# The Effect of Language Ideologies on the Canadian Shift: Evidence from /æ/ in Vancouver, BC and Seattle, WA[1]

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**Abstract**

*Language ideologies have been acknowledged as an important factor in linguistic behavior, and all the more in border regions. This work considers the variable ideologies held by English speakers in Seattle, WA and Vancouver, BC as predictors of speakers' phonetic realizations for /æ/, a defining and diagnostic dialect feature of the region. The data reveal asymmetrical ideologies of sameness: Vancouver speakers perceive Seattle inhabitants as culturally and linguistically more similar to them than vice versa. For Vancouver, /æ/ is more fronted for speakers who emphasize more similarity with their cross-border counterparts, which entails less participation in the Canadian Shift. Seattleites' production is affected by a different locally salient ideology: the importance of local shopping, which is a significant predictor of a more retracted /æ/. The findings raise awareness about the role of ideology in sound change and introduce questions about the role of social meaning and gender.*

**Keywords:** language ideology, Canadian English, Seattle English, BAT retraction, sociophonetics

## 1. *Introduction*

**Borders**

In the current political climate, national geopolitical borders have become an important part of societal discourse. For social psychologists, anthropologists and linguists, they have been of interest for some time as a locus of both contact and ideological separation. Liebkind (1999), for instance, grounds her discussion of language and ethnicity in terms of an individual's need to identify with particular social groups and to positively distinguish their own social group from other groups on valuable dimensions. Geopolitical borders provide a powerful symbol for this social psychological distinction, and language is an intimately connected factor. Dialectology as a subfield of linguistics arose in the social and political climate of 19th century Europe, which was driven by nationalism and envisioned language as a critical symbol of sociocultural cohesion at the national level.

This nation-state drive set the tone for the earliest dialectological studies, and it continues to set the tone for theoretical formulations about the way national borders affect language attitudes and speech behaviors. While nationalism tends to pressure nations to unite under one language, globalization has yielded seemingly boundless contact and information exchange across national boundaries causing scholars to describe the modern state as 'borderless' and fluid (Ohmae 1999). This creates a social psychological tension eloquently conveyed by Friedman (2007): "Borders are fixed and fluid, impermeable and porous. They separate but also connect, demarcate but also blend differences... Borders are used to exercise power over others. They regulate migration, movement, and travel, the flow of people, goods, ideas, and cultural formations of all kinds... They insist on purity, distinction, difference but facilitate contamination, mixing, creolization." (S. Friedman 2007, p. 273)

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Among regions where economic and cultural exchange over a national border seems likely is the Pacific Northwest, also known as Cascadia, a region typically thought to span from Oregon through Washington State and north to British Columbia. The settlement patterns of the Canadian and American West, in particular, have allowed for significant exchange and overlap throughout the region's history. In the West, a strong regional identity spans the national border, making it somewhat unique as a region in contrast to other transborder regions of the U.S.-Canadian border to the east. The multidisciplinary body of work proposing Cascadia as the ideal candidate for a move toward transnational policies and a transborder regional identity is a testimony to this regional solidarity (Alper 1996, Cold-Ravnkilde, Singh, & Lee 2011, Smith 2004). In fact, Cascadia has been described as a reference case for "the neo-liberal vision for a transborder region" (Sparke 2000).

Where does language fit in to this region characterized by strong sociocultural solidarity as well as a national border? To what extent does language shape our conceptualization of the border and to what extent is language shaped by speakers' conceptualizations of the border? A limited number of studies in linguistics consider the role of the U.S.-Canadian border, and none of these focus on the unique Pacific Northwest region. Boberg (2000) illustrates that geopolitical borders are resistant to sound change, and that traditional models for sound change, such as Trudgill's (1974) gravity model, do not accurately predict the lack of diffusion across a national border. Boberg shows that for Detroit, MI and Windsor, ON, such a model would predict the adoption of Northern Cities vowel shift features by Windsor speakers, which does not actually occur in Boberg's data. He speculates that national borders may impede the spread of sound changes, though he does mention a potentially important role of ideology, which goes largely unaddressed in his (2000) study. Do speakers' ideologies manifest differently in the Pacific Northwest and how does this relate to sound change?

## 2. Background

### Language Ideologies

A variety of researchers have discussed ideological processes related to individual's perception and production, especially relevant in border regions. Like Leibkind (1999), Auer (2005) argues that linguistic divergence is caused by the cognitive and social psychological process of imagining those on the other side of the border as different from us. Irvine and Gal (2000) describe ideological practices of *erasure* (not perceiving differences that exist) and *fractal recursivity* (projection of perceived contrasts from one level of the system to another). According to Irvine and Gal, these processes occur simultaneously and continuously and can affect all levels of the linguistic and sociolinguistic system. Lippi-Green (1997) describes what she terms the "myth of non-accent," which is itself a social psychological process individual and societies may espouse when they describe themselves or certain speech communities as "not really having an accent."
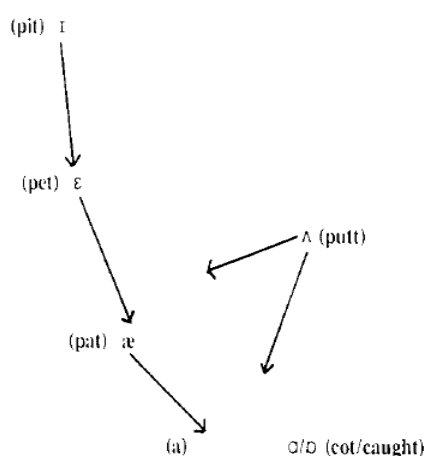
Research has illustrated that the ideological construction of difference (or its flipside, sameness) relates to linguistic production and perception. Niedzielski (1999) shows that Michigan talkers' perceptual judgments of a constant speech signal were affected by being told that they were listening to a Canadian as opposed to an American talker. Becker et al. (2014) found that Oregon speakers who expressed an ideology of sameness in a class folk dialectology map-labeling task were also less likely to participate in the California Vowel Shift and more likely to participate in BAG raising, another feature of Pacific Northwest English. Evans (2011) and (2013) shows that this ideology of sameness does exist among a minority of Washington speakers who believed that everyone throughout the state sounded the same, though her study does not examine the direct link to production or acoustic perception.

### The Canadian Shift/West Coast Shift

The Canadian Vowel Shift was first described by Clarke, Elms, and Youssef in 1995 (shown below in Figure 1). It has been the subject of many subsequent studies and has been more recently termed "the Elsewhere Shift." The shift is typically thought to be a pull-chain characterized first by the lowering and backing of /æ/ toward /ɑ/ following the COT ~ CAUGHT merger. The Atlas of North American English sets the threshold of F2 < 1825 Hz as a diagnostic for /æ/ retraction. Boberg (2008) describes the Canadian Shift as a pan-Canadian change in progress and gives a normalized mean of 1724 Hz for /æ/ across the country as whole. As subsequent steps in the chain shift, /æ/ backing is followed by the lowering and backing of the other front lax vowels, /ɛ/ and /ɪ/. Grama and Kennedy (2009) observe that the Canadian Vowel Shift looks just like the California Vowel Shift, but Kennedy and Grama (2012) speculate that the phenomena must be independent of one another. The research traditions have continued to address the two shifts independently, despite their obvious structural similarities.

No large-scale studies outside of the ANAE have directly compared this vowel shift taking place in Canada and in other regions of the U.S., like California or the Northwest. In Canada, /æ/ retraction is thought to be a female-led change in progress more advanced in Vancouver than in Toronto (Esling & Warkentyne 1993, Pappas & Jeffrey 2014). There has been some discussion of whether the apparent time movement of /æ/ has been strictly backing on the F2 dimension or whether it has involved lowering. Sadlier-Brown and Tamminga (2008) find that retraction is characterized only by backing on the F2 dimension in Vancouver, while also accompanied by lowering on the F1 dimension in Halifax. Few studies have used acoustic information to investigate the progression of the change based on surrounding phonetic environment. Hall (2000) is one exception. While this study relies on a small speaker sample and impressionistic coding, Hall argues that following laterals and fricatives favor retraction. More recently, Umbal (2016) finds that Filipinos in Vancouver are also participating in /æ/ retraction. A larger-scale acoustic analysis of /æ/ retraction will shed light on the phonetic motivations of this change as it progresses.

**Figure 1: The Canadian Shift by Clarke, Elms, Youssef (1995)**



### Ideologies in the California Shift

Prior research on a structurally similar sound change in California and Oregon has made evident the important role of speakers' ideologies in predicting their participation in the change. Podesva et al. (2015) find that the opposition between country and town ideology is related to the progression of the California Vowel Shift in Redding, CA. Ethnographic and ideological studies of Canadian speakers engaged in the Canadian Vowel Shift are few to non-existent, to the author's knowledge. As Gal and Irvine (1995) note, researchers and scholars may perpetuate an ideology of difference through their methodological choices and analyses. Previous studies of the Canadian/California Vowel shift(s) have treated in isolation a very similar structural change happening "separately" on either side of the U.S.-Canadian border, exemplifying the effect of this meta-ideology on the research paradigm itself.

### Research Questions for the Current Study

The research questions for the present work follow from the issues addressed previously in the literature and the remaining gaps:

1) Are Vancouver, BC and Seattle, WA speakers participating similarly in /æ/ retraction?
2) What acoustic/phonetic factors affect /æ/ retraction?
3) What ideologies do Vancouver and Seattle speakers have about their own speech and the speech of natives from the other city?
4) How do speakers' ideologies about the national border and their perception of counterparts from the other city relate to their participation in this sound change in progress?

## 3. *Methods*

### Speaker Sample

The data were gathered from a balanced sample of 39 speakers in Seattle and Vancouver who identified as native speakers of English, moved to their home city no later than age 7 and had completed at least their elementary and secondary education in there. In a few cases, residents had lived away for a year or two, but had moved back and were currently living, working or attending school in either Seattle or Vancouver. An overview of this distribution by Age and Sex is shown in Table 1.

**Table 1: Speaker Sample in Seattle and Vancouver**

|  | Age Group 1 (18-25) | Age Group 2 (26-36) |
|---|---|---|
| Men | 5 | 5* |
| Women | 5 | 5 |

*Only 4 speakers were included for Men, Age Group 2 in Vancouver Speakers were recruited

It is worth noting that this sample does not constitute the full range of ages that would typically be included in an apparent time study. The age groupings are *emically* defined by life phase and may still show meaningful differences with respect to linguistic behavior, but they have a limited ability to identify patterns of language change across many generations of speakers (Eckert 1998).

### Acoustic Analysis

The data presented in this study were collected by the researcher in 2014-2015 via a series of word-list reading tasks and sociocultural interviews with speakers of Seattle and Vancouver English. The data were recorded as .wav files using a Zoom 4h handheld digital recorder. The word list elicited the following for each speaker: 5 phonemes X 6 following contexts (place/manner) X 2 voicing contexts X 3 repetitions for a total of 660 tokens per speaker. Speakers read one repetition of the word list, took a break to answer some sociocultural interview questions, read another repetition of the word list, and so on. The sound files were imported into PRAAT and were transcribed, force-aligned and extracted using the FAVE suite (Boersma & Weenik, 2014 and Rosenfelder et al. 2011, respectively). The data were hand-checked for accuracy using a PRAAT script by Riebold (2014).

### Statistical analysis

The current analysis of /æ/ retraction contains 13,020 tokens from Seattle talkers and 12,190 tokens from Vancouver talkers. No instances of /æg/ or /æN/ are included in this analysis. The data were Lobanov (1971) normalized data prior to being subject to mixed-effect regression models, though some descriptive statistics are presented here in raw Hertz to give better intuitive insight into the position of the vowels (Adank, Smits, and van Hout 2004). The data were graphed and plotted in R using ggplot2 (Wickham 2009). LMER models were constructed first for F1 and F2 in each city independently and then across cities using the lme4 package in R (Gorman 2009, Bates et al. 2015). The mixed-effects linear regression models included phonetic factors defined a priori to be relevant (such as manner of articulation of the following consonant), sociolinguistic factors, as well as random effects for Word and Speaker. These models also included interactions established in prior literature as relevant, such as duration and the following constant, for instance. The mixed-effects models included dynamic comparisons of formant trajectory shape by modeling the values across 5 time-proportional points of the vowel's duration as an ordered factor (Sonderegger, pc.). Factors that did not serve to significantly improve the model were removed. Models were compared by ANOVA and their AIC values were considered. The best model selected was that with the highest predictive power and fewest terms.

### Sociocultural Interview Methods

The sociocultural interview was designed to get a better understanding of the participants' local history, their views on the Pacific Northwest as a region, and their sense of national, regional, and municipal identity. Questions were adapted in part from the Q-GEN II sociocultural interview modules (Labov 1973-77). It also explored the various ways participants might express or enact their affinity or connection to their own city, and to a lesser extent, the other city.
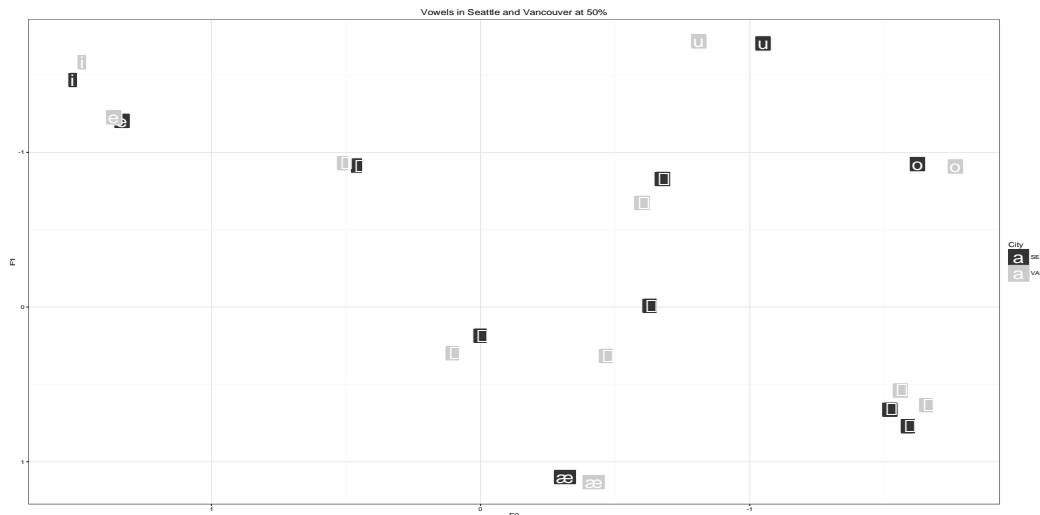
The interview contained a mixture of question types with many Likert-scale type questions and other open-ended, free response questions. The Likert-scale questions were normalized prior to inclusion in the mixed-effect linear regression models. While a wide range of these questions were tested to determine whether they were associated with speakers' production, they were removed or not included in the final model if no significant effect was found and if they did not significantly improve the model as judging by the AIC value. The relevant questions for the current analysis are a set of 3 Likert-scale questions about the similarity of different pairs of cities and a set of 4 Likert-scale questions about the frequency/importance of shopping local in their city and in the region. The last set of open-ended questions about their impressions of people's speech in the opposite city is also relevant here. Participants were asked whether they had any impressions of speech in the other city, if they ever noticed that people from the other city talked differently than they did and whether they thought they would be able to accurately identify someone as being from the other city if they overheard them talking. Speakers' responses to these questions were considered individually. If respondents mentioned that people from the other city "sounded similar," "not really different," "pretty much just like us," or "all the same," they were assigned a "Yes" valued for the ideology of sameness.

## 4.  Findings

**Vowel Space**

The full vowels spaces for Seattle and Vancouver speakers are compared below. These plots are an overview and do not account for allophonic differences according to phonetic environment or for dynamic vowel-inherent spectral change over the duration of the segment. Overall, the vowel spaces for Seattle and Vancouver speakers show relatively small differences. There appears to be some variation in terms of back vowel fronting across the two cities with /u/ more front in Vancouver and /o/ more front in Seattle. For the front lax vowels in question here, the differences are slight: /ɛ/ appears slightly lower and frontier for Vancouver talkers, while the Vancouver /æ/ does appear slightly backer. A more thorough investigation of the role of phonetic environment in /æ/ retraction is presented in the following sub-sections.

**Figure 2: Monophthongal Vowels for Seattle and Vancouver Speakers at 50% Duration**



**BAT retraction in Vancouver**

This section will provide an overview of the acoustic analysis for /æ/ retraction including descriptive statistics and the results of the mixed-effects linear regression model. The complete output of significant factors in the model will be presented in the following section. Vancouver speakers had a normalized F2 mean of 1685 Hz and an F1 mean of 836 Hz preceding a stop. The largest significant effects in the model were found for preceding and following phonetic environments. Significant effects were also found for sex and age group. Manner of articulation of the following consonant was a significant predictor of F2 values for /æ/ with fricatives and laterals being more retracted than stops (Coef. 0.238 on -0.788 Int., p= 0.00). A following lateral is coarticulatorily predicted to lower F2 values, yet for Vancouver speakers /æ/ before a fricative is not significantly fronter than before a lateral.

These two following environments pattern together and slightly, but significantly, differently than a following stop. One specific preceding phone, /r/, was found to have the effect of lowering F2 values for the following vowel such that RAT was more retracted than BAT (Coef. -5.43 on -0.788 Int, p = 0.00). Two social characteristics of the speaker were also found to be significant predictors of F2 values: age group and sex. Women had lower F2 values than men, meaning a more retracted pronunciation for /æ/ (Coef. 0.139 for men compared to women as baseline of  -0.788 Int., p =0.02). Likewise, younger speakers had more retracted pronunciations of /æ/(Coef. 0.135 for older group on -0.788 Int., p = 0.02). There was generally less social variation on the F1 dimension, with no significant main effect of sex or age group. This suggests that for Vancouver speakers, /æ/ retraction is a change that takes place primarily on the backing rather than lowering dimension.
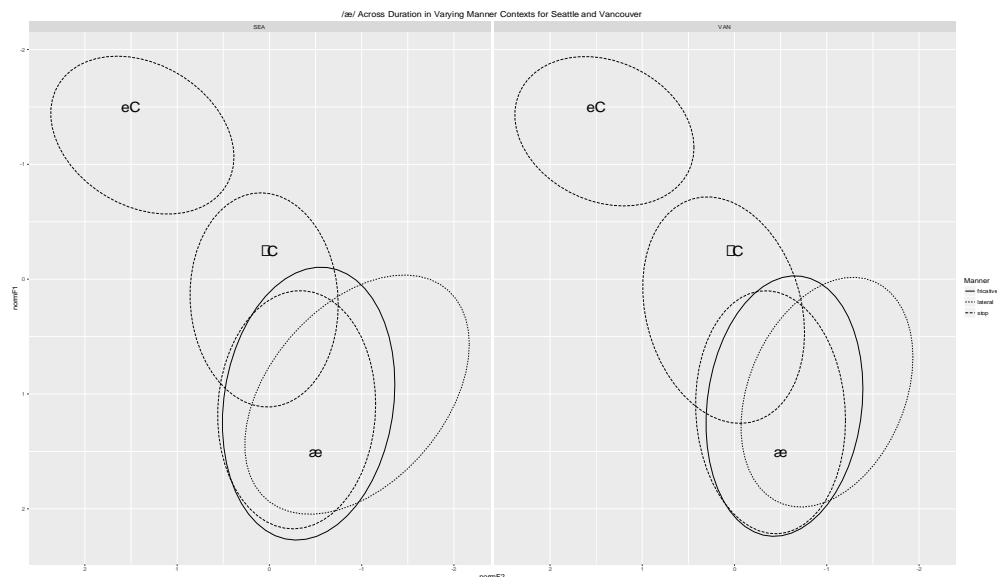
**BAT retraction in Seattle**

Seattle speakers had an unnormalized F2 mean of 1737 Hz and an F1 mean of 820 Hz preceding a non-nasal, non-/g/ stop. While this F2 value is not as low as for Vancouver, it is still lower than the threshold set by the Atlas of North American English, thereby fitting the criteria for "retracted." As for Vancouver speakers, manner of articulation of the following consonant had a significant effect on F2 values for Seattle speakers' realization of /æ/. Seattle speakers' tokens of /æ/ were significantly more retracted before laterals (Coef. -0.531 on -0.452 Int., p <0.000), but they were not significantly more retracted before fricatives than stops (Coef. 0.107 on -0.452 Int., p = 0.06). There were no significant main effects of sex or age group on F2 values for Seattle speakers.

**Comparing BAT retraction in Vancouver and Seattle**

The figure below compares Seattle and Vancouver speakers' realizations of /æ/ at onset in various following manner contexts relative to front vowels /ɛ/ and /e/. The vowels were specifically plotted at onset because this should be prior to the coarticulatory effects of the following consonant. Differences by following manner at onset are stronger evidence that the coarticulatory effects of the following consonant have become conventionalized and may reveal more about how the change is progressing by phonetic environment. It is noteworthy that, while significant differences do emerge in the regression model comparing Seattle and Vancouver, the differences appear to be relatively small when presented visually.

**Figure 3: Ellipse Plots for /æ/ at Onset in Following Manner Contexts with Front Vowels for Seattle and Vancouver**



When the /æ/ tokens were pooled for comparison across both cities, city emerged as a significant predictor of F2 values. Vancouver speakers had significantly lower F2 values, indicating a more retracted variant of /æ/ (Coef: -0.332 on -0.445 Int., *p*<0.000). The main effect of following phonetic environment was significant and also manner of the following consonant interacted with city to significantly affect F2 values. In each following manner environment, Vancouver is more retracted. Across both cities, no main effects were found for age Ggroup or sex. There was a somewhat surprising significant main effect of city on F1 indicating a lower F1 value for Vancouver speakers (Coef: -0.431 on -0.454 Int., p <0.000). This would correspond with a higher vowel for Vancouver.
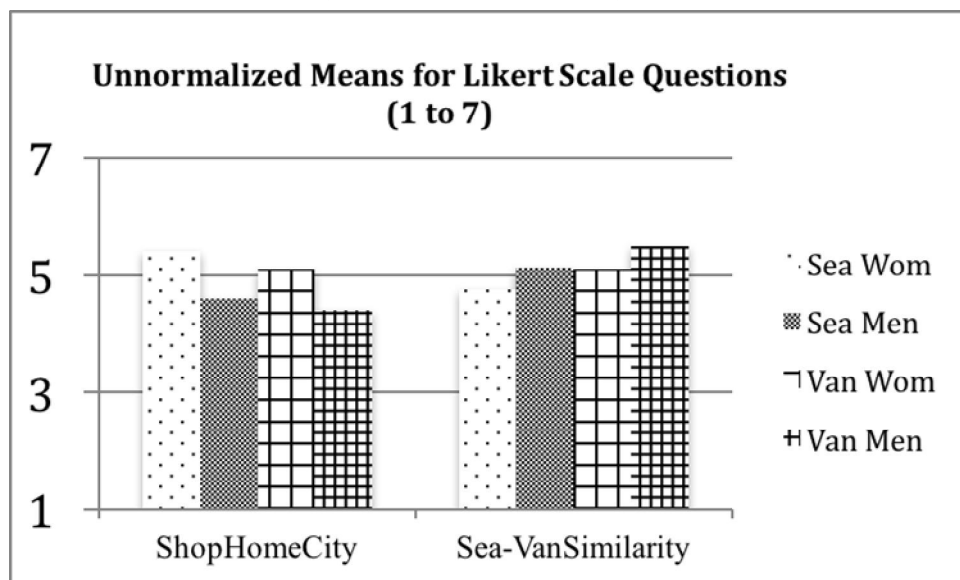
**Speaker Demographics**

Overall, the Vancouver and Seattle speakers showed a considerable degree of similarity in terms of their self-identifications of class, their age, education status and the diversity of neighborhoods they represented in their respective cities. In both cities, the majority of speakers identified as middle-class and had obtained, or was in pursuit of, an undergraduate college degree. The median age in Vancouver was 26; 25 in Seattle. Speakers from both cities represented a range of urban neighborhoods and some near suburbs. One difference between the two cities related to participants' ethnic identities. Five speakers identified as Asian Canadian in the Vancouver sample while two speakers identified as African American in the Seattle sample. Nonetheless, participants from Seattle and Vancouver had very similar views of their regional Pacific Northwest identity, regardless of their nationality or ethnic identity. They characterized the region as being socially and politically liberal, environmentally-motivated, and to some extent, disconnected from the rest of its country. Vancouver participants did have higher ratings for their national pride than Seattle participants, and Seattle speakers were more likely to make negative evaluative comments about their nationality or national pride.
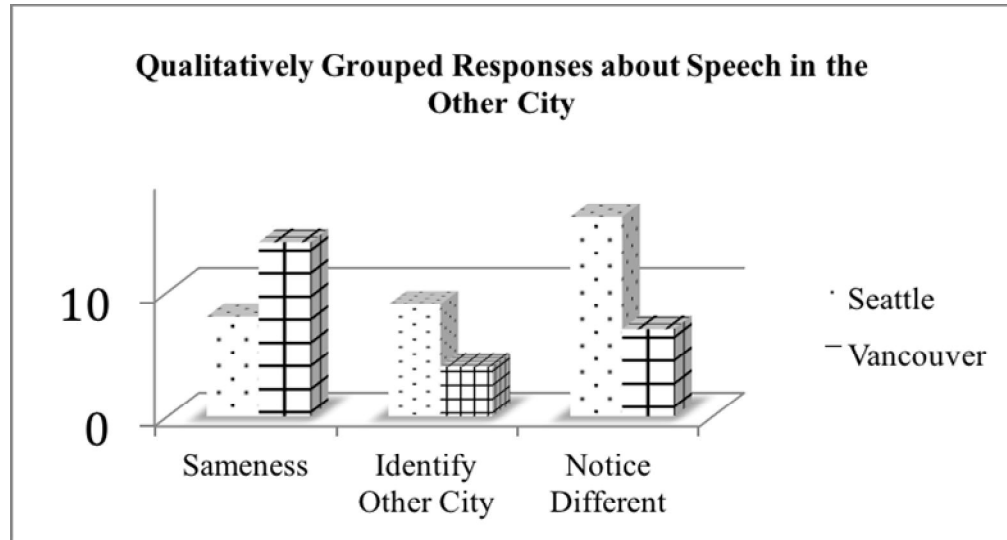
**Speaker Ideologies**

Despite these similarities in macro-sociological and demographic categories, participants from Seattle and Vancouver showed important ideological differences. These were especially evident in participants' responses to questions about the similarity of Seattle and Vancouver and the importance of shopping from local businesses in their home city. The graph below summarizes the responses to these two questions for Seattle and Vancouver participants, with sexes represented separately.

**Figure 4: Participants' Ratings of Seattle and Vancouver's Similarity and the Importance of Shopping Locally from Their Home City**



With respect to Seattle and Vancouver's similarity, an interesting pattern emerges: Vancouver respondents rate the similarity of Seattle and Vancouver as significantly higher than Seattle respondents (t-value = 2.4, p=0.03). Vancouver rates Seattle and Vancouver's similarity at 5.3 on a 7-point scale (SD=0.71); Seattle speakers rated them at 4.9 out of 7 (SD=0.84). Furthermore, men in both cities rate the pair of cities as more similar than women do. In response to the importance of shopping from local businesses in their home city, however, it is Seattle respondents who provide a higher rating than Vancouver respondents. Again, women in both cities rate the importance of local shopping as higher than men. The chart below shows speakers responses to questions about the speech of the opposite city. Fourteen of 19 Vancouver speakers exhibited an ideology of sameness in their response. In contrast, only eight of 20 Seattle speakers articulated an ideology of sameness. Nine of 20 Seattle talkers felt confident that they could identify someone as being from Vancouver if they overheard them talking. Only four of 19 Vancouver speakers felt they would be able to identify someone as being from Seattle based on their speech. Finally, the majority of Seattle respondents (16 out of 20) noticed that people from Vancouver talked differently than they did, whereas only seven of 19 Vancouver respondents noticed this about Seattle talkers.

**Figure 5: Participants' Ratings Regarding the Similarity or Difference of Speech in the Other City**



As will be further discussed in the subsequent sections, these findings reveal asymmetric ideologies of sameness between Vancouver and Seattle participants and also highlight the differences in salient local ideologies between the two cities with similarity of Seattle and Vancouver being more salient to Vancouver respondents and the importance of local shopping being more salient to Seattle respondents.

### Ideology as a Predictor of Acoustic Realities

For both cities, there are significant main effects of ideological variables on F2 values in the analysis of /æ/ retraction. For Vancouver, higher ratings of perceived Seattle and Vancouver similarity were a significant predictor of higher F2 vowels, meaning a more front realization of /æ/ (Coef: 0.06, on -0.788 Int., p = 0.03). In other words, the more speakers perceived Seattle and Vancouver as similar, the less retracted their /æ/ was. In Seattle, on the other hand, perceived Seattle and Vancouver similarity did not have a significant effect on F2 values. Instead, respondents' ratings for the importance of shopping from local businesses in their home city did have a significant effect on F2 values, with higher ratings associated with a lower F2 value (Coef: -0.111 on - 0.452 Int., p = 0.00). That is to say, the more participants embraced local shopping, the more retraction they showed relative to their peers of the same city. Across both cities, frequency of shopping local from the respondent's home city emerged as a significant predictor of F2 values. Like the finding for Seattle, this significant relationship identifies more retracted variants for respondents who had higher ratings for how often they shopped locally from their home city (Coef: -0.05 on. -0.445 Int., p = 0.02).

### Statistical Models

The final models and tables of significant effects are provided below.
### Equation 1: Mixed-Effects Linear Regression Model for F2 in Vancouver

F2.lmerG <- lmer(normF2 ~ Manner*as. factor(Age Group)*Sex + Manner*Position.ord* msdur + Preceding Phone + norm Seattle Vancouver Similarity + (1 + Position.ord | Name) + (1|Word), data=VANaeret)

**Table 2: Statistically significant factors in lmer model output for F2 in Vancouver**

|  | Estimate | Std..Error | t.value | p |
|---|---|---|---|---|
| **(Intercept)** | -0.788 | 0.11 | -7.26 | < 1e-04 |
| **Mannerstop** | 0.238 | 0.08 | 3.00 | 0.00 |
| **as.factor(AgeGroup)2** | 0.135 | 0.06 | 2.27 | 0.02 |
| **SexM** | 0.139 | 0.06 | 2.32 | 0.02 |
| **Position.ord.L** | -0.268 | 0.06 | -4.41 | < 1e-04 |
| **Position.ord.Q** | -0.123 | 0.06 | -2.17 | 0.03 |
| **msdur** | 0.001 | 0.00 | 6.38 | < 1e-04 |
| **PrecedingPhoner** | -0.543 | 0.16 | -3.45 | 0.00 |
| **normSeattleVancouverSimilarity** | 0.055 | 0.03 | 2.18 | 0.03 |
| **Mannerstop:as.factor(AgeGroup)2** | -0.100 | 0.02 | -4.51 | < 1e-04 |
| **Mannerlateral:SexM** | -0.209 | 0.03 | -6.01 | < 1e-04 |
| **Mannerstop:Position.ord.L** | 0.155 | 0.07 | 2.37 | 0.02 |
| **Mannerstop:Position.ord.Q** | 0.125 | 0.07 | 1.92 | 0.05 |
| **Mannerlateral:msdur** | -0.002 | 0.00 | -4.20 | < 1e-04 |
| **Mannerstop:msdur** | -0.001 | 0.00 | -3.64 | 0.00 |
| **Position.ord.Q:msdur** | 0.001 | 0.00 | 3.67 | 0.00 |
| **Mannerlateral:as.factor(AgeGroup)2:SexM** | 0.095 | 0.05 | 1.93 | 0.05 |
| **Mannerstop:as.factor(AgeGroup)2:SexM** | 0.072 | 0.03 | 2.25 | 0.02 |
| **Mannerlateral:Position.ord.L:msdur** | -0.003 | 0.00 | -3.21 | 0.00 |

**Equation 2: Mixed-Effects Linear Regression Model for F2 in Seattle**

F2.lmerE <- lmer (normF2 ~ Manner*Position.ord* as.factor (Age Group)*Sex + msdur + normImportance Shopping PNW + (1 + Position.ord | Name) + (1|Word), data=SEAaeret)

**Table 3: Statistically significant factors in lmer model output for F2 in Seattle**

|  | Estimate | Std..Error | t.value | p |
|---|---|---|---|---|
| **(Intercept)** | -0.452 | 0.07 | -6.07 | < 1e-04 |
| **Mannerlateral** | -0.531 | 0.09 | -6.24 | < 1e-04 |
| **Mannerstop** | 0.107 | 0.06 | 1.90 | 0.06 |
| **msdur** | 0.000 | 0.00 | 3.70 | 0.00 |
| **normImportanceShoppingPNW** | -0.111 | 0.03 | -3.36 | 0.00 |
| **Mannerlateral:Position.ord.L** | -0.529 | 0.06 | -8.75 | < 1e-04 |
| **Mannerlateral:as.factor(AgcGroup)2** | 0.111 | 0.04 | 2.95 | 0.00 |
| **Mannerlateral:SexM** | 0.130 | 0.04 | 3.36 | 0.00 |
| **Mannerstop:SexM** | 0.064 | 0.03 | 2.48 | 0.01 |
| **Position.ord.L:SexM** | -0.263 | 0.09 | -2.81 | 0.00 |
| **Mannerlateral:Position.ord.L:SexM** | 0.245 | 0.09 | 2.83 | 0.00 |
| **Mannerlateral:as.factor(AgeGroup)2:SexM** | -0.326 | 0.05 | -6.04 | < 1e-04 |
| **Mannerlateral:Position.ord.L:as.factor(AgeGroup)2:SexM** | -0.259 | 0.12 | -2.15 | 0.03 |

**Equation 3: Mixed-Effects Linear Regression Model for F2 in Vancouver**

F2.lmerG <- lmer (normF2 ~ Manner*as. factor (Age Group)*Sex + Manner*Position. ord* msdur + Preceding Phone + norm Seattle Vancouver Similarity + (1 + Position.ord | Name) + (1|Word), data=VANaeret)

**Table 4: Statistically significant factors in lmer model output for F2 in Vancouver**

|  | Estimate | Std..Error | t.value | p |
|---|---|---|---|---|
| **(Intercept)** | -0.445 | 0.09 | -4.73 | < 1e-04 |
| **Mannerlateral** | -0.719 | 0.10 | -7.44 | < 1e-04 |
| **Mannerstop** | 0.158 | 0.07 | 2.29 | 0.02 |
| **CityVAN** | -0.332 | 0.06 | -5.60 | < 1e-04 |
| **Position.ord.L** | -0.157 | 0.06 | -2.70 | 0.01 |
| **msdur** | 0.001 | 0.00 | 3.73 | 0.00 |
| **PrecedingPhoner** | -0.476 | 0.15 | -3.13 | 0.00 |
| **normHowOftenShopLocalHomeCity** | -0.047 | 0.02 | -2.35 | 0.02 |
| **Mannerlateral:CityVAN** | 0.435 | 0.06 | 7.16 | < 1e-04 |
| **Mannerstop:CityVAN** | 0.125 | 0.04 | 2.99 | 0.00 |
| **Mannerlateral:Position.ord.L** | -0.500 | 0.09 | -5.84 | < 1e-04 |
| **Mannerlateral:msdur** | 0.002 | 0.00 | 5.39 | < 1e-04 |
| **Mannerstop:msdur** | 0.000 | 0.00 | -2.56 | 0.01 |
| **CityVAN:msdur** | 0.001 | 0.00 | 5.50 | < 1e-04 |
| **Mannerlateral:CityVAN:Position.ord.L** | 0.376 | 0.14 | 2.78 | 0.01 |
| **Mannerlateral:CityVAN:msdur** | -0.003 | 0.00 | -6.03 | < 1e-04 |
| **Mannerstop:CityVAN:msdur** | -0.001 | 0.00 | -2.97 | 0.00 |
| **Mannerlateral:CityVAN:Position.ord.L:msdur** | -0.003 | 0.00 | -2.82 | 0.00 |

## 5. *Discussion*

The findings of the acoustic analysis in both cities are consistent with prior literature. BAT retraction appears in these data to be a change in progress in Vancouver, led by women and younger speakers as previously noted by Esling and Warkentyne (1993), Sadlier-Brown and Tamminga (2008), Pappas and Jeffrey (2014). BAT retraction does not show *strong* signs of a change in progress in Seattle given the lack of social variation by age and sex, though women do show more retraction than men. (Again, this study does not have the depth of a full apparent time study, so cannot directly report on how /æ/ has changed over generations of speakers.) This is mostly consistent with Wassink (2015), which does rely on apparent time data, and states that there is no evidence of /æ/ retraction in Seattle. Although statistically significant differences do emerge with Vancouver being more retracted, the size of the differences between Vancouver and Seattle speakers should be kept in mind. The difference between Vancouver and Seattle speakers' mean F2 values is not large (52 Hz), and Seattle speakers' values, at 1737 Hz, do still meet the previously established threshold of 1825 Hz for /æ/ retraction. These findings provided a better understanding of the role of following phonetic environment than has been offered in previous studies, which in turn provides more insight into progression of the change.

The findings of the ideological research suggest that Seattle and Vancouver speakers use distinct strategies to maintain their ethnic group distinctiveness with respect to the nationality border. Seattle speakers rely on perceived differences in speech to differentiate themselves from Vancouver speakers, despite also attributing many positive qualities to Vancouverites and Canadians in general, such as friendliness, outdoorsiness, elegance, inclusiveness of diverse populations, and so on. Vancouver speakers generally responded that they did not perceive their speech as a differentiator from Seattle speakers or vice versa. While Vancouver respondents vocally embraced their national pride, they may have more of an underlying interest in grouping themselves together with Seattleites than Seattleites do in grouping themselves together with Vancouverites.

**Ideological similarity with Seattle may be an underlying contrast with Eastern Canada**

While noting that perceived similarity to Seattle is a significant predictor of less participation in /æ/ retraction for Vancouver speakers, this should not be interpreted to mean that Canadians will converge with Americans or that their ideologies evidence a true desire for convergence. Vancouver respondents made clear that they construct their opposition to other Canadians, like Toronto residents, and this may indirectly cause them to express more similarity to other Pacific Northwest cities, like Seattle.

This does not equate convergence, however. When a full range of diagnostic dialectal variants is considered, Vancouver speakers robustly retain features that distinguish them from Seattle speakers including a lack of pre-nasal /æ/ rising, and Canadian Raising of /aʊ/ and /aɪ/, despite also sharing some phonological features like /æg/ raising (see Swan 2016). The language ideologies among Canadians speakers in the Pacific Northwest are similarly complex and serve to simultaneously differentiate Western Canada from the Eastern Provinces, unite BC with other parts of the U.S. Pacific Northwest, while also preserving a strong sense of Canadian identity and differentiation from the States. The extent to which any of the ideological stances is activated likely depends on situational context and interlocutor, and socially-meaningful phonetic features can be expected to work in tandem.

### Are genders effects mediated by ideology or are ideology mediated by gender?

While the number of speakers in each age and sex sub-grouping does not allow for statistical testing to determine whether answers to ideological questions were affected by the speaker's age or sex, clear patterns emerge that hold true across both cities. More men espouse an ideology of sameness with the opposing city than women, while in both cities; women see a greater importance in buying local goods from their home city. In both cities, women show more retracted realizations of /æ/ than men. While this does not reach statistical significance for Seattle talkers, a closer examination of the individual speakers shows that the five speakers with the lowest F2 values for /æ/ are women. Since precisely these ideological stances, which do correlate with the speakers' sex, emerge as significant predictors of linguistic behavior, it is worth noting that it is difficult to know whether the effect is underlyingly one of ideological differences or one of differences between the sexes. Perhaps most appropriate here would be to observe that sex and gender may lead to ideological differences, which in turn, affect linguistic behavior. This may reveal more complexity behind the well-established observation that women act as the leaders of sound change.

### Retracted /æ/ may have different social meanings in Vancouver and Seattle

Vancouver and Seattle have acoustically different realizations of /æ/, but the cities also differ in terms of the variable's status as part of a change in progress. Given that /æ/ retraction is part of a well-documented change in progress in Vancouver, it is likely that the variant has acquired a particular social meaning, perhaps indexing the groups who are leading the change or indexing urbaneness as the change is thought to affect urban areas first. D'Onofrio (2015) shows that the same variable (retracted /æ/) in California has a complex social meaning, indexing a Valley Girl persona when it is very backed, but indexing a "business professional" persona when it is only slightly backed. No social meanings studies have been conducted for this variant in Seattle or Vancouver. The ideological stances among Seattle and Vancouver speakers that significantly affect their production of retracted /æ/ may be a first clue into the social meaning of the variant. For Seattle speakers, D'Onofrio's (2015) observation that slightly retracted /æ/ may have a generic social meaning of "sophistication" for U.S. speakers may be relevant. The perceived importance of local shopping, and the use of slightly more retracted /æ/ by women could suggest that this social meaning of sophistication holds for Seattle. The social meaning of retracted /æ/ in Vancouver may be more complex in terms of the change and progress and how the variant fits into Vancouverites conceptualization of their relationships to other parts of Canada and to the States. More research is needed to better understand the complexity of social meanings for retracted /æ/ and how these vary between the two cities.

### Ideology of sameness is not a predictor of phonetic behavior for phonologized features

While this study focuses on the relationship between ideologies of sameness and a sound change in progress, for the four other diagnostic phonetic variables in addition to /æ/ retraction that were examined in the larger study, ideology of sameness was not a significant predictor of speakers' acoustic realizations. The phonologized features of each city are not significantly affected by speakers' perceived similarity to the other city (Canadian Raising of /aʊ/ and /aɪ/ in Vancouver and /æn/ rising in Seattle). The ideology of sameness is a significant predictor of speaker participation in a change in progress when the variant has a locally-relevant social meaning.

## 6. Conclusion

Ideology plays an important role in how sound changes proceed through a community, but the locally salient ideologies involved in the contrasts vary by community and must be discovered using ethnographic methods. More research is needed to fully understand the similarities and differences between the vowels shifts observed in West Coast English. Is Seattle truly an island in which the California/Canadian/Elsewhere Shift is not taking place? Or is this shift taking place differently in Seattle? For all speakers, a complex array of ideologies and identities interact and apply dynamically in everyday speech interactions. For Canadian speakers, especially, in this region of high sociocultural solidarity traversed by a national border, processes of ideological similarity and differentiation are both simultaneously at work. This study suggests that the same variable process, /æ/ retraction, may be associated with distinct social meanings in different communities. For the vowels involved in the geographically expansive "Elsewhere" shift, it is especially relevant to question the role of variation in the localized social meanings of the same structural processes. To this end, Becker and Swan (in progress) are conducting a follow-up study to examine the social meaning of retracted /æ/ four West Coast cities including Vancouver and Seattle.

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