THE CANADIAN SHIFT: COAST TO COAST[*]

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1. Introduction

1.1 Research Goals

The "Canadian Shift" (CS) is a widespread change affecting the lax vowel subsystem of speakers of Canadian English (CanE). In its first description, undertaken by Clarke, Elms, and Youssef (1995), the Shift was proposed to involve the retraction of /ae/ ('bat') and subsequent lowering of /e/ ('bet') and /i/ ('bit') in response to the merger of /oh/ ('caught') and /o/ ('cot') in the low-back region of the vowel space. Certain aspects of this shift, for example /ae/ retraction, have been identified in various locales across Canada, including Ontario (Lawrance 2002, De Decker and MacKenzie 2000, Roeder and Jarmasz 2007), Montreal (Boberg 2005), Winnipeg (Hagiwara 2006) and Vancouver (Esling and Warkentyne 1993). Regional descriptions such as these, however, have raised further questions on the nature of what has been termed a "defining feature" of CanE (Labov, Ash, and Boberg 2006: 130, 146). In particular, the Shift's presence on the easternmost shores of Canada has recently been doubted (Labov et al. 2006: 130, 219, 221)[1] and aspects of its original phonetic characterisation called into question (Lawrence 2002, Hagiwara 2006, Boberg 2005, Labov et al. 2006).

The present study will address the contradictory claims in a controlled comparison of two regions at opposite ends of Canada: Halifax and Vancouver. Past findings, including those of Esling and Warkentyne (1993) and Boberg (2008), led us to hypothesize the CS would be active in each region. However, prior to the current study, neither region had been investigated for the presence of the CS in its entirety; that is, with at least /ae/ and /e/ determined to be phonetically differentiated among speakers of different ages. Motivated by this and by the disparity of existing claims, the immediate goals of this work can be summarised in three research questions:

(1) Is the CS identifiable in apparent-time data on each coast?
(2) What are the phonetic characteristics of the Shift's movement in apparent-time?
(3) If the CS is active in Halifax, is it more advanced in Vancouver?

[*] Thank you to Charles Boberg for making available data from the project "Variation and Change in the Phonetics of Canadian English", supported by Social Sciences and Humanities Research Council of Canada Standard Research Grant #410-2005-1924, as well as for his ongoing assistance with this work.

[1] See, in particular, Map 15.4 (p. 219), which shows the domain of the CS to extend from Vancouver to Montreal, but not further east.

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1.2 Background

Labov (1991) proposed a three-way division of North American dialects: the Northern Cities of the U.S., the Southern U.S. and a third region, termed the "Third Dialect Region", which included Canada and most of the western United States. Whereas the first two of these regions were characterised by major vowel shifts, the Third Dialect Region was characterised by the purported stability induced by one of its principal features, the low-back merger. Clarke et al.'s description of the CS in 1995 was the first indication that the Third Dialect Region was not as stable as originally thought. They concluded that, at least in the group of young middle-class Ontarians studied, the three front lax vowels[2] of Canadians were involved in a chain shift similar in nature, but in some ways directionally opposite, to the well-studied chain shift occurring in the northern cities of the U.S. While the proposed catalyst of the Northern Cities Shift was the maintenance of two separate phonemes in the low-back region of the vowel space, Clarke et al. proposed that the merger of these two phonemes, rather than stabilising the vowel system as predicted, initiated the movement of the Canadian lax vowel subsystem (Fig. 1). Importantly, this characterization of the CS is that of a "true" pull chain, in which the empty space left by the movement of one vowel motivates the movement of the next.

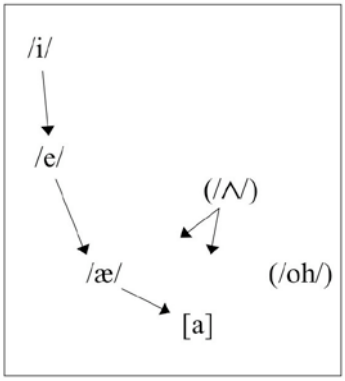

Fig. 1. The Canadian Shift (Clarke et al. 1995)

Clarke et al.'s study, however, has been criticised on several grounds. As Boberg (2005) points out, the study was mostly restricted to young Ontarians, hindering the applicability of its findings to other regions of Canada. Furthermore, Clarke et al. used impressionistic transcription for most of their analysis, a method that is susceptible to transcriber error such as bias and

[2] Clarke et al. also find evidence for the advancement of /ə/, but we will concentrate exclusively on the front lax vowels as the link between /ə/ and the CS has not been confirmed.

inconsistency. The method, lacking a precise system of measurement, prohibits a clear demarcation of what constitutes "the presence or absence of vowel shifting" (1995:211). Finally, lacking sufficient data from another age group with which to compare, Clarke et al. do not explain how they determined the apparent-time directionality of the Shift, and could only speculate that the shifted values they did find were evidence of a change in progress, and not a completed process.

More recent research sheds some light on these uncertainties by identifying similar patterns in other areas of Canada, but introduces disagreement on which vowels are implicated in the CS and which direction they appear to be moving. Esling and Warkentyne (1993), in an analysis of Vancouver speech, find increased incidence of /ae/ retraction among younger speakers. De Decker and MacKenzie (2000) and Roeder and Jarmasz (2007) find /i/ and /e/ lowering to be inversely correlated with age in Toronto. However, Lawrence (2002), in a study of young Ontarian women, finds evidence for retraction, rather than lowering, of /i/ and /e/. In Winnipeg, Hagiwara (2006) finds /ae/ lowering and retraction, with ensuing "redistribution" of /i/ and /e/ mainly on the backness dimension.

The retraction claim is most strongly supported in Boberg's (2005) apparent-time study of anglophone Montrealers. Here, all lax vowels are examined among three distinct age groups. Boberg asserts that the CS is active in apparent time in Montreal, but that it is better characterised as a set of parallel retractions. This generalized retraction is ascribed to an analogical process, probably initiated by the retraction of /ae/, in which vowels of similar phonetic quality undergo similar phonetic processes. The study finds /e/ retraction to be the most significant movement and /i/ retraction only weakly active.

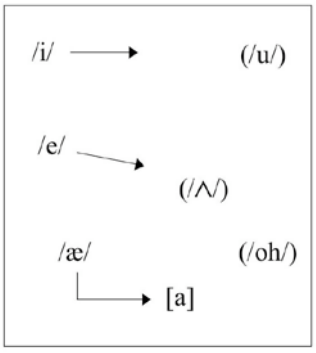

Fig. 2. The Canadian Shift (Boberg 2005)

To these two competing characterisations, Labov, Ash, and Boberg (2006), in the *Atlas of North American English*, add a third claim: that the CS involves retraction of /ae/ and subsequent *diagonal* movement of /e/, without any evident change in /i/.

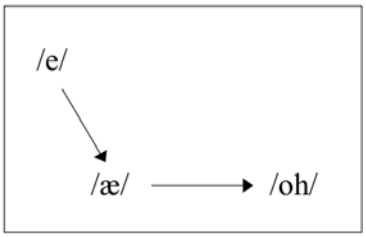

Fig 3. The Canadian Shift (Labov et al. 2006)

Perhaps Labov et al.'s most important contribution to research on the Canadian Shift is due to the wide scope of their survey. Though limited to between one and four speakers per city, the survey covers the expanse of North America and is able to conclude that the Canadian Shift is, with the notable exception of the Atlantic provinces, a Canada-wide phenomenon that occurs only intermittently in other areas of the Third Dialect Region. Because of this, Labov et al. use the bounds of the CS to define their Canadian Dialect Region, which consequently excludes the Atlantic provinces.

Most recently, Boberg (2008) has suggested that the sharp isogloss which, in the Labov et al. view, separates the Atlantic provinces from the rest of Canada is not justified by CS data. This study analyses the vowels of young CanE speakers and supplies the Young group data for the current research. In this age cohort, Boberg finds shifted values in the Atlantic provinces; however, without the benefit of an older group of speakers, the study must leave open the question of whether the CS is currently active in this region.

With such an array of different research locales, goals and methodology, the picture of the CS has remained far from complete. Labov et al. (2006) and Boberg (2008) disagree on the presence of the CS in the Maritimes. Furthermore, at least three phonetic characterisations have been proposed to describe the current change in Canadian speech: a chain shift involving /i/ and /e/ lowering (Clarke et al. 1995); a series of parallel retractions (Boberg 2005); and diagonal movement excluding /i/ (Labov et al. 2006).

The present study finds /ae/, /e/ and /i/ to be shifting in apparent time in both Vancouver and Halifax, providing support for an expanded view of the Canadian Dialect Region proposed by Labov et al. (2006); that is, one that includes the Maritime provinces, or at least the city of Halifax. Less immediately, the results of this study bear on wider questions on the nature of all chain shifts. Since all speakers of CanE share the structural input condition of the CS, differences in regional descriptions may be puzzling. The results of the current study, however, suggest that regional variation may be a natural outcome of identical inputs. Though a diagonal characterisation, similar to that of Labov et al. (2006), is the view most compatible with the current research, persistent differences between Halifax and Vancouver in the trajectory of /ae/ indicate that it would not be prudent to discount other researchers' findings simply on the basis that they seem inconsistent. Finally, this study finds Vancouver to be further ahead in the CS, which suggests that, although the change is not uniform,

it does diffuse from larger to smaller cities as would be expected from standard models of geolinguistic diffusion.

2. Methodology

2.1 Participants

The study employed 26 participants, 14 from Halifax and 12 from Vancouver. Each group was further divisible into an Old (b. 1922-1972) and a Young (b. 1981-1986) group, with males and females being approximately evenly represented in each of the four ensuing sub-groups[3] (see Table 1). The respective Old groups had an average birth year of 1948 (Vancouver) and 1951 (Halifax), and both Young groups had an average birth year of 1984.

	Vancouver		Halifax		**Total**	
Young	3 F	3 M	3 F	3 M	**6 F**	**6 M**
Old	4 F	2 M	6 F	2 M	**10 F**	**4 M**
Sub-Total:	**7 F**	**5 M**	**9 F**	**5 M**	**16 F**	**10 M**
Total:	**12**		**14**		**26**	

Table 1. Participant Makeup

The older speakers were recruited in 2007 either through a personal connection to one of the authors or by on-campus advertisements at Dalhousie University, in the case of some Halifax speakers. The younger speakers are undergraduate students at McGill University from each region, who were also part of the sample analyzed in Boberg (2008). In both cases, participants were selected according to several requirements: they must have been a native speaker of English; they must have been born and raised in the relevant city or its immediate surrounding region; they must have had at least one parent born and raised in the relevant region; and they must have not spent significant periods of time outside the relevant region. All speakers were from a middle-class background and had a high school diploma, but showed varying degrees of higher education.

2.2 Data Collection

Data was gathered during a modified sociolinguistic interview lasting thirty

[3] The authors find that the division of participants by age group is useful in revealing some of the internal demographics of the sample, including the even distribution of sex among the younger speakers and the approximately equal bias towards women in each Old group; however, such a division is admittedly artificial due to the highly differing age range of each group. For the latter reason, age groups will only be exploited when they are able to lend clarity to the discussion or to the visual display of data.

minutes to one hour. For the younger speakers, the interviews were conducted and tape-recorded by a McGill linguistics student. For the older speakers, the authors recorded the interviews digitally on a laptop computer. Halifax speakers were recorded using a Samson CU01 USB Studio Condenser Microphone and the sound-editing software *Audacity*; Vancouver speakers were recorded using an in-built laptop microphone and *GarageBand* software. For the younger speakers, interviews mostly took place at McGill University; for the older speakers interviews were conducted either in the speaker's home or at Dalhousie University, in the case of some Halifax speakers.

Interviews consisted of three components: the elicitation of demographic data, including residential, genealogical, education, and work history of the speaker; the reading of a word list composed of 79 words representing all the vowel phones of English in six environments; and a conversational component in which topics varying from current social and political issues to participants' real-life experiences were informally discussed.

2.3 Data Analysis

All interview recordings were analyzed using Kay Elemetrics' *Computer Speech Lab* (version 4400). Words containing a CS vowel were extracted from the word-list data and a linear predictive coding (LPC) analysis was performed on each word's spectrogram. Certain linguistic environments known to influence vowel quality were excluded, including those pre-nasal, pre-[r] and pre-[l]. To maximize the reliability of a regional comparison, all LPC analysis was performed by the same person[4].

The first and second formants of each vowel were measured at the midpoint of the vowel's nucleus or the maximum point of F1; inflection points in F2 were also occasionally used to select the optimal point of measurement (that is, the point at which the vowel was most target-like) where F1 did not have a clear maximum. The formant measurements were then normalized using Nearey's (1977) normalization algorithm, which makes acoustic measurements from different speakers comparable by adjusting them to reflect the length of the vocal tract.

The statistical analyses of the resulting data were conducted in *Microsoft Excel*, using Pearson product moment correlation coefficients to determine the apparent-time directionality of the CS.

3. Results and Analysis

3.1 Identifying the CS in Vancouver and Halifax

Descriptive statistics for the Vancouver and Halifax data sets are presented in Table 2, which shows the mean F1 and F2 measurements across all speakers in each region, and the related standard deviations. Labov et al. (2006) provide an

[4] Thank you to Charles Boberg.

acoustic definition used for delimiting the regions where the Shift takes place, a combination of thresholds for the vowels found to be involved in the Shift: F1 /e/ > 650 & F2 /ae/ < 1825 & F2 /oh/ < 1275 (Labov et al. 2006). The F2 of /oh/ in this case is intended to reflect not a change in progress but rather the completed merger of /o/ with /oh/ in the low-back region, the assumed trigger for the CS. Formant means in Table 2 that fall within this quantitative definition of the CS are shown in bold. It is evident that both Vancouver and Halifax are shifted.

	Vancouver	Halifax
F1 /i/	557 (80)	549 (76)
F2 /i/	2063 (132)	2050 (150)
F1 /e/	**747 (67)**	**716 (102)**
F2 /e/	1958 (126)	1929 (153)
F1 /ae/	871 (101)	858 (134)
F2 /ae/	**1774 (121)**	**1814 (158)**
F1 /oh/	766 (77)	801 (84)
F2 /oh/	**1213 (100)**	**1252 (76)**

Table 2. Means of F1 and F2 measurements (in Hz) from all speakers, with standard deviations in parentheses. Measurements critical to the Canadian Shift as defined by Labov et al. (2006) are shaded.

As a further illustration that shifted vowels are widely present in both Vancouver and Halifax, rather than just in the speech of several highly advanced speakers who could throw the averages off, Figures 4 and 5 show the mean values of /e/ and /ae/ for each speaker. The definitional thresholds for these two vowels (the F1 of /e/ and the F2 of /æ/) are imposed on the vowel space to allow a visual inspection of the general level of shiftedness throughout both samples. It can be seen in the charts that the majority of speakers in both regions, including most of the older speakers, have shifted values for /e/ and /ae/, strengthening the positive identification of the CS in Halifax and Vancouver.

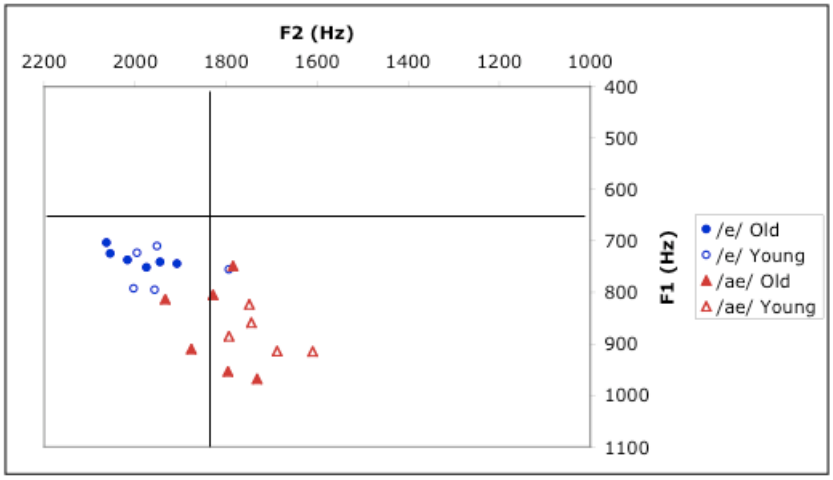

Fig 4. Individual means of /e/ and /ae/ for Vancouver speakers.

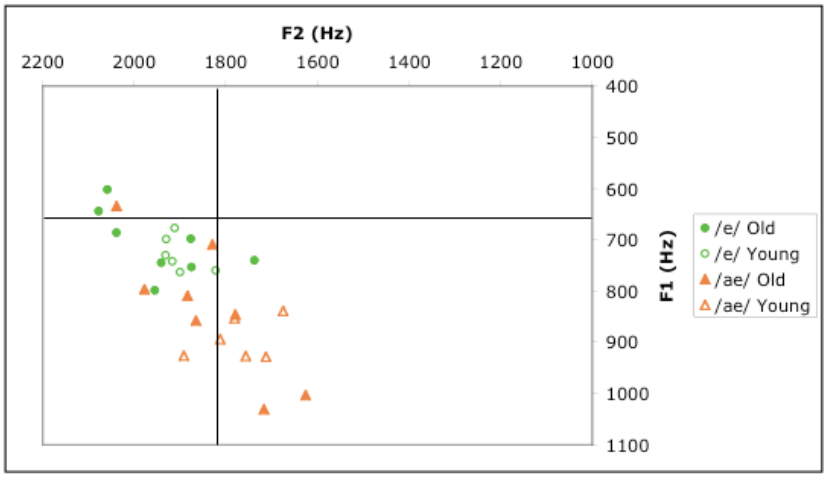

Fig. 5. Individual means of /e/ and /ae/ for Halifax speakers

The identification of shifted vowels in Halifax is consistent with the finding of Boberg (2008) that the CS is present throughout Canada, in contrast to Labov et al.'s (2006) suggestion that the Shift is not present in Nova Scotia. Since the absence of the CS in the Atlantic provinces was the main justification for the exclusion of this area from the Canadian Dialect Region, we suggest that the main Canadian isogloss may need to be revisited in light of the results from Boberg (2008) and the present study.

3.2 The Progress of the CS in Apparent Time and Phonetic Space

Demonstrating that most speakers have shifted vowel averages indicates the presence of the CS by Labov et al.'s (2006) standards but is not sufficient to confirm that the shift is currently taking place. To identify a change in progress, we need to correlate age with vowel quality under the apparent-time hypothesis. This process will lead into a discussion of the phonetic characterisation of the shift.

Table 3 shows the Pearson product moment correlation coefficients (*r*) of birth year with acoustic vowel measurements. Note that a positive correlation between birth year and F1 implies that the vowel is becoming lower in apparent time, while a negative correlation between birth year and F2 implies that the vowel is retracting in apparent time. Absolute values of *r* greater than 0.50 are considered to show a fairly strong correlation, while absolute *r*-values between 0.25 and 0.5 are taken as moderate.

	Vancouver	Halifax
F1 /i/	0.38	0.23
F2 /i/	-0.32	-0.21
F1 /e/	0.54	0.48
F2 /e/	-0.53	-0.51
F1 /ae/	-0.07	0.61
F2 /ae/	-0.73	-0.64

Table 3. Pearson correlations (*r*) of birth year with formant measurements (positive F1 correlations indicate lowering, negative F2 correlations indicate retraction)

Table 3 shows that the Canadian Shift is indeed currently active in both Vancouver and Halifax. Vancouver speakers demonstrate strong correlations of age with both dimensions of /e/ (F1, $r = 0.54$; F2, $r = -0.53$) and especially with the F2 of /ae/ ($r = -0.73$). Both the F1 and F2 of /i/ are also moderately correlated with age ($r = 0.38$, $r = -0.32$, respectively). In Halifax, the F1 and F2 of /ae/ correlate strongly with age ($r = 0.61$, $r = -0.64$, respectively). The correlations for /e/ are somewhat weaker, with both F1 ($r = 0.48$) and F2 ($r = -0.51$) being close to $|r| = 0.50$, the threshold between a moderate and a fairly strong correlation. The correlations for F1 ($r = 0.23$) and F2 ($r = -0.21$) of /i/ are weaker still, but are quite close to 0.25, the lower limit of moderate correlation. All of the evident correlations, including the weaker ones, are in the predicted directions (lowering and retraction).

An immediate observation to be made from the above results is that /i/, the highest vowel of the front lax vowel subsystem, has begun to follow its counterparts in their general movement of retraction and lowering. Although this is counter to the report of Labov et al. (2006) that /i/ is stable, it is exactly what

is predicted by chain shift theory and is also consistent with certain earlier reports, including the original Clarke et al. (1995). The weaker correlations for /i/ relative to /e/ and /ae/, particularly in Halifax, can be taken to reflect the lag of this vowel as it joins the Shift; because the trends in /i/ are consistent across the regions and parallel the changes in /e/, it would be unwise to discount them.

Turning from correlation strength to the direction of movement, we see that /i/ appears to be behaving similarly in both Vancouver and Halifax. In each region, the *r*-value for F1 is very close to the *r*-value for F2, suggesting that the magnitude of the movement along each dimension is roughly equivalent. In other words, /i/ movement appears to be diagonal. Exactly the same is true of /e/, with nearly identical *r*-values for F1 and F2 evident in each region. Unlike the apparent shift in /i/, the diagonal movement of /e/ is a feature of the CS as described by Labov et al. (2006). For this vowel, then, both Vancouver and Halifax appear to be conforming to Labov et al.'s version of the CS, which differs from Boberg's (2005) retraction and Clarke et al.'s (1995) lowering.

The behaviour of /ae/, on the other hand, does not quite follow the pattern of /i/ and /e/. It is in /ae/ that we see the clearest difference between the two cities. In the Vancouver data, age correlates strongly with the F2 of /ae/ but not at all with the F1 of /ae/. This is clear evidence of retraction unaccompanied by lowering. Vancouver thus continues to hew to the Labov et al. (2006) model of the Shift, with the addition of diagonal /i/ movement. Halifax, on the other hand, has diagonal /ae/ movement, again seen in the similarity of the *r*-values for F1 and F2. This finding is in keeping with many previous descriptions: auditory analyses such as Clarke et al. (1995) refer to retraction and lowering of /ae/; acoustic analyses such as Boberg (2005) and Hagiwara (2006), though they disagree with Clarke et al.'s description of /i/ and /e/, have found at least some degree of /ae/ lowering, although they find retraction is most salient.

In the divergence of the two cities with respect to /ae/, we may have an explanation for why different versions of the CS have been reported by different researchers. This study holds constant many methodological and sampling differences of previous research, allowing for an accurate cross-regional comparison: the age and sex distribution of the sample was controlled as much as possible; each speaker is represented by the same set of words; formant measurements and normalisation were performed by the same individual; and the same statistical tests were used in the analysis. But despite these controls, there is still a major difference to be seen in the phonetic characterisation of the Shift in the two cities. We suggest, therefore, that previous reports of the CS need not be seen as competing. Rather, there is room for regional variation in the specific path that the lax vowels take through phonetic space.

3.3 The Diffusion of the CS

Finally, we turn to the question of how the CS spreads across locales. Our hypothesis, based on the *cascade model of diffusion* (Callary 1975) was that Vancouver will lead Halifax in the progress of the CS under the assumption that sound changes spread from larger to smaller urban areas within a dialect region

like Canada. The hypothesis appears to be confirmed by the data given in Table 4.

	Vancouver	Halifax	*p*-value
F1 /i/	557	549	(0.31)
F2 /i/	2063	2050	(0.30)
F1 /e/	747	716	0.03
F2 /e/	1958	1929	(0.13)
F1 /ae/	871	858	(0.25)
F2 /ae/	1774	1814	0.04

Table 4. Means of F1 and F2 measurements (in Hz) from all speakers and t-test results for significant differences between the regions. Non-significant differences are in brackets.

Table 4 shows that /i/ is not significantly different in Halifax and Vancouver in either height or advancement, while the amount of lowering of /e/ and retraction of /ae/ do differ significantly between the regions. Vancouver is significantly more advanced in /e/ lowering and /ae/ retraction—two major features of the Shift as identified by Clarke et al. (1995) and the precise movements implicated in Labov et al.'s (2006) definition of "shifted". A visual comparison of the regional averages is provided in Fig. 6.

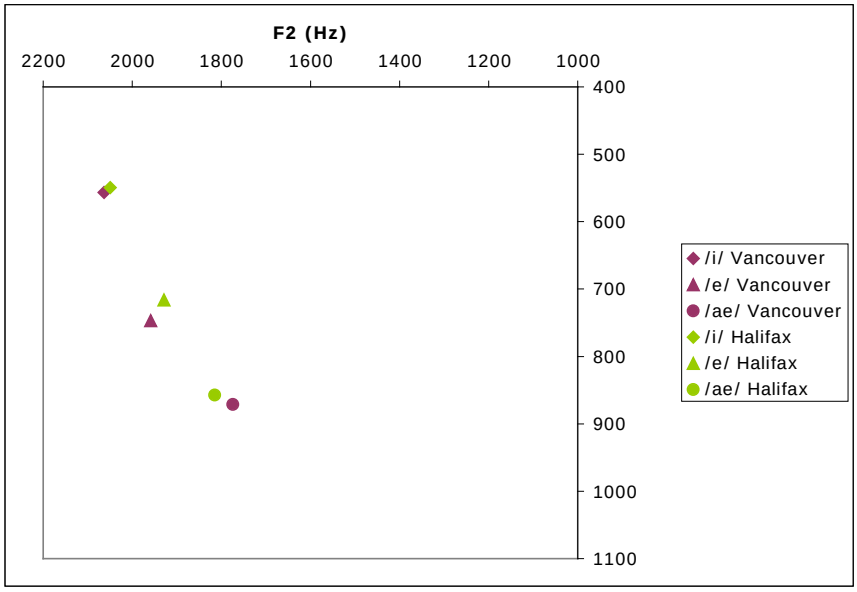

Fig. 6. Averages for all Vancouver and all Halifax speakers

4. Conclusion

In the introduction, we outlined three research questions about the Canadian Shift that we hoped to answer in this study. They are repeated here:

(1) Is the CS identifiable in apparent-time data on each coast?
(2) What are the phonetic characteristics of the Shift's movement in apparent-time?
(3) If the CS is active in Halifax, is it more advanced in Vancouver?

The first question was motivated by the exclusion of the Atlantic provinces from the Canadian Dialect Region of Labov et al.'s (2006) *Atlas of North American English*. The CS is the main defining feature of Canada in their dialect taxonomy, and thus the geographic extent of the CS is a question of considerable interest to dialectologists. Boberg (2008) indicates that, contrary to Labov et al.'s findings, young adults in the Atlantic provinces do demonstrate shifted front lax vowels. Here, we extended this finding with an apparent-time analysis confirming that the CS is a currently active phenomenon in Halifax. The isogloss defining the Canadian Dialect Region, therefore, deserves to be revisited. That the Canadian Dialect Region extends to the west coast of Canada is confirmed, as expected, by the identification of an active CS in Vancouver, where previous findings had been limited to /ae/ retraction.

The second question stems from disagreement in the CS literature on how precisely to characterise the set of changes taking place in the front lax vowel subsystem. In the results presented above, we demonstrated that although /i/ and /e/ are behaving similarly in Vancouver and Halifax, there is a clear difference in the trajectory of /ae/ in each city. This difference led us to suggest that the input condition of the low-back merger may not necessitate an identical development in different dialects despite triggering a shift in generally the same direction. Rather, there seems to be room for regional variation in the CS. This more expanded view of what constitutes the CS could account for previous researchers' varying findings in other Canadian cities as well. To conclude that there is regional variation in the way chain shifts play out, however, does seem to call into question the mechanical properties of chain shifting. We hope, therefore, that our results will fuel continued inquiry into the nature of chain shifts generally, and will be taken into account in theoretical approaches to this particular type of sound change.

Finally, our third question arose from a familiar hypothesis about the spatial diffusion of various types of language change: that innovations arise in major urban centres and spread to smaller ones. This is a simplified statement of Callary's (1975) *cascade model*. Our results indicate Vancouver speakers as a group are significantly further ahead (lower and more retracted) than Halifax speakers on the major defining dimensions of the CS, namely the F1 of /e/ and the F2 of /ae/. Consistent with the *cascade model*, one of the reasons for this difference may be the relative populations of the two regions studied.

The persistence of regional variation in this controlled study suggests that further research on the CS will continue to offer new regional variants, reflecting different phonetic pathways and different stages of diffusion. The goals of the present study precluded the examination of conditioning factors such as sex, socio-economic status and linguistic environment, which have been a focus of earlier research on the CS. Clearly, the inclusion of these in future work on Vancouver and Halifax will lend insight into what factors, other than structural ones, motivate or inhibit the Shift. However, for further insight on the structural motivations of the CS and vowel shifts generally, an in-depth examination of the lax vowel subsystems of other Third Dialect areas, which share the Shift's structural input condition, is required. The identification of a shift elsewhere[5] would call into question the use of the CS to define the Canadian Dialect Region, while its absence, as suggested by Labov et al. (2006), would provoke the question: what prevents a shift in areas which share the low-back merger? In this way, future descriptions of the phonetic qualities of the CS have the potential not only to raise, but to answer, such important questions.

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[5] A similar shift in California is described by Hinton, Moonwoman, Bremnar, Luthin, Van Clay Lerner and Corcoran (1987). This shift is compared to the CS in Clarke et al.'s (1995) original description, in which the two are described as "virtually identical" (1995:213), a result of a shared input condition. More recently, Hagiwara (2006) questions this explanation for the similarities between the two dialects, suggesting the fronter, unrounded quality of Californian /oh/ does not leave the same "void" (2006:134) as Canadians' backed, rounded low-back vowel. Currently there seems to be no consensus on the relationship between the "California Shift" and the CS.

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