Changing Phonology, Stable Borders:
The Low Back Merger in Northern New York

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Dialect regions of **Upstate New York** (Dinkin 2009, 2011, 2013) include:
• Inland North (central and western NY): characterized by Northern Cities Shift
• North Country (northeast corner of NY): advanced LOT/THOUGHT merger; no NCS
LOT/THOUGHT merger mostly absent in Inland North; but strongest incipient evidence for
   it is at **northern edge** of Inland North, near Canada and North Country (Dinkin 2011).

Boundary between Inland North & North Country is in **St. Lawrence County**—
   sparsely-populated rural region (16/km²), across St. Lawrence River from E Ontario—
   sharply separating communities of **Ogdensburg & Canton**.

Research questions in this paper:
1.   Is merger in northern NY **due to proximity of Canada**?
     • Nearest large cities are in Canada—likeliest source of diffusion?
     • But Boberg (2000) argues sound change doesn't diffuse across the border.
2.   **Why is there a dialect boundary** between Ogdensburg and Canton?
     • Boundary is quite sharp—no other populated places between the two
     • Settlement history (Dinkin 2013)? But it's not that clear in this region.
     • They differ in several economic & geographic features:

Ogdensburg	Canton
city	village
on the river, with border crossing	20 miles from the river
low population born outside NY	high population born outside NY
low middle-class population	high middle-class population
two prisons	two universities
further west	further east

This study: broader examination of St. Lawrence region—
   4 communities **along St. Lawrence River**, 4 about 25 miles south of it (see map).
28 interviews conducted 2007–8 (Dinkin 2009, 2011, 2013):
   Canton (9), Ogdensburg (9), Watertown (10)
24 new interviews, conducted in 2014 using the same methodology:
   Alexandria Bay (4), Gouverneur (5), Massena (4), Potsdam (6), Waddington (5)

New interviews' normalized formant measurements extracted with FAVE (Rosenfelder et al. 2011);
   old interviews' vowel measurements were renormalized for comparability.
One Alexandria Bay speaker's formants were not measurable due to too much background noise.
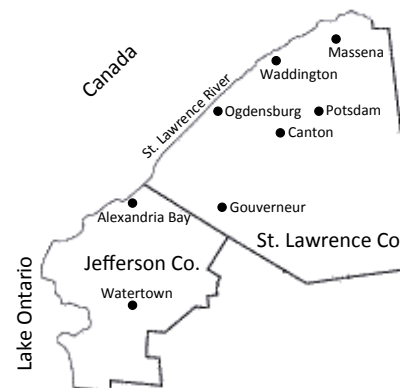
Jefferson and St. Lawrence Counties, showing communities sampled in this study

Significant **differences between towns** and **apparent-time change toward merger** were
   found in linear-regression models of multiple indices of LOT/THOUGHT merger.

Minimal-pair judgments:
   each speaker[1] gave judgments on two minimal pairs (usually *cot-caught*, *don-dawn*);
   each speaker is assigned score from 0 (both pairs merged) to 4 (both pairs distinct).
Linear regression model of judgment score vs. town, year of birth, gender, and education
   predicts these scores[2] by town:

Alex Bay: 3.66	Ogdensburg: 3.71	Waddington: 2.06	Massena: 1.33
Watertown: 3.71	Gouverneur: 3.48	Canton: 1.45	Potsdam: 1.28

Sharp difference **between eastern & western halves** of data: more merged on east side.

Apparent-time trend toward merger in judgments ≈ –0.45 per decade

Adjusted Euclidean distance (Nycz & Hall-Lew 2014) estimates F1/F2 distance
   between speakers' central phonetic targets of LOT and THOUGHT phonemes.
Linear regression of speakers' ED-Adjusted vs. town, year of birth, gender, and education
   predicts these distances by town:

Alex Bay: 193	Ogdensburg: 268	Waddington: 150	Massena: 151
Watertown: 299	Gouverneur: 261	Canton: 121	Potsdam: 143

Still an east-west difference, but **Alex Bay is now atypical of western half**;
   LOT/THOUGHT substantially closer there than other towns with non-merged judgments.

Apparent-time trend toward shrinking Euclidean distance ≈ –25 Hz per decade

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[1] One speaker in Waddington ended the interview without completing elicitation tasks.
[2] All modeled results shown by town set year of birth = 1976, the median age of the sample.

Bhattacharyya's affinity (cf. Strelluf 2016, Johnson 2015):
    measures **degree of overlap** between phonetic distributions of two phonemes,
    ranges from 0 (completely separate) to 1 (total overlap).
Model of speakers' Bhattacharyya affinity of LOT/THOUGHT phonemes (excluding pre-/l, r/)
    vs. town, year of birth, gender, education predicts these values by town:

Alex Bay: .679	Ogdensburg: .396	Waddington: .692	Massena: .731
Watertown: .303	Gouverneur: .395	Canton: .705	Potsdam: .715

Alexandria Bay now solidly patterns with the eastern half as more merged.
Apparent-time trend toward increasing overlap ≈ +.04 per decade

Results so far:
• **Sharp boundary** between more merged east half, unmerged west half
• Merger **progressing in apparent time** throughout the region
• Alexandria Bay patterns as unmerged in judgments but more merged in production
    (Phonetic measurements only represent 3 speakers in Alex Bay; maybe small-sample fluke?)
• Proximity to Canadian border does not appear to play much role in degree of merger

Watertown & Ogdensburg maintain distinction by having **LOT fronter** than other towns,
    but Gouverneur maintains it **without** fronting LOT:

Alex Bay: 1432	**Ogdensburg: 1580**	Waddington: 1431	Massena: 1433
Watertown: 1588	Gouverneur: 1484	Canton: 1473	Potsdam: 1402

Mixed-effects linear regression of LOT F2 vs. town, year of birth, gender, education, style, phonetic
environment factors[3]; speaker and word as random effects.

Does Gouverneur have higher THOUGHT than other towns, to compensate?
    Possibly, though not to the level of statistical significance.

Alex Bay: 798	Ogdensburg: 794	Waddington: 813	Massena: 825
Watertown: 788	**Gouverneur: 759**	Canton: 817	Potsdam: 778

Mixed-effects linear regression of THOUGHT F1, as above.

Why the difference between Gouverneur vs. Ogdensburg/Watertown?
    LOT-fronting and THOUGHT-lowering are **part of Northern Cities Shift**.
Compare another indicator of NCS, **raising and fronting of TRAP**:
    much less present in Gouverneur, than Ogdensburg, Watertown, or even Alex Bay.

Alex Bay: 391	**Ogdensburg: 539**	Waddington: 189	Massena: 233
Watertown: 530	Gouverneur: 278	Canton: 190	Potsdam: 171

Mixed-effects linear regression of front diagonal index (F2–2F1) of TRAP,
    as above but also excluding prenasal tokens.

• Watertown & Ogdensburg: low back distinction **with NCS**
• Gouverneur: low back distinction but **substantially less evidence of NCS**
• Alex Bay: low back distinction in judgments only; intermediate NCS in TRAP
• eastern half of sample: low back merger, no NCS

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[3] Treatment coding sets reference level as null onset, /t/ coda. Tokens preceding /l/, /r/ are excluded.

Is low back merger in northern NY due to proximity of Canada?
    Towns closer to Canada aren't consistently associated with more (or less!) merger.
    Alex Bay may be an exception, but merger there has a different character than the eastern half.

Why is there a dialect boundary between Ogdensburg and Canton?
    NCS is present in Watertown, Alex Bay, Ogdensburg, but not elsewhere. Why there?
In 19th C., Ogdensburg was the **easternmost limit of shipping** from Lake Ontario:
    "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; cf. also Willoughby 1960:1)
So the dialect boundary represents a break in historical patterns of transport/commerce—
    no longer relevant to today's transportation, but still reflected in dialectology.

Why does Alexandria Bay have low back merger in production?
• Small towns near dialect borders seem less dialectally stable than cities (Dinkin 2009);
    population of Alex Bay is only 1000, vs. Ogdensburg 10,000, Watertown 27,000.
• More mobile population, tourist town: more dialect contact in Alex Bay?
• And the three speakers measured may just be an unrepresentative small sample.

Why does Gouverneur lack NCS while Watertown and Ogdensburg data have it?—
    possible result of **real-time change**? Did it **originally** have NCS, but lose it?
New fieldwork by Anja Thiel (p.c.) finds Ogdensburg has **mostly lost NCS** since 2008;
    Maybe Gouverneur is the same, and 2014 data postdates loss of NCS there?

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