THE FOOT OF THE LAKE: A SHARP DIALECT BOUNDARY IN RURAL NORTHERN NEW YORK

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ABSTRACT: In 2013, Dinkin reported an unexpectedly sharp dialect boundary in northern New York between the communities of Ogdensburg and Canton in St. Lawrence County: Ogdensburg exhibited the Northern Cities Vowel Shift (NCS) and very little evidence of the low back merger, while Canton showed low back merger nearing completion and no NCS. This article investigates the nature of this dialect boundary via new sociolinguistic interview data from eight neighboring communities: four along the St. Lawrence River and four 25 miles south of it. An east-west division is observed in merger incidence: the four communities to the west, including Ogdensburg, show relatively robust LOT-THOUGHT distinction, though apparent-time trends toward merger exist; east of Ogdensburg, the merger is much more advanced. A similar sharp boundary may hold for the NCS raising of TRAP (though the data are spottier due to the NCS's obsolescence). The geographical sharpness of this boundary suggests that it is not due merely to socioeconomic differences between communities. It may be due to historical patterns of transportation: in the nineteenth century, Ogdensburg was the easternmost navigable point of the upper St. Lawrence River, meaning communities east of Ogdensburg were not directly accessible to the Great Lakes shipping network.

KEYWORDS: low back merger, Northern Cities Shift, dialect geography, Inland North, North Country

THE INLAND NORTH of the United States is a dialect region in flux. Labov, Ash, and Boberg's *Atlas of North American English* (2006) portrayed the region, stretching along the Great Lakes from Upstate New York to Wisconsin, as maintaining or even increasing its distinctiveness from other dialect regions. While the merger of the low back LOT and THOUGHT vowel phonemes was in progress or complete in the majority of North American dialect regions, the Inland North appeared to show "stable resistance" to the merger in the *Atlas* data, collected in the 1990s. The characteristic chain shift of the region, the Northern Cities Shift (NCS), involving the fronting of LOT, the fronting and raising of TRAP, the lowering of THOUGHT, and other changes, was in progress in apparent time to the extent that it was one of Labov, Ash, and Boberg's most prominent examples of North American dialect regions diverging from each other.

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In the years since the publication of Labov, Ash, and Boberg (2006), however, it has become clear that the Inland North's stable distinctiveness was short-lived. The backing of LOT across all of Upstate New York, documented in Dinkin (2011), is both a retreat from the NCS and progress toward the low back merger. Driscoll and Lape (2015) find nearly all of the NCS features retreating in apparent time in Syracuse, New York; Milholland (2018) finds the same in Buffalo. Wagner et al. (2016), Morgan et al. (2017), and Nesbitt (2018), among others, have reported retreat from both raised TRAP and fronted LOT in Michigan. McCarthy (2011), D'Onofrio and Benheim (2018), and Durian and Cameron (2018) have all reported the loss of some or all NCS features in Chicago among at least some groups of speakers.

Several studies, including Driscoll and Lape (2015), Nesbitt and Mason (2016), and Thiel and Dinkin (2017), have suggested that retreat from the NCS features is due to growing negative social evaluation of its features. With regard to LOT, I have proposed (Dinkin 2011) that the backing of LOT is spreading into the Inland North from adjacent regions where the low back merger is well established, such as Canada; this argument is based on data collected in 2006–8 showing that the Inland North communities displaying the most evidence of low back merger in progress are those closest to the Canadian border, at the northern edge of New York State. Also at the northern edge of New York is a dialect region termed the North Country,[1] which lacks the NCS and is the only dialect region in upstate New York where the merger appeared to be well established at the time of that fieldwork.

An outstanding conundrum in the dialectology of the NCS is the nature of the border between the Inland North and the North Country. In data collected in 2008, I found a sharp dialect border in St. Lawrence County, New York (Dinkin 2013), between the city of Ogdensburg and the village of Canton, near the northern border of the state. Ogdensburg is an Inland North city, in which the majority of speakers sampled showed substantial NCS raising of TRAP and fronting of LOT, and none had full merger of LOT and THOUGHT. In Canton, nearly all speakers sampled had LOT and THOUGHT at least partially merged in minimal-pair judgments, and no NCS raising of TRAP was in evidence; on the basis of this, Canton was assigned to the North Country. The apparent dialect boundary between these two communities is quite sharp; Ogdensburg and Canton are only 20 miles apart, in a sparsely populated rural region with no settlements of appreciable size between them, so it is not possible for there to be a gradual geographic transition from the Inland North pattern to the North Country pattern.

In an earlier article (Dinkin 2013), I was not able to completely explain the presence of this sharp dialect boundary, describing it as a topic that "would benefit from additional data collection" (28). Elsewhere in New York State, the geographical limit of the Inland North dialect region was found to

be determined by early-nineteenth-century settlement patterns: communities that were principally founded by westward migration from western New England exhibit the NCS (see also Boberg 2001 on the relationship between western New England and the NCS), while communities in which New England settlement played little to no role belong to a different dialect region, the Hudson Valley. This explanation, however, is not fully satisfying for the boundary between Ogdensburg and Canton, inasmuch as their settlements both apparently derive from western New England.[2]

Now that the gradual loss of the NCS has been documented throughout the Inland North region, however, an alternative possibility presents itself: perhaps the dialect boundary between Ogdensburg and Canton is illusory. If the NCS is being lost and trends toward the low back merger are initiated throughout the Inland North, perhaps Canton was once an Inland North community as well and is merely an early adopter of trends that are now beginning to be visible throughout the region. If the loss of the NCS is driven by social stigma associated with it or by contact with speakers from non–Inland North regions, Canton's status as a college town with a more middle-class population might account for the absence of the NCS there in 2008.

The principal research questions of this article are thus: What is the nature and cause of the dialect difference between Ogdensburg and Canton? Do they differ linguistically because they truly lie in separate regions or because of socioeconomic and demographic differences within a single region? To answer this question, we must examine the region surrounding Ogdensburg and Canton. A secondary question of interest is whether the advancement of LOT-THOUGHT merger in northern New York is a result of diffusion from nearby Canada, and so the principal focus of analysis in this article will be the LOT and THOUGHT vowels; but the most distinctive feature of the NCS, the raising of TRAP, will be examined as well.

THE REGION

St. Lawrence County is the largest county in New York State by area, at 2,680 square miles, and the sixth-least densely populated, at about 40 people per square mile.[3] Its location is shown in figure 1. The southeastern third of the county overlaps with Adirondack State Park and contains only 3% of the county's population (Barge 2011) as of the 2010 census. The remaining two-thirds of the county have the shape of an arc, bounded on the northwest by the St. Lawrence River, which constitutes the U.S.-Canada border. All of the county's 11 incorporated villages lie within that arc, including Canton, the county seat, as well as Ogdensburg, the county's most populous place and only city. The county's population is 94% White.

FIGURE 1
St. Lawrence County, New York

The nearest major city to St. Lawrence County is Ottawa, Canada, which lies 51 miles north of Ogdensburg and has a population approaching a million people. The nearest city of any size on the American side of the border is Watertown, New York, which is 54 miles southwest of Ogdensburg, in Jefferson County, and has a population of 26,753. Ottawa's status as the nearest urban center suggests that Canadian English may play an important role as a source of dialect diffusion; however, Boberg (2000) argues that sound change does not diffuse easily across the U.S.-Canada border, suggesting that the presence of the LOT-THOUGHT merger in New York's North Country and trends toward merger in the northern reaches of the Inland North must have some other source.

Ogdensburg and Canton differ in several geographic, economic, and demographic features, any of which could be causally connected to the dialect difference between them:

1. Ogdensburg has the legal status of a city, while Canton is a village.
2. Ogdensburg's population of 11,367 is nearly twice Canton's 6,277.
3. Ogdensburg is located along the shore of the St. Lawrence River and is the site of a bridge to Canada; Canton is about midway between the river and Adirondack Park.
4. Canton has a more mobile population than Ogdensburg. The 2010 American Community Survey estimated that 22% of Canton's residents had moved

there from outside St. Lawrence County in the past year and that 40% were not born in the state of New York, while only 9% and 14%, respectively, of Ogdensburg's residents matched that description.

5. Canton's population on average is better educated and more middle class; Ogdensburg's is less educated and more working class. According to the 2010 American Community Survey estimates, 46% of Canton's residents over the age of 25 had a bachelor's or higher degree, while only 15% of Ogdensburg's did. In Canton, 40% of the employed population held "management, business, science, and arts occupations," while only 26% did in Ogdensburg.
6. Canton is a college town, home to both St. Lawrence University and a campus of the State University of New York (SUNY). Ogdensburg's largest employer is the New York Department of Corrections, which operates two prisons in the city (Lawton 2014).

To disentangle which, if any, of these factors are relevant to the linguistic differences between Ogdensburg and Canton, this study collects data from several other communities in St. Lawrence County and neighboring Jefferson County that share different combinations of geographic and economic features. New interviews were conducted in the villages of Massena, Potsdam, Waddington, Gouverneur, and Alexandria Bay. Combined with my existing data from Canton, Ogdensburg, and the Inland North city of Watertown (Dinkin 2009, 2013), these five villages complete a 4 × 2 grid of communities, as shown in figure 2: four communities along the St. Lawrence River, and four more approximately 25 miles south of those.

Three of the communities along the river—Ogdensburg, Alexandria Bay, and Massena—are adjacent to bridges into Canada; the fourth, Waddington, is on the river but not the site of a crossing. Potsdam, like Canton, is a college town, home to Clarkson University and another SUNY campus. Watertown and Ogdensburg are the only cities among these communities; the others are all villages. Table 1 compares the communities' demographics in terms of the quantitative features discussed above for Ogdensburg and Canton. If we hypothesize that the presence of the LOT/THOUGHT merger is influenced by population mobility or socioeconomic class, or by accessibility to Canada, we might predict that Ogdensburg and Massena would show similar status with respect to the merger, as would Canton and Potsdam.

METHODOLOGY

The new data for this study, from Alexandria Bay, Waddington, Massena, Gouverneur, and Potsdam, was collected by means of the Short Sociolinguistic Encounter protocol (Ash 2002). These are interviews of approximately 20 minutes, conducted on the spot with natives of the speech community

FIGURE 2
Map of the Communities Sampled in This Study

TABLE 1
Community Demographics
(based on 2010 American Community Survey 5-year estimates)

Community	*Population*	*Moved in Past Year*[a]	*Born Outside N.Y. State*	*Bachelor's Degree+*[b]	*Management Occupation*[c]
Alexandria Bay	1,097	8%	33%	20%	28%
Ogdensburg	11,367	9%	14%	15%	26%
Waddington	721	3%	18%	18%	40%
Massena	11,269	4%	17%	15%	27%
Watertown	26,753	11%	28%	21%	28%
Gouverneur	3,997	16%	16%	20%	36%
Canton	6,277	22%	40%	46%	40%
Potsdam	9,476	26%	31%	43%	30%

a. "Moved in past year" includes individuals who moved from a location outside their current county.
b. This percentage is out of residents over age 25.
c. The occupation category is "management, business, science, and arts," and the percentage is out of employed individuals 16 and over.

recruited by approaching them in publicly accessible places such as local businesses and parks. Nearly all subjects indicated that they were raised from early childhood in their home communities.[4] After free conversation on topics such as travel, recreation habits, and life in the community, subjects read a

word list of 160 items and provided judgments of mergedness or distinctness for minimal pairs, including *cot-caught* and *don-dawn*. The interview rubric and word lists can be found in the appendix. The bulk of the new interviews were conducted in the summer of 2014, but five additional interviews in Alexandria Bay were conducted in summer 2017 in order to increase the sample size. All speakers interviewed were White.

First- and second-formant measurements of stressed vowel tokens were extracted using the FAVE software package (Rosenfelder et al. 2011). Formant measurements are normalized by FAVE using the Lobanov (1971) procedure and then translated back into hertz values, setting each speaker's mean F1 and F2 at 650 Hz and 1700 Hz, respectively, with standard deviations of 150 Hz and 420 Hz.

Data from Watertown, Ogdensburg, and Canton is taken from my existing corpus (Dinkin 2009, 2013); interviews in Watertown were conducted in 2007, and interviews in Ogdensburg and Canton were conducted in 2008. Full methodological details on these can be found in Dinkin (2009). Most interviews were conducted according to a Short Sociolinguistic Encounter protocol similar to the new interviews, but two in Ogdensburg and two in Canton were telephone interviews following the methodology of Labov, Ash, and Boberg (2006), conducted by cold-calling telephone numbers in the communities until reaching someone who was a native of the community and willing to be interviewed. These telephone interviews did not involve the reading of word lists, but merger judgments on the pairs *hot-caught* and *don-dawn* were elicited.

Formant measurements in the 2007–8 data were extracted in Praat 4 (Boersma and Weenink 2005) by selecting a measurement point for each vowel by hand; full details on the hand-measurement procedure can be found in Dinkin (2009). In the original analysis of these interviews (Dinkin 2009, 2011, 2013), formant measurements were normalized using the log-mean normalization algorithm and group norm of Labov, Ash, and Boberg (2006), for direct comparability to their data. In this study, for comparability with the new data, these data were re-normalized using the same Lobanov method as is used by FAVE.

The data are statistically analyzed by using Rbrul (Johnson 2009) to calculate linear regression models for the effects of social predictors such as location, year of birth, gender, and education on various indices of LOT-THOUGHT merger. For simplicity of interpretation, the age variable in all regression models is year of birth minus 1973, the median year of birth of the sample. All predictors reported as significant at the $p < 0.05$ level improve the quality of the models, as per Rbrul's calculation of the Akaike information criterion. When community was found to be a significant predictor in a

TABLE 2
Interviews Included in the Current Study

Community	*Number of Interviews*	*Year*	*Mean Birth Year*	*Notes*
Alexandria Bay	9	2014, 2017	1971	1 interview's formants not measurable
Ogdensburg	9	2008	1972	2 interviewed by telephone
Waddington	5	2014	1960	1 interview no minimal-pair judgments
Massena	4	2014	1978	
Watertown	10	2007	1972	
Gouverneur	5	2014	1968	1 only word list and minimal pairs
Canton	9	2008	1973	2 interviewed by telephone
Potsdam	6	2014	1979	

regression model and it was necessary to make post-hoc pairwise comparisons between individual communities, significance was tested via Tukey tests, as implemented in the R package emmeans (Lenth et al. 2019).

Table 2 lists the number of interviews in the current study per community, with the mean year of birth of the speakers interviewed.

METHODOLOGICAL LIMITATIONS. The chief limitation of this study is the size of the sample: due to the small population of the communities under investigation and the limited time available for data collection, in some communities it was only possible to recruit a few speakers. Among these, a handful of speakers provided incomplete interviews: one speaker in Waddington terminated the interview partway through the word list and did not provide minimal-pair judgments; one speaker in Gouverneur did not have time to be interviewed and therefore only read the wordlist and gave minimal-pair judgments. Formants from one interview in Alexandria Bay could not be measured due to poor audio quality, so only this speaker's minimal-pair judgments could be included for analysis. Moreover, interview subjects were recruited purely by availability rather than any more balanced sampling method, meaning their representativeness as a sample of the community may be doubtful. Despite the limitations of this data set, however, as will be seen below, the distribution of the LOT-THOUGHT merger among these communities shows patterns that are remarkably clear.

The analysis in this article directly compares interviews conducted in 2007–8 with interviews conducted in 2014–17. The Short Sociolinguistic Encounter interview methodology used in 2014–17 replicates that of the earlier study. However, while the vowel formants in the new sample were measured by the FAVE program suite (Rosenfelder et al. 2011), those in the earlier sample were measured at time points selected by hand in Praat. In Severance, Evanini, and Dinkin (2015), we compared my hand measurements

(Dinkin 2009) to the output of the FAVE program for a sample of speakers from Utica, New York, and found that the differences between the results of the two measurement methods were in general small; therefore, the hand measurements from the 2007–8 data will be considered comparable to the automatically extracted formant measurements for the new interviews. As for whether data collected in 2007–8 can even be considered comparable with data from 2014–17 for the purpose of identifying dialect regions in which language change may be taking place, that issue will be discussed below in the section "Real-Time Concerns."

MINIMAL-PAIR JUDGMENTS

We will begin by analyzing speakers' judgments of LOT-THOUGHT minimal or near-minimal pairs. Each individual is assigned a score between 0 and 4 for their merger judgments: for each of the two minimal pairs, they score 0 points if they described the pair as merged, 2 points if they described it as distinct, and 1 if they were unsure, described the pair as "close," or gave some other intermediate answer.

Table 3 reports the minimal-pair scores of each speaker in the sample, from oldest to youngest in each community. Results by community will be displayed in this 4 × 2 grid format as a schematic representation of the geographical layout of the sampled communities: the four communities along the St. Lawrence River on top, from west to east, and the other four communities below (see figure 2). Table 3 shows a clear east-west difference in minimal-pair judgments: the large majority of speakers in the western half of the sample maintain the LOT-THOUGHT distinction, while substantially fewer do in the eastern half. An apparent-time trend toward merger is also visible, in both halves of the region: in the east, all speakers who maintain the full distinction in their judgments are among the older speakers inter-

TABLE 3
LOT-THOUGHT Minimal-Pair Scores of All Speakers from Oldest to Youngest by Community

Alexandria Bay 4, 4, 4, 4, 4, 4, 4, 0, 4	Ogdensburg 4, 4, 4, 4, 3, 4, 3, 4, 2	WEST | EAST	Waddington 4, 0, 4, 2	Massena 0, 4, 0, 0
Watertown 4, 4, 4, 4, 4, 4, 4, 2, 1, 4	Gouverneur 4, 4, 4, 3, 3		Canton 4, 2, 0, 3, 0, 2, 2, 0, 0	Potsdam 4, 1, 0, 0, 0, 0

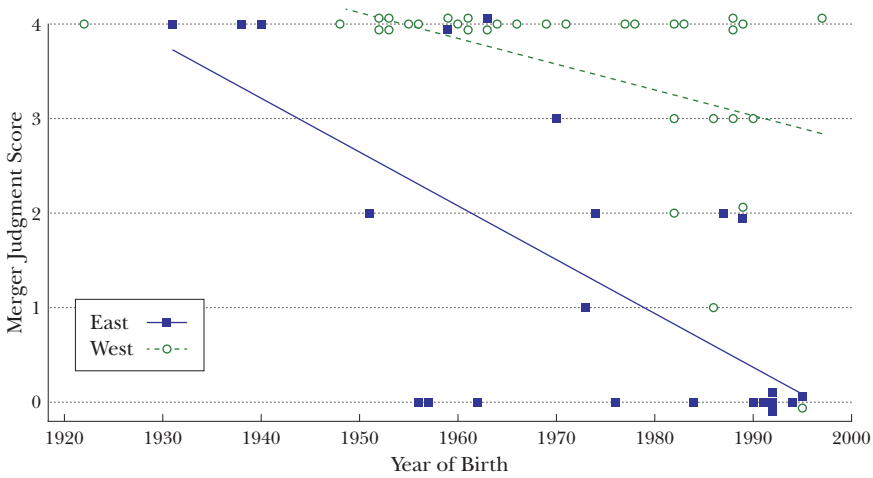
viewed;[5] in the west, all individuals who show any sign of merger are among the younger speakers.

Figure 3 displays this apparent-time trend clearly for both the east and west halves of the data. In the western half, almost all speakers are fully unmerged, and the handful of speakers who do show some influence of merger on their minimal-pair judgments were all born after 1980. In the eastern half, speakers born before 1950 show the full distinction, those between 1950 and 1970 range from fully merged to fully distinct, all speakers born in 1970 or later show at least some effect of merger in their judgments, and the youngest speakers are all fully merged.

Table 4 displays a regression model confirming the significance of both the apparent-time trend toward more merged judgments and the difference between communities. Table 5 shows the expected judgment score for a speaker born in 1973 in each community, and demonstrates the east-west division very clearly. Indeed, if we replace the individual communities in table 4 with a simple binary east-west variable, shown in table 6, it actually slightly improves the fit of the model.

Canton and Potsdam, the two college towns with similar high rates of population mobility and education, pattern together as predicted. However, Ogdensburg and Massena, both communities on the St. Lawrence River adjacent to border crossings with similarly low rates of population mobility,

FIGURE 3
Apparent-Time Trend in LOT-THOUGHT Minimal-Pair Judgments



NOTE: Vertical jitter is added to separate individuals with the same age and judgment score.

TABLE 4
Multiple Linear Regression of LOT-THOUGHT Minimal-Pair Judgment Scores

Predictor	*p*	*Value*	*Coefficient*	*n*
Community	< .001	Alexandria Bay (W)	1.275	9
		Ogdensburg (W)	1.100	9
		Watertown (W)	1.084	10
		Gouverneur (W)	0.870	5
		Waddington (E)	–0.492	4
		Canton (E)	–1.192	9
		Massena (E)	–1.279	4
		Potsdam (E)	–1.366	6
Year of birth	< .001	+1 year	–0.043	56
Education	.1	current HS or college student	0.357	11
		unknown	0.249	2
		bachelor's degree or more	0.090	13
		some postsecondary education	–0.054	13
		high school only or less	–0.642	17
Gender	.7	male	0.054	21
		female	–0.054	35

NOTE: Nonsignificant predictors are in gray. Intercept = 2.526 at year of birth = 1973. $r^2 \approx 0.60$.

TABLE 5
Expected LOT-THOUGHT Minimal-Pair Score for a Speaker Born in 1973, per Regression Model

Alexandria Bay	Ogdensburg	WEST | EAST	Waddington	Massena
3.801	3.626		2.034	1.247
Watertown	Gouverneur		Canton	Potsdam
3.610	3.396		1.334	1.160

education, and white-collar occupations, fail to pattern together; a post-hoc Tukey test finds the difference between Ogdensburg and Massena to be significant at $p \approx .03$. This supports the hypothesis that the difference between the eastern and western communities in this sample is because they represent different geographical dialect regions, rather than being communities within a single dialect region differing linguistically from one another due to differing social and economic situations. In any event, the merger is in progress in apparent time throughout both regions; year of birth remains a significant predictor when run on each half of the sample independently.

TABLE 6
Multiple Linear Regression of LOT-THOUGHT Minimal-Pair Judgment Scores

Predictor	*p*	*Value*	*Coefficient*	*n*
East-West	< .001	west	1.112	33
		east	–1.112	23
Year of birth	< .001	+1 year	–0.046	56
Education	.2	unknown	0.395	2
		current HS or college student	0.327	11
		bachelor's degree or more	0.025	13
		some postsecondary education	–0.156	13
		high school only or less	–0.591	17
Gender	.7	male	0.047	21
		female	–0.047	35

NOTE: Nonsignificant predictors are in gray. Intercept = 2.535 at year of birth = 1973. $r^2 \approx 0.62$.

PHONETIC INDICES OF MERGER

The discussion above deals with speakers' explicit judgments of mergedness. However, explicit minimal-pair judgments do not always directly correspond to actual mergedness in production. We will evaluate each speaker's degree of mergedness via two metrics: adjusted Euclidean distance, which estimates the distance between the central phonetic targets of LOT and THOUGHT, and Bhattacharyya's affinity, which measures the degree to which the phonetic distributions of LOT and THOUGHT overlap.

The adjusted Euclidean distance between two phonemes (Nycz and Hall-Lew 2014) estimates the distance in phonetic space between the phonemes' central phonetic targets. The simple Euclidean distance in F1/F2 space between the mean position of LOT and the mean position of THOUGHT is rendered less effective as a measure of merger by asymmetries between the phonetic environments of LOT and THOUGHT in the words in which they appear. For example, a following /l/ tends to depress the F2 of a token of LOT or THOUGHT. However, the THOUGHT phoneme appears in more words with a following /l/ than the LOT phoneme does. Therefore, even a speaker with complete merger may appear to have THOUGHT backer than LOT on average, just because a greater percentage of their THOUGHT tokens are pulled back by a following /l/. The adjusted Euclidean distance attempts to compensate for this effect. For each speaker, linear regression models on F1 and F2 of LOT and THOUGHT tokens are calculated, with phoneme-identity and phonetic-environment factors as predictors. The value of the regression coefficient

for the phoneme-identity predictor is taken to be the adjusted distance between LOT and THOUGHT in that formant, and so the adjusted Euclidean distance is the square root of the sum of the squares of the adjusted F1 and F2 distances. The regression models used to calculate adjusted Euclidean distances in this study included the five phonetic-environment factors for which FAVE codes its output by default. A lower value of adjusted Euclidean distance corresponds to a greater degree of merger.

Table 7 shows a multiple linear regression model for the adjusted Euclidean distance between LOT and THOUGHT phonemes, as predicted by community, age, education, and gender, and table 8 shows the adjusted Euclidean distances predicted in each community for a speaker born in 1973. Like the minimal-pair judgments, the adjusted Euclidean distances show change in apparent time toward merger, displayed in figure 4, and a sharp boundary between the east and west halves of the data; but unlike the minimal-pair judgments, Alexandria Bay is atypical of the western half. Although Alexandria Bay is (approximately) geographically between Ogdensburg and Watertown and these Alexandria Bay speakers uniformly[6] describe *cot-caught*

TABLE 7
Multiple Linear Regression on Adjusted Euclidean Distance between LOT and THOUGHT

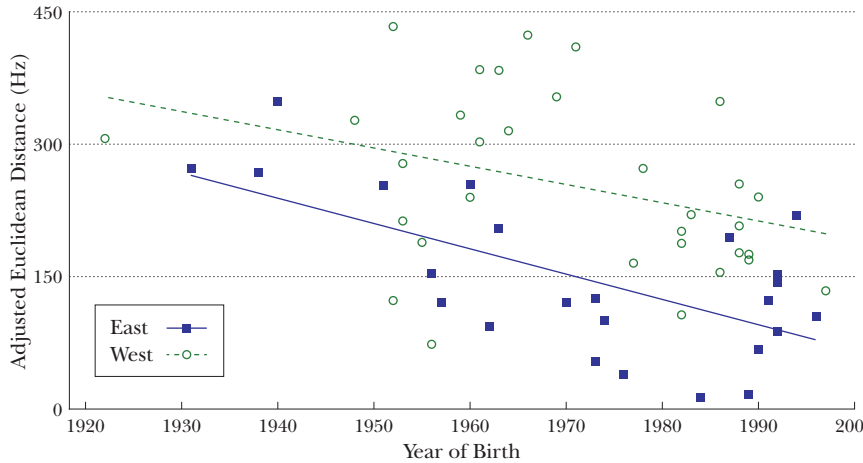
Predictor	*p*	*Value*	*Coefficient*	*n*
Community	< .001	Watertown (W)	107	10
		Ogdensburg (W)	77	9
		Gouverneur (W)	56	5
		Massena (E)	–37	4
		Alexandria Bay (W)	–39	8
		Potsdam (E)	–41	6
		Waddington (E)	–50	5
		Canton (E)	–74	9
Year of birth	< .001	+1 year	–2.762	56
Education	.2	unknown	15	2
		bachelor's degree or more	12	13
		current HS or college student	8	11
		some postsecondary education	5	13
		high school only or less	–40	17
Gender	.2	male	13	21
		female	–13	35

NOTE: Nonsignificant predictors are in gray. Intercept = 205 at year of birth = 1973. $r^2 \approx 0.61$.

TABLE 8
Expected Adjusted Euclidean Distance between LOT and THOUGHT for a Speaker Born in 1973, per Regression Model

Alexandria Bay 166	Ogdensburg 282	WEST | EAST	Waddington 155	Massena 168
Watertown 311	Gouverneur 261		Canton 130	Potsdam 164

FIGURE 4
Apparent-Time Trend in Adjusted Euclidean Distance between LOT and THOUGHT



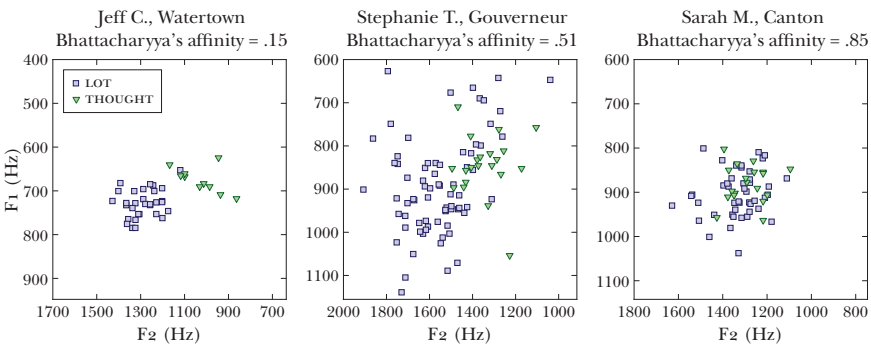
and *don-dawn* minimal pairs as distinct, their adjusted Euclidean distance between LOT and THOUGHT is typical of communities in the eastern half of St. Lawrence County, where minimal-pair judgments are predominantly merged. Post-hoc Tukey tests indicate Alexandria Bay is significantly different from both Ogdensburg ($p \approx .04$) and Watertown ($p \approx .003$). Therefore, unlike with minimal-pair judgments, replacing the community variable with a binary east-west variable does not improve the model; it instead increases the Akaike information criterion by 10 and reduces r^2 by 0.14.

Our second phonetic measure of LOT-THOUGHT merger, following Johnson (2015) and Strelluf (2016), is Bhattacharyya's affinity. This is a statistical measure of the degree to which two clouds of tokens overlap (Bhattacharyya 1943), implemented in the R package adehabitatHR (Calenge 2006). At opposite extremes, it is equal to 1 if the two samples occupy the exact same region of space with the same relative density at all points, and it is equal

to 0 if the two samples occupy disjoint regions with no overlap; therefore, a Bhattacharyya affinity between LOT and THOUGHT approaching 1 corresponds to merger. Figure 5 illustrates LOT-THOUGHT distributions with low, intermediate, and high Bhattacharyya affinities: Jeff, from Watertown, has almost completely disjoint LOT and THOUGHT distributions, with only one token overlapping and a correspondingly low Bhattacharyya affinity of 0.15; Stephanie, from Gouverneur, has a substantial area of overlap between LOT and THOUGHT, but LOT's range extends some distance away from THOUGHT into a nonoverlapping region, and the Bhattacharyya affinity is close to 0.5; Sarah, from Canton, has LOT and THOUGHT almost completely overlapping, with a high Bhattacharyya affinity of 0.85 reflecting that. Tokens of both phonemes before /l/ and /r/ are excluded from calculations of Bhattacharyya affinity because it can be ambiguous, even for unmerged speakers, which phoneme such tokens belong to.

Bhattacharyya's affinity complements adjusted Euclidean distance as an index of merger in progress. Adjusted Euclidean distance measures the distance between the central targets of the two phonemes, but cannot distinguish whether phonemes occupy discrete or overlapping regions of phonetic space. On the other hand, Bhattacharyya's affinity measures the degree to which the two phonemes overlap; but if they don't overlap, it has nothing to say about how near or far from each other they are. Thus, arguably, adjusted Euclidean distance is more effective at measuring the early stages of progress toward merger, while Bhattacharyya affinity is more useful at measuring the advancement of merger itself.

FIGURE 5
Samples of Bhattacharyya's Affinity for LOT-THOUGHT Overlap



NOTE: Tokens before /l/ and /r/ are excluded. Formants in these plots are unnormalized.

Table 9 shows a linear regression model for the Bhattacharyya affinity of LOT and THOUGHT, and table 10 shows the predicted values for each community for a speaker born in 1973. We see a similar pattern here as for adjusted Euclidean distance: a sharp boundary between the east and west halves of the data, with Alexandria Bay apparently more merged than the other communities in the western half. Again, replacing the individual-community variable with a binary east-west variable does not improve the model. Here, Alexandria Bay's coefficient appears to be intermediate between those of the

TABLE 9
Multiple Linear Regression on Bhattacharyya Affinity for LOT-THOUGHT Overlap

Predictor	*p*	*Value*	*Coefficient n*	
Community	< .001	Watertown (W)	–0.263	10
		Ogdensburg (W)	–0.173	9
		Gouverneur (W)	–0.172	5
		Alexandria Bay (W)	0.032	8
		Waddington (E)	0.113	5
		Canton (E)	0.141	9
		Potsdam (E)	0.155	6
		Massena (E)	0.167	4
Year of birth	.001	+1 year	0.004	56
Education	.035	unknown	–0.058	2
		some postsecondary education	–0.036	13
		current HS or college student	–0.017	11
		bachelor's degree or more	0.007	13
		high school only or less	0.103	17
Gender	.1	male	–0.027	21
		female	0.027	35

NOTE: Tokens before /l/ and /r/ are excluded. Nonsignificant predictors are in gray. Intercept = 0.555 at year of birth = 1973. $r^2 \approx 0.66$.

TABLE 10
Expected Bhattacharyya Affinity for LOT-THOUGHT Overlap for a Speaker Born in 1973, per Regression Model

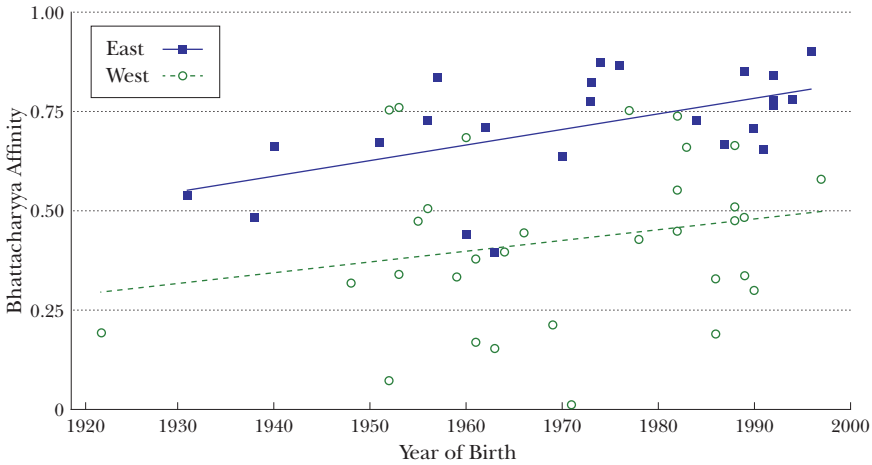
Alexandria Bay	Ogdensburg		Waddington	Massena
.587	.382	WEST | EAST	.668	.722
Watertown	Gouverneur		Canton	Potsdam
.292	.383		.696	.710

east and west halves, rather than being entirely typical of the east half; post-hoc Tukey tests find Alexandria Bay to be significantly different only from Watertown ($p \approx .002$). If Bhattacharyya's affinity is a better measure of later stages of progress toward merger and adjusted Euclidean distance a better measure of earlier stages, the fact that Alexandria Bay appears less similar to the eastern communities in Bhattacharyya's affinity than in adjusted Euclidean distance is consistent with the village's distinct minimal-pair judgments.

As table 9 shows, Bhattacharyya's affinity exhibits the same apparent-time change toward merger that was visible in minimal-pair judgments and adjusted Euclidean distance. This trend is displayed in figure 6. There is also a (more marginally significant) effect of education, in which it appears that individuals with post-secondary education are less merged than those without.

Thus, so far, there appears to be a sharp dialect boundary between the eastern and western halves of the sample. To the east, the low back merger is quite advanced in all indices, while to the west the LOT and THOUGHT phonemes remain largely distinct, in both production and minimal-pair judgment. Alexandria Bay appears to be an exception to this pattern—it is distinct in judgments, like the other communities on the west side, but it resembles the eastern communities in production. In any event, progress toward the merger appears to be advancing in apparent time in both the eastern and western regions, although it is much more advanced in the eastern half.

FIGURE 6
Apparent-Time Trend in Bhattacharyya Affinity



INDIVIDUAL VOWELS AND THE NORTHERN CITIES SHIFT

We now turn to examine the phonetic mechanism by which the distinction between LOT and THOUGHT is lost or maintained. A merger between the two phonemes may be effected by (1) backing LOT to merge with THOUGHT, so that unmerged communities and speakers will have LOT fronter than their merged counterparts, or by (2) lowering THOUGHT to merge with LOT, so that unmerged communities have higher THOUGHT than merged communities; or, of course, (3) both of these may be the case.

Table 11 shows a mixed-effects regression on F2 of LOT with respect to community, age, gender, speech style, and education,[7] as well as phonetic environment,[8] with speaker and word as random effects. Of the three communities in which LOT and THOUGHT remain largely distinct in production, Watertown and Ogdensburg show substantial fronting of LOT, while Gou-

TABLE 11
Multiple Linear Mixed-Effects Regression on F2 of LOT Tokens, with Speaker and Word as Random Predictors

Predictor	*p*	*Value*	*Coefficient*	*n*
Community	< .001	Watertown (W)	95.3	309
		Ogdensburg (W)	93.3	312
		Gouverneur (W)	4.5	215
		Alexandria Bay (W)	–1.1	476
		Canton (E)	–10.3	352
		Waddington (E)	–46.1	287
		Massena (E)	–50.9	269
		Potsdam (E)	–84.7	355
Gender	< .01	male	23.6	973
		female	–23.6	1,602
Year of birth	.03	+1 year	–1.1	2,575
Style	.5	spontaneous speech	11.2	2,095
		minimal pairs	–4.0	189
		word list	–7.2	291
Education	.98	some postsecondary education	10.0	589
		bachelor's degree or more	6.8	634
		high school only or less	–3.1	493
		current HS or college student	–3.9	775
		unknown	–9.8	84

NOTE: Preceding and following consonants included as fixed predictors; omitted here for compactness. Tokens preceding coda /l/ and /r/, or in other styles, excluded. Intercept = 1416 at year of birth = 1973. Fixed $r^2 \approx 0.35$; total $r^2 \approx 0.52$.

verneur's LOT is more intermediate in F2, closer to that of some of the communities in the eastern half of the region. Thus, it seems that while Ogdensburg and Gouverneur maintain the contrast between LOT and THOUGHT by having LOT substantially fronter than other communities in the region do, this is less true for Gouverneur. Post-hoc Tukey tests find that Watertown and Ogdensburg each have LOT significantly fronter than all communities in the eastern half of the data at the $p < .05$ level or better; Gouverneur and Alexandria Bay show no significant pairwise comparisons. Meanwhile, significant effects of gender and age indicate apparent-time change toward backing LOT (as reported in Dinkin 2011), led by women.

Since the vowel space becomes narrower toward the bottom—that is, the available range of F2 for low vowels is much smaller than the range for mid or high vowels—and THOUGHT is located on the back diagonal of the vowel space, changes in this phoneme's height are likely to entail changes in back-

TABLE 12
Multiple Linear Mixed-Effects Regression on F2 + (2 × F1) of THOUGHT Tokens, with Speaker and Word as Random Predictors

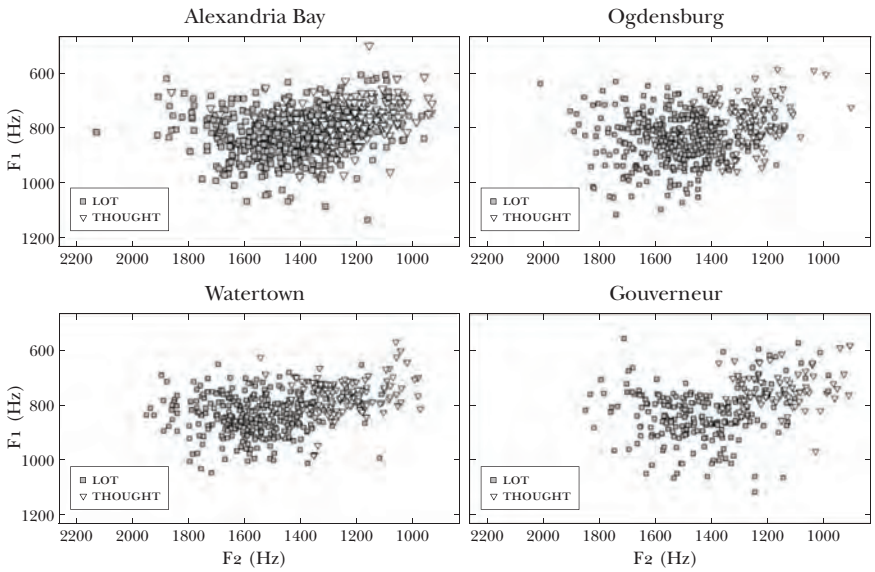
Predictor	*p*	*Value*	*Coefficient*	*n*
Style	< .01	minimal pairs	–34.3	127
		word list	–7.0	198
		spontaneous speech	41.3	639
Community	< .01	Gouverneur (W)	–144.9	82
		Potsdam (E)	–88.8	101
		Watertown (W)	–14.4	126
		Alexandria Bay (W)	10.3	216
		Waddington (E)	30.4	90
		Ogdensburg (W)	44.2	100
		Massena (E)	62.6	108
		Canton (E)	100.6	141
Year of birth	.05	+1 year	–1.9	964
Education	.6	bachelor's degree or more	–30.6	224
		current HS or college student	–21.9	160
		some postsecondary education	–16.0	235
		high school only or less	31.0	307
		unknown	37.5	38
Gender	.96	male	–0.7	594
		female	0.7	370

NOTE: Preceding and following consonants included as fixed predictors; omitted here for compactness. Tokens preceding coda /l/ and /r/, or in other styles, excluded. Intercept = 2774 at year of birth = 1973. Fixed $r^2 \approx 0.26$; total $r^2 \approx 0.38$.

ness as well. We will measure the position and movement of THOUGHT along the back diagonal using the linear combination F2 + (2 × F1); this quantity is smaller if the vowel is higher and backer and larger if it is lower and fronter. Table 12 shows a mixed-effects regression model for this back-diagonal index of THOUGHT. Although the data set is small and messy, it appears to be the case that Gouverneur has the highest and backest THOUGHT of any community in the sample; the only pairwise comparison between communities found to represent a significant difference in a post-hoc Tukey test is that between Gouverneur and Canton. The effect of style in table 12 suggests that speakers who do contrast LOT and THOUGHT increase the distance between the two phonemes in careful speech.

The regression models shown in tables 11 and 12 indicate that, although the LOT-THOUGHT distinction is maintained in production in Ogdensburg, Watertown, and Gouverneur, it is not maintained in the same way in all three communities: in Gouverneur, the contrast is maintained by having THOUGHT higher and backer than in other communities, while in Ogdensburg and Watertown, it is by the frontness of LOT. This difference between Gouverneur and the other communities is visible in figure 7: in Watertown and Ogdensburg the chief difference between the distribution of the LOT

FIGURE 7
The F1-F2 Distribution of LOT and THOUGHT Tokens in the Western Half of the Sampled Region



NOTE: Tokens before /r/ and /l/ are excluded.

and THOUGHT tokens is in the F2 dimension, and the two phonemes' ranges substantially overlap in the F1 dimension; but in Gouverneur the distribution of THOUGHT appears distinctly higher than that of LOT, with little F1 overlap.

Thus, Ogdensburg and Watertown distinguish LOT from THOUGHT by a relatively fronted LOT, while Gouverneur does so by a relatively raised THOUGHT. Why the difference between them? Well, according to traditional descriptions (e.g., Labov, Ash, and Boberg 2006), the Northern Cities Shift involves both the fronting of LOT and the lowering of THOUGHT. This picture is therefore consistent with a model wherein Ogdensburg and Watertown are both subject to the NCS, but Gouverneur is not. We can test this hypothesis by examining the most distinctive vowel shift of the NCS: the raising of TRAP.

Table 13 displays a mixed-effects model of the raising and fronting of TRAP, measured by the front diagonal index $F2 - (2 \times F1)$. Here a positive value represents increased raising and fronting. We find that Watertown and Ogdensburg, the communities with fronted LOT, also show substantial

TABLE 13
Multiple Linear Mixed-Effects Regression on $F2 - (2 \times F1)$ of TRAP Tokens, with Speaker and Word as Random Predictors

Predictor	*p*	*Value*	*Coefficient*	*n*
Community	< .001	Watertown (W)	218.7	310
		Ogdensburg (W)	218.0	255
		Alexandria Bay (W)	41.1	538
		Gouverneur (W)	–28.4	232
		Massena (E)	–78.9	262
		Canton (E)	–113.2	282
		Waddington (E)	–116.3	319
		Potsdam (E)	–141.0	389
Year of birth	.02	+1 year	–1.9	2,587
Education	.03	unknown	85.6	102
		some postsecondary education	1.8	621
		current HS or college student	–1.5	418
		bachelor's degree or more	–10.9	597
		high school only or less	–75.0	849
Style	.8	spontaneous speech	2.4	2,103
		word list	–2.4	484
Gender	.9	male	1.5	914
		female	–1.5	1,673

NOTE: Preceding and following consonants included as fixed predictors; omitted here for compactness. Tokens preceding coda /l/, /r/, or nasals, or in other styles, excluded. Intercept = 334 at year of birth = 1973. Fixed $r^2 \approx 0.29$; total $r^2 \approx 0.47$.

raising and fronting of TRAP. The LOT-THOUGHT-merging eastern communities have the lowest, backest TRAP; this is unsurprising given that numerous studies have documented lowering and backing of TRAP coinciding with LOT-THOUGHT merger, or progress toward it, in a variety of dialect regions (see, e.g., Clarke, Elms, and Youssef 1995; Boberg 2005; Eckert 2008; Durian 2012; Kennedy and Grama 2012; Bowie et al. 2012; Kirtley et al. 2016). The marginally significant effect of age suggests this expected backing is taking place, apparently led by non-college-educated speakers.[9] Gouverneur and Alexandria Bay both appear to have TRAP intermediate between the raised TRAP of Watertown and Ogdensburg and the low TRAP of the eastern communities. This seems to support the hypothesis of Gouverneur as a non-NCS community without the low back merger and Watertown and Ogdensburg as NCS communities without the low back merger. Post-hoc pairwise Tukey tests find Watertown and Ogdensburg differ significantly in TRAP from all other communities, including Alexandria Bay and Gouverneur, at the $p < .01$ level or better; and Alexandria Bay additionally differs from Potsdam at $p \approx .02$.

REAL-TIME CONCERNS

At this point, however, it is necessary to engage with the fact that the data in Ogdensburg and Watertown was collected 6–10 years earlier than the data in Alexandria Bay and Gouverneur. At the time of the fieldwork, there was no reason to suppose that data collected in 2014 might not be generally comparable to data collected in 2008; the 6-year interval seemed to be short enough that it was unlikely that any of the communities would have undergone a rapid dialect change between the two data collection trips. More recent data, however, has called this into question: in Thiel and Dinkin (2017), we compare the 2008 data from Ogdensburg with new data collected in Ogdensburg in 2016 by Thiel (2019) and find that the height of TRAP in Ogdensburg decreased substantially between the two samples, even among speakers born in the same years. For instance, the five speakers born in the 1980s and interviewed in 2008 all have F1 of TRAP less than 700 Hz (normalized) in spontaneous speech, easily meeting Labov, Ash, and Boberg's (2006) criterion for NCS participation; but all speakers interviewed in 2016, including those born in the 1980s, have TRAP F1 greater than 700 Hz in this style. Thus, it appears that Ogdensburg has effectively lost NCS TRAP-raising over the period between 2008 and 2016.

This means that the relatively unraised TRAP in Gouverneur in the current data set does not necessarily mean Gouverneur differs in dialectological status from Watertown and Ogdensburg. That is, it could be the case that

Gouverneur in 2014 is a NCS community sampled after it has begun to lose the NCS, like Ogdensburg when sampled by Thiel in 2016. Figure 8 shows that Alexandria Bay and Gouverneur's front-diagonal TRAP-raising indices are right in line with those of Ogdensburg in 2016 but not those of Ogdensburg in 2008. So, although Gouverneur and Alexandria Bay don't obviously have substantially raised TRAP in the current data, the data are compatible with a potential description of them as post-NCS communities, like 2016 Ogdensburg. On the other hand, the communities in the eastern half of the sample have TRAP substantially lower, beyond what would be expected for a recent retreat from the NCS. If we exclude the 2007–8 interviews from the current data, looking only at the data collected after the hypothesized loss of TRAP-raising, TRAP in Gouverneur and Alexandria Bay is still significantly higher than in the eastern half of the sample, as shown in table 14.

Does the fact that rapid real-time change in NCS features has been observed in northern New York impel us to change our analysis above of the LOT-THOUGHT contrast? Thiel has kindly given me access to formant measurements from her 2016 interviews, which allows me to compare 2008 and 2016 Ogdensburg in terms of the phonetic indices of LOT-THOUGHT merger. Linear regression models[10] similar to those reported in tables 7 and 9 above suggest that Ogdensburg speakers' adjusted Euclidean distance between LOT and THOUGHT may have been about 60 Hz smaller in 2016 than in 2008 ($p \approx .003$) and that the Bhattacharyya overlap between the two phonemes

FIGURE 8
F2 – (2 × F1) of TRAP in Alexandria Bay and Gouverneur vs. Two Data Sets from Ogdensburg (2016 data courtesy of Anja Thiel)

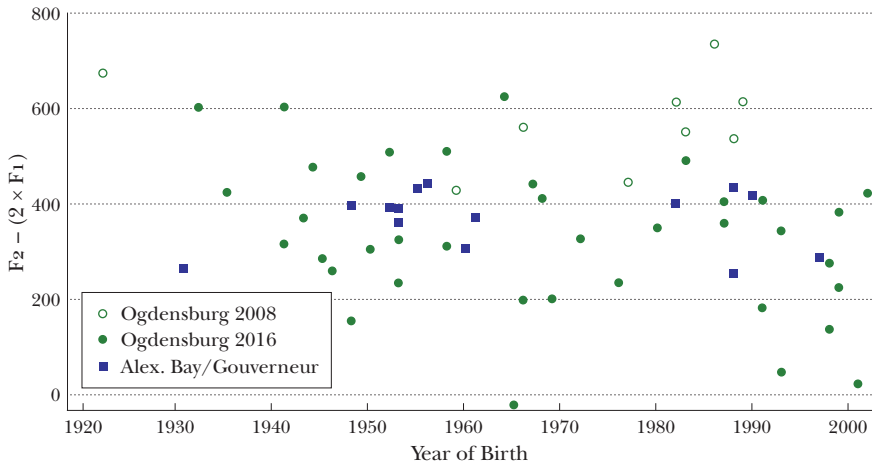


TABLE 14
Multiple Linear Mixed-Effects Regression on F2 – (2 × F1) of TRAP Tokens, with Speaker and Word as Random Predictors

Predictor	*p*	*Value*	*Coefficient*	*n*
East/West	< .001	Alexandria Bay, Gouverneur (W)	70.6	770
		Potsdam, Massena, Waddington (E)	–70.6	990
Year of birth	.05	+1 year	–2.0	1,740
Style	.2	spontaneous speech	17.1	1,393
		word list	–17.1	347
Gender	.2	male	19.9	553
		female	–19.9	1,187
Education	.3	unknown	81.8	102
		bachelor's degree or more	26.9	379
		some postsecondary education	–12.5	415
		high school only or less	–45.6	655
		current HS or college student	–50.1	189

NOTE: Preceding and following consonants included as fixed predictors; omitted here for compactness. Tokens preceding coda /l/, /r/, or nasals, or in other styles, excluded. Binary east/west factor produced a better fit than five-way community factor. Intercept = 249 at year of birth = 1973. Fixed $r^2 \approx 0.19$; total $r^2 \approx 0.35$.

about .2 units greater ($p \approx .0003$). At the same time, Thiel (2019) reports that minimal-pair judgments in Ogdensburg in 2016 were similar to those in 2008, with roughly two-thirds of speakers judging LOT and THOUGHT as distinct and the remaining third (mostly young individuals) giving intermediate or mixed judgments; only one speaker out of 32 judged the two phonemes fully merged. The co-occurrence of maintenance of distinction in minimal-pair judgments with narrowing differences in production makes 2016 Ogdensburg look much more like 2014–17 Alexandria Bay, and in both indices it is still less merged than communities in the eastern half of the current sample.

Thus, the fortuitous collection of new data in Ogdensburg eight years later than the Ogdensburg data that motivated this study suggests a more unified picture of the western half of the area being studied. The retreat of TRAP-raising in real time in Ogdensburg suggests that the lower-than-NCS TRAP in Alexandria Bay and Gouverneur COULD be the result of the same lowering taking place there. The narrowing of LOT-THOUGHT phonetic distance in Ogdensburg, while maintaining distinct minimal-pair judgments, suggests that the same thing COULD have happened in Alexandria Bay. In other words, the data we have here is compatible with the following model:

1. In 2008, the western half of the region under study possessed raised TRAP and distinct LOT-THOUGHT.
2. After 2008, TRAP-raising began to be lost, although so far TRAP is not yet as low as it is in the neighboring eastern half of St. Lawrence County.
3. In at least Alexandria Bay and Ogdensburg, the phonetic distance between LOT and THOUGHT shrank, though minimal-pair judgments remained largely distinct. (The 2014 data from Gouverneur, however, finds that LOT-THOUGHT distance is still large there.)
4. In most of these indices, especially minimal-pair judgments and TRAP height, the difference between the eastern and western regions remains clear.

This model cannot be directly verified, in the absence of newer data from Watertown and (more valuable, but less probable) older data from Alexandria Bay and Gouverneur. But it is the simplest dialectological description that fits the data at hand.

DISCUSSION AND CONCLUSIONS

The principal motivating research question for the current study was the nature of the dialect difference between Ogdensburg and Canton in 2008, reported in Dinkin (2013): did they differ because they are located in different regions or merely because of their different demographic and economic makeup? The data examined here comes down firmly on the side of different dialect regions. The four communities examined in the eastern half of St. Lawrence County all pattern together in all of the indices measured in this article, despite some small differences between them: their LOT-THOUGHT minimal-pair judgments suggest advanced progress toward merger; their LOT-THOUGHT production finds the phonemes relatively close and overlapping; and their TRAP production shows virtually no trace of NCS raising or even of the retreat from TRAP-raising found in 2016 Ogdensburg. The communities in the western half of the sample appear more heterogeneous, but that can be convincingly argued on the basis of the 2016 Ogdensburg data from Thiel (2019) to be the result of real-time change cross-cutting the different years in which data was collected in these communities; moreover, the feature that shows the single most consistent difference between east and west—the LOT-THOUGHT minimal-pair judgments—also appears to be the one showing the greatest stability over real time in Ogdensburg. Thus, although Ogdensburg may be undergoing changes that are making its dialect more similar to Canton now, the reason for the difference between them in the first place does appear to be due to their positions on opposite sides of a dialect boundary, not their differing socioeconomic makeup and levels of dialect contact.

The most instructive comparison is not between Ogdensburg and Canton but between Ogdensburg and Massena, two communities of almost the same size, both situated on the St. Lawrence River alongside bridges into Ontario, both the same distance from the nearby college towns of Canton and Potsdam, with similarly chiefly low-mobility, low-education, working-class populations. Despite the communities' apparent similarities in everything but mere east-west position, Massena patterns with the other eastern communities in showing advanced low back merger, while in Ogdensburg, like the other western communities, change toward merger is still in its early stages. Post-hoc Tukey tests find Ogdensburg and Massena to differ significantly in four of the six regression models calculated in this article (all but adjusted Euclidean distance and the height/backness of THOUGHT). The only probable explanation for this is that there really is a dialect boundary down the middle of St. Lawrence County; demographic and economic patterns are not sufficient to explain the observed differences between communities. Thus, Ogdensburg, Watertown, Alexandria Bay, and Gouverneur are part of the Inland North dialect region (at least the fringe thereof), and Canton, Potsdam, Waddington, and Massena are part of the North Country.

The article's secondary research question was whether the presence of low back merger in northern New York is due to the adjacency of the region to Canada. There is weak evidence that this is at least partially the case. The comparison between the 2008 Ogdensburg data and Thiel's 2016 data shows that in Ogdensburg LOT and THOUGHT are approaching each other in phonetic space (while minimal-pair judgments remain largely distinct); the current data from Alexandria Bay looks very much like that of a community in which that has already happened. On the other hand, Gouverneur appears to maintain more robust phonetic separation between LOT and THOUGHT in data from 2014. Alexandria Bay and Ogdensburg are both sites of Canadian border crossings, while Gouverneur is some distance south of the border. Thus, it may be the case that progress toward the LOT-THOUGHT merger is accelerated in border communities with direct access to Canada, somewhat contrary to Boberg (2000)'s prediction, and takes longer to reach a more distant community like Gouverneur. This, however, is highly speculative given the absence of more detailed data.

The question remains: WHY is there a dialect boundary down the middle of St. Lawrence County, separating Ogdensburg and Gouverneur from Waddington and Canton? The boundary of the Inland North fringe in central New York can be explained in terms of patterns of migration and settlement (Dinkin 2009, 2013); but that account seems unconvincing for St. Lawrence County, inasmuch as communities in both the eastern and western halves of the region were settled largely by migration from western New England.

However, it does suggest that early nineteenth-century transportation patterns could be a fruitful area of history to search for explanations for a boundary in just that place.

As it happens, there was an important barrier to transportation in the early nineteenth century separating Ogdensburg from communities farther east: the St. Lawrence River itself. In the first half of the nineteenth century, Ogdensburg was the easternmost navigable point of the St. Lawrence River heading downstream from Lake Ontario; the river became unnavigable shoals and rapids east of Ogdensburg as far as Montreal. Until the construction of the St. Lawrence Seaway in the mid-twentieth century, river traffic could only bypass these rapids via a series of small canals within Canada (Willoughby 1960). The nineteenth-century *Gazetteer of the United States of America* (Hayward 1854) has this to say about Ogdensburg:

> Ogdensburg is considered as being at the foot of the lake, because there is little descent in the river to this place, below which the rapids commence, and the river navigation ends. [Hayward 1854, 504]

Thus, during the formative years of these communities, Ogdensburg and Alexandria Bay were accessible to shipping from Lake Ontario that points farther east on the river were not. Hayward's description of Ogdensburg as "the foot of the lake" is telling. Dialectologists have often described the Inland North and the NCS as the dialect of the "Great Lakes region" (e.g., Thomas 2000, 368; Gordon 2002, 254; Labov, Ash, and Boberg 2006, 121); in a very real historical sense, Ogdensburg was at the time of its founding the northeasternmost limit of the Great Lakes region. Finding that the Inland North stops at Ogdensburg suggests that the association of the NCS with the Great Lakes themselves is more than just a geographical coincidence.

This is compatible with my hypothesis (Dinkin 2013, 26) about the original spread of the NCS, or its phonetic precursors, in Upstate New York: that the preconditions necessary for the development of the NCS originated in the growing communities of the Inland North core in central and western New York, centered on the Erie Canal, and then diffused along major trade routes to more distant communities in eastern and northern New York that were in regular linguistic contact with the Inland North core, provided they shared the Inland North's western New England–based settlement history. At the time this was happening, Ogdensburg was an immediate part of that network of trade and contact—described by Hayward (1854, 504) as a "place of much trade" with "steamboats daily running through Lake Ontario" in the 1850s—in a way that the eastern part of St. Lawrence County could not be. And although Ogdensburg is no longer a major shipping port today and the construction of the St. Lawrence Seaway in the twentieth century made the

river navigable straight through from the lake to the sea, the dialect boundary has remained in place, not unlike the dialect boundaries in central New York deriving from histories of population movement that are no longer directly relevant to residents' lives.

The presence of the Inland North–North Country dialect boundary in St. Lawrence County is still perceptible today in the status of LOT and THOUGHT and the height of TRAP. But changes trending away from NCS and toward LOT-THOUGHT merger have been documented in many communities of the Inland North, and Ogdensburg and its environs are apparently no exception. Thus, just as we answer the open question from Dinkin (2013, 28) of "which factors really determine the presence or absence of the NCS in far northern New York," the NCS is in the process of fading out in the region. This suggests the dialect boundary between the eastern and western halves of St. Lawrence County may disappear sooner or later, once the phonological features distinguishing the two regions are lost. The era of dialect boundaries in the eastern United States derived from colonial-era and nineteenth-century settlement and transportation patterns may, therefore, be coming to an end at last—perhaps to be replaced by dialect boundaries dependent on more contemporarily salient elements of regional identity, such as state boundaries (see, e.g., Stanford, Leddy-Cecere, and Baclawski 2012) or popularly familiar regions such as "Upstate New York" (see, e.g., Dinkin and Evanini 2010). St. Lawrence County could be a valuable site for future studies examining the apparent obsolescence of a dialect boundary: as salient features such as the LOT-THOUGHT distinction and TRAP-raising fade from the west side of the boundary, will northern New York become dialectologically uniform, or are there subtler differences between the two sides of the boundary that will persist? We are fortunate to have caught the St. Lawrence County dialect boundary at this critical moment in its history.

APPENDIX 1
Interview Rubric for 2014–17 Interviews

Demographic information:

- Age (year born), where born and raised (history of moves)
- Residence: where in town are you living now? Where else have you lived?
- Parents: where born and raised
- Grandparents: where born and raised
- School: where did you go to elementary school? High school?
- Did you go to college? Where?
- Speak any languages other than English?
- Occupation? Parents' occupation?

Travel:

What other towns in the area do you go to regularly, for shopping, work, etc.?
Canton, Ogdensburg, etc.
What about cities like Watertown, Plattsburgh?
Over the river to Canada?
Bigger cities: Syracuse, Ottawa, NYC, Albany, Montreal?
Vacations?

Topics for discussion:

What's happening around town? Major news?
What's downtown like?

Is it easy to get a job here?
Good place to have a family?
Plan to stay here or try to find work someplace else?

Where do people go for fun on weekends? On vacation?
Anything you do in town for fun?
What are the sports that people are interested in? What teams?

What was school like here as a kid?
Tough teachers? Fights?
Any place, when you were a kid, you weren't supposed to go?

Distinctive accents in St. Lawrence County?
Do people talk the same here as in Ogdensburg? Canton? Canada? NYC?

NOTE: Not all interviews followed this exact series of "topics for discussion"; participants were allowed to guide the conversation to topics that interested them.

APPENDIX 2
Word List for 2014–17 Interviews
(listed in order of presentation)

hot	tool	dress	body	documentary	writer	yes I can
slow	step	put	pen	fire	alcohol	calm
but	nurse	hoed	camel	trap	merry	about
boat	weight	could	strut	head	heart	valve
don	ship	tour	prize	hammer	write	bit
kit	board	stay	go	free	horse	hold
play	cash	hang	cider	pull	bat	path
planning	storm	choice	dollar	for	sigh	duel
sacks	home	fleece	tune	dawn	complimentary	law
boot	bag	near	hate	sure	thought	seed
hoot	howl	beet	traffic	mat	pin	father
and	bath	spa	here	cot	cure	school
doll	ham	laugh	pal	price	ebb	gull
caught	tile	hut	goose	pass	group	mad
Mary	tall	marry	face	bother	socks	beard

tin	cloth	elementary	plate	lot	rug	planet
can	sad	bait	dog	solve	taller	four
few	boy	ride	had	hog	hook	full
bet	force	foot	draw	loud	hide	hair
north	bowl	key	bed	cry	coin	hoarse
bite	heed	soap	goat	spider	rider	moss
cab	start	square	bard	shout	hurt	palm
wire	hid	hum	crown	bared	mouth	fool

APPENDIX 3
Minimal and Near-Minimal Pairs for 2014–17 Interviews

Interview subjects were shown these pairs of words and asked to pronounce them, and answer (in the case of the pairs with the same initial consonant) whether they thought they were pronounced the same, or (in the case of different initial consonants) whether they thought they rhymed.

caught/cot	don/dawn	marry/Mary	spider/lighter
bother/father	higher/fire	writing/riding	

NOTES

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1. As a popularly recognized geographical/cultural region, the term "North Country" encompasses the entire portion of New York State north of the Adirondacks. As a dialect region, introduced in Dinkin (2009), "North Country" includes only those portions of northern New York that are outside the range of the NCS and show advanced progress toward low back merger. Although this article investigates both sides of the boundary of the dialectological North Country, all of the communities examined are part of the North Country in the nonlinguistic geographical sense.
2. According to Hough (1853, 279), Canton's earliest families were "most of them […] from Vermont." Meanwhile, Merriam (1907) states that Ogdensburg's settlers arrived from New England via two routes: westward from New England via central New York and then north via Lake Ontario; and north via Lake Champlain and then west. Although it is possible that Ogdensburg's and Canton's settlers originated from different parts of western New England—Canton from Vermont

and Ogdensburg from the same Connecticut and Massachusetts sources as other Inland North communities—this is not sufficient to explain the sharpness of the dialect boundary between the communities. In any case, Vermont itself was settled from those Connecticut and Massachusetts sources as well, so Canton would share that dialectal heritage.

3. U.S. Census figures presented throughout are based on 2010 American Community Survey 5-year estimates, based on data collected from 2005 to 2009 (http://data.census.gov).
4. One speaker moved to Potsdam at the age of eight from the nearby village of Norwood; one attended elementary school at the Madrid-Waddington Central School but high school in Potsdam. Both are counted as Potsdam speakers for the purposes of this study. One was born and raised in Massena but moved to Potsdam as an adult; he is counted as a Massena speaker.
5. Even in Waddington, the younger of the two speakers with a score of 4 was born in 1963, substantially older than the median age of the entire sample.
6. The one Alexandria Bay speaker whose minimal-pair judgments were merged was also the one whose formants could not be measured due to poor recording quality.
7. This regression does not find significant effects of speech style or education level, and the effect of age is marginally significant. Inasmuch as different communities have been shown to have different statuses with respect to the LOT-THOUGHT merger, it is probable that some of these predictors may have different effects on F2 of LOT in different communities; however, due to the small sample size in some communities, it seemed inadvisable to test for significant interactions between community and other social predictors in this data set; doing so would run the risk of overfitting the data.
8. Terms for preceding and following consonant are included in the regression model, but omitted from regression tables for conciseness since they are not relevant to the current analysis. Preceding consonant is coded according to the default FAVE output; following consonant is coded according to individual phonemes by combining the FAVE codes for following manner of articulation, place of articulation, and voicing.
9. A model using a binary east-west geographic variable instead of the eight-valued community variable is a worse fit than this model in terms of Akaike information criterion. However, using a binary variable leads to a significant interaction between east-west position and year of birth ($p \approx .02$) that indicates that the apparent-time backing of TRAP is only present in the more LOT-THOUGHT-merged eastern half of the data.
10. The full models are omitted for conciseness.

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