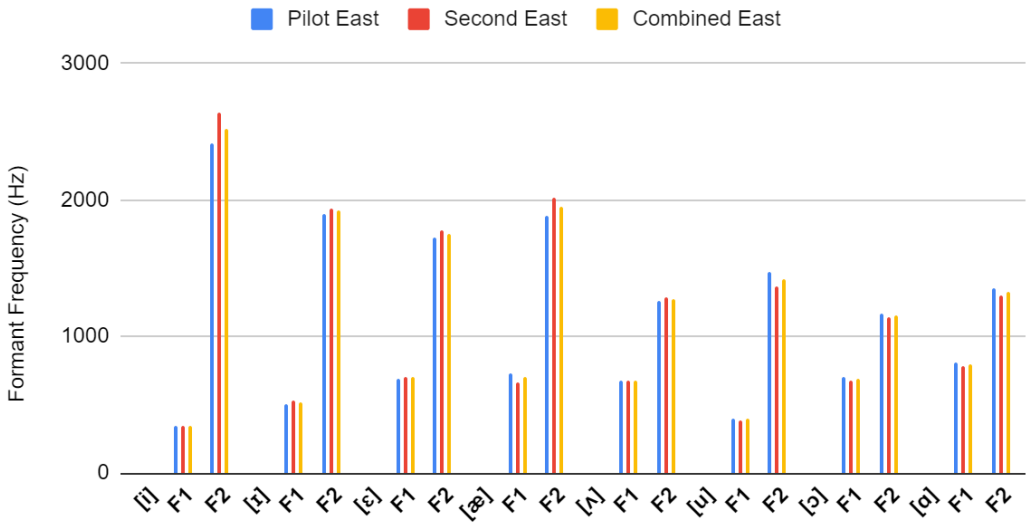

Figure 9. Comparing survey results for East Michigan

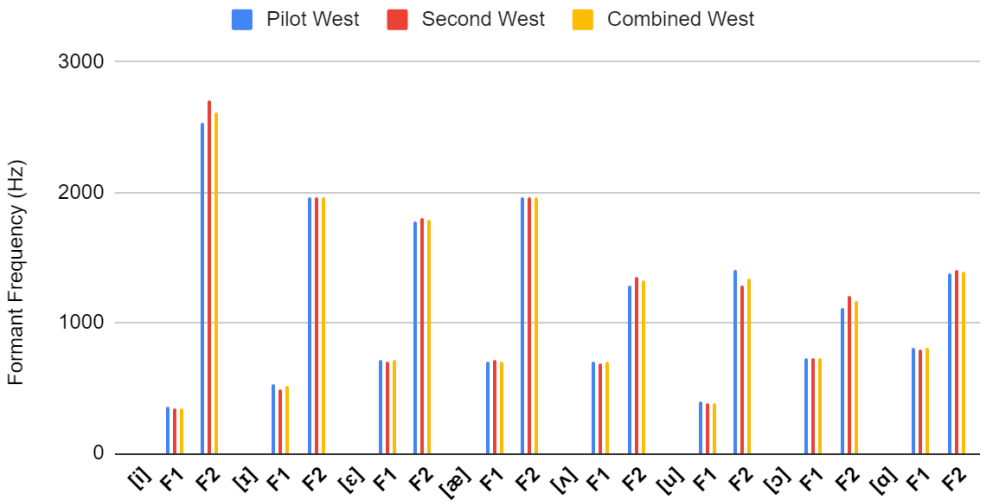

Figure 10. Comparing survey results for West Michigan

4.2. COMPARING EAST & WEST MICHIGAN. In summary, East Michigan NCS and reversal are distributed in terms of population density, with population dense areas progressing from mid stage to late stage NCS. Areas with lower population density progressing from early-stage NCS to mid-stage NCS before reversing the later stages in the youngest group.

In contrast, West Michigan NCS and reversal are distributed in terms speaker sex. Male speakers mid/late-stage NCS, peaking in the youngest group until the mid-stages might begin to reverse. Likewise, the female speakers start with mid/late stage NCS but by the middle age group begin to reverse the mid-stages first before reversing the later stages in the youngest speakers.

Note that the two regions exhibit not only different demographic distributions of the NCS (density based vs. sex based), but also have different mechanisms of reversal. In East Michigan, the later stages of the shift are the first to be abandoned, but in West Michigan both male and female speakers seem to prefer reversing the mid-stages first.

4.3. COMPARISON TO OTHER LITERATURE. This variability of distribution and mechanism is not peculiar to Michigan. When compared with the other studies in NCS reversal, we can see the same discrepancies seen in Michigan. In Chicago, the "reversal" documented by D'Onofrio & Benheim (2019) affects people on a neighbourhood level depending on their perception of the people who have shifted vowels. In Syracuse, Driscoll & Lape (2015) identified reversal affecting populations, which is similar to East Michigan where the distribution of reversal is based on population-density, with little-to-no association with the sex of the speaker. And we can extrapolate from Chapman (2017) that reversal in the Twin Cities is likely associated with speaker sex as in West Michigan. We can therefore see that the discrepancies in how reversal is distributed on a region's speakers is widespread and not just an idiosyncrasy of Michigan.

It is more difficult to evaluate the chronology of change in these other studies due to these studies not listing the vowels of their speakers in terms of chronology, but I will do my best to extrapolate.

The adult males in Chapman (2017) show positive indicators of the NCS in the early stages but not the later stages of the shift, with mid-stages such as the lowering of /ɔ/ increasing as time progresses. This suggests a shift in progress for the surveyed males born 1962-1982. Seeing that female speakers of the same age did not display indications of the NCS, it is impossible to say

using Chapman's data whether or not the indicators seen in younger female speakers (born 1999-2001) is indicative of adopting the NCS or NCS reversal. But we can confirm that their male contemporaries have lost all of the shifted vowels of their elders with the exception of an /æ/ that remains fronted. This suggests a loss of the more advanced late-stages of the NCS before the earlier stages. In which case, we may tentatively identify Twin Cities' NCS reversal occurring in male speakers mirroring the shift from its furthest extent down to its origin.

As for D'Onofrio & Benheim (2019), it remains impossible to extrapolate a chronology as they did not emphasise but de-emphasized the immediate importance of age when concerning the NCS and reversal in Chicago. Likewise, Driscoll & Lape (2015) are aware of the importance of age, but only uncovered the result of reversal rather than observing the motion of individual vowels over time.

4.4. THE NECESSITY FOR NEW TERMINOLOGY. Certainly, more research is needed that specifically investigates the chronology of the "reversal." It is clear that different areas are reversing across different populations, and at least in three areas (East Michigan, West Michigan, Twin Cities Area) there are different chronologies in the mechanism by which these vowels "reverse."

I would like to call attention to this inconsistency. Historically speaking, we have observed linguistic change and vowel shifts from a removed position making inferences based on evidence found in writing. However, based on the data discussed here, we can see that "reversal" is not a uniform process. With today's linguistic method and technology, we can afford to meticulously document what is happening as it happens. It is our responsibility to our academic posterity to be as precise as we possibly can, and the term "reversal" currently lacks that precision. For us, "reversal" indicates an undoing of a change. How vague. Is this undoing an exact mirror of the doing, is reversal the same as advancement but backwards? Do any vowels deviate from the pattern observed by its partners? How vague indeed.

"Reversal" is a term born out of describing end results of a process we did not observe. But why should we describe an end result when there is ongoing change that we can observe and document? We can afford to use a more precise definition

In response to this, I propose the following terms and definitions:

- **Counter-shift:** the departure from an established vocalic phenomenon, whether by one uniform mechanism or the product of multiple processes.
- **Novel counter-shift:** the departure from an established vocalic phenomenon by a process that does not pertain directly to the previous phenomenon.
- **(Mirror) reversal:** a subset of countershift; the regression of a shift that reverses the more recent stages and works backwards towards the earliest stages.
- **Zip-up reversal:** a subset of countershift; the regression of a shift that reverses the earlier stages and continues towards the later stages.
- **Peripheral/Internal:** describes where the regression occurs (eg. Peripheral zip-up reversal describes a shift beginning at the earliest stage of a shift, whereas internal zip-up reversal describes a change in a medial stage that affects its surroundings).

Of these terms, counter-shift is the most generic, and most closely resembles the former definition of "reversal." The two definitions for reversal (mirror and zip-up) are types of counter-shifting with specific chronological mechanisms to their change. A counter-shift may contain either type of reversal or both, as well as any other changes in the previously established

paradigm. By these definitions, East Michigan NCS is undergoing a peripheral mirror reversal distributed over population-density. West Michigan NCS is undergoing an internal mirror reversal distributed over speaker sex.

Regardless of how accurate these observations concerning sociophonetic change in Michigan are as more data is collected, and regardless of whether or not these specific terms are adopted, the necessity for specificity in our terminology remains, and by extension the necessity for an inquiry that strives for specificity. It is never our goal to be vague, nor responsible to be specific without good cause, but it is necessary to apply methods that lead to specificity and to develop new ones when required to avoid relying on empty terms like "reversal."

5. Conclusions. By surveying multiple regions of Michigan's Lower Peninsula, I have been able to demonstrate a board representation of vowels in the state and compare them along terms of region, age, sex, and the population-density of the area. In doing so, I have demonstrated the contemporary vowels of East and West Michigan. Each region has its own distribution of the Northern Cities Vowel Shift and its counter-shifts. East Michigan has external mirror reversal in young speakers from areas of low population density, where the later stages of the NCS reversing before the early ones. West Michigan displays internal mirror reversal primarily in young female speakers, where reversal starts in the mid-stages, before continuing with the later, then earliest stages of the NCS.

Due to the dearth in terminology describing the regression of vowel shifts (and other linguistic change), I have proposed a more precise lexicon for the purpose of indicating how a shift regresses. This includes zip-up vs. mirror reversal, which describes regression starting at the earlier and later stages of a shift respectively. I have also proposed the term "counter-shifting" to describe any general shift away from an established linguistic change, sub-categorized as zip-up/mirror reversal and novel counter-shifting. It is my intention to provide these terms so that we may more accurately describe the linguistic changes we observe, given our opportunity to do so.

Further research in the regions of Michigan is required to continue refining the conclusions made, and I hope that research is made in other states that venture beyond the urban centres. Further, the diversity of counter-shifting remains to be documented in other states, and comparisons between age groups tracking the extent of their vowel movements is necessary to provide a reasonably accurate chronology of change to provide an accurate description. In addition, analysis of older recordings will help provide a comparison point between older speakers today and when they were younger. This should help mitigate changes in their speech, as people will not necessarily maintain the speech they initially possessed and may alter it multiple times throughout their lives.

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Appendix A: Pilot survey stimuli

Oral and Post-Nasal Environments

Minimal Sets	[i]	[ɪ]	[ɛ]	[æ]	[ʌ]	[u]	[ʊ]	[ɔ]	[ɑ]
x	beat	bit	bet	bat	but	boot	**full**	bought	bot
x	beak	Bic	beck	back	buck	*fool*	book	bawk	Bach
x	seat	sit	set	sat	*cup*	suit	soot	sought	sot
x	*ease*	nick	neck	knack	*duck*	nuke	nook	*cawed*	knock
x	meet	mitt	met	mat	mutt	moot	*rook*	*raw*	*cod*
	steep	kid	pet	bath	puff	coop	put	pause	gosh
	feed	his	step	tab	sub	booth	could	caught	cot
	dear	pig	fed	has	shut	stoop	cook	dog	top
	lead	kiss	mesh	have	fuzz	whose	hood	hawk	mop
	steer	ill	mess	cash	dull	food	hoof*	laud	block
	reed	fish	bell	pal	cull	soup	bush	sauce	rock
	league	dish	red	laugh	lush	shoot	push	all	shot
	leash	fill	leg	past	rub	loot	good	awe	shop
	feet	lip	less	ask	rut	root	**wolf**	awed	odd
	lease	rib	sell	nap	up	tool	look	fought	dock

Pre-Nasal Environments

Minimal Pairs	[i̪]	[ɪ]	[ɛ]	[æ]	[ʌ]	[u]	[ʊ]	[ɔ]	[ɑ]
	gene	rim	wren	ram	rum	room		pawn	John
	team	fin	fen	fan	fun	tomb		fawn	Tom
	deem	dim	den	dam	dumb	doom		dawn	don
	seen	sin	send	sand	sun	soon	woman	lawn	mom
	gleam	pin	pent	plant	punt	boon		tawny	romcom

Appendix B: Second survey stimuli

	i	I	e	ae	a	c	^	u
s_t	seat	sit	set	sat	sot	sought	sutt	suit
b_t	beat	bit	bet	bat	bot	bought	butt	boot
h_d	heed	hid	head	had	hod	hawed	hud	who'd
m_t	meet	mitt	met	mat	mott	mought	mutt	moot
b_n	bean	bin	been	ban	bond	pawn	bun	boon