Vowels in contact: A case study in Romanian

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From a desire to better understand the effect of both external and internal factors on vowel production in immigrant groups, this paper explores the change in vowel quality of two speakers of Romanian in Canada. The focus is on the behaviour of the central high vowel, which lacks a correlate in English, and the implication of age at the time of immigration. The Lobanov vowel extrinsic method for normalization of speaker data was used to analyze two speakers' vowel production. The raw and normalized means from each participant are compared to a control. Language internal factors were better at predicting change than language external ones. Both participants maintained their production of the high central vowel due to its phonetic distance. Further, both participants produced a more raised schwa than the control. This points to a divergence rather than convergence towards English.
Keywords: Vowels; Romanian; Vowel change

1   Introduction

Language contact situations have never been more common in the word's history. Immigrant groups negotiate between two or more languages on a daily basis. This interaction creates changes in at least one language, but the changes in minority languages do not always result in the attrition of that language. As Bullock (2004) points out, the processes lead to innovation.

The factors that lead some parts of the phonological system to be more susceptible to change than others are largely unknown. Previous accounts phonological distance may account for the preservation of some elements (Godson, 2004), while pressures to fit in to particular groups makes teenagers more susceptible to influence on their phonological system (Fought, 2004). From a desire to better understand the effect of both external and internal factors on vowel production in immigrant groups, this paper explores the change in vowel quality of two speakers of Romanian in Canada. Would a young adult speaker be more susceptible to convergence than someone in their 30s? What role does phonological distance play in the preservation of contrast?

In order to investigate these questions, the vowel productions of two speakers of Romanian, Dio and Tami, are analyzed. Dio was 30 years old at the time of immigration and Tami was 16. The six monophthongs of Romanian, /i, u, e, ə, o, a/ , are expected to show inter-speaker variation under English influence,

while the seventh vowel, /ɨ/, is expected to be preserved in both speakers because it does not have a counterpart in English.

2   Background

Studies on phonetic and phonological variation in contact situation try to work out which parts of the phonological systems of languages are most susceptible to change and which factors determine this. These categories help researchers interpret linguistic data in the context of society and its daily use. Attention has been given to both the ways in which a minority language can influence a dominant one (e.g. Hoffman and Walker, 2010) as well as how dominant languages result in the attrition of a minority language in its speakers (e.g. Chumak-Horbatsch, 1999; Montrul, 2002). Although most studies focus on the changes taking place the syntactic system, there are also those that tackle phonological changes. However, the factors that lead some parts of the speaker's phonology to be more susceptible to change than others remain largely unknown.

Convergence of phonological features is a common outcome (Bullock, 2004). One language, usually the minority, tends to become more like the other in the features that they share. Conversely, it has also been found that phonetic distance can, in some cases, work to preserve the features that are distinct in both languages. For example, in Godson's (2004) study, the quality of back rounded vowels of Armenian speakers in the U.S. was preserved rather than influenced by the English back rounded vowels.

An important addition to research conducted on these issues in recent years has been the consideration of external, social factors, and their role in change. Such as Chinen and Tucker (2005) and Kuunas (2009) focus on issues of identity in minority language speakers. Not only are community involvement and positive attitudes about one's langauge are linked with overall better langauge performance, but these studies show that by focusing on the speaker researchers can uncover more about the motivation and drives that shape and are shaped by the language system.

Age, another critical factor in language change, is not only relevant in the initial developmental stage of language acquisition but also in the creation of varieties at later ages as well. Fought (2004) shows how phonology can go through a variable stage during teenage years when young adults are trying to define identities and integrate in different group. This critical time period in a person's life can make the phonological system more susceptible to influence as outside pressures to conform act upon it. It is expected then that even though a speaker has a fully formed native phonology, if they were a teenager at the time of immigration they will show more variation overall and be more different from a native speaker than someone more matured at the time of immigration.

3 Questions and Methodology

The study is part of a larger effort to understand the effect of different linguistic and social factors on the phonology of heritage speakers. Data from two native speakers immigrated to Canada is presented to answer the questions:

a) What is the overall change in the vowel quality produced by speakers of differing ages?

b) What role does phonological distance play in the preservation of contrast?

The two speakers, Dio and Tami, that are analyzed were recruited through the larger investigation on Romanian heritage speakers. They were selected for this paper based on their entry time in the study and the different ages at which they entered Canada. Dio is a middle age male who immigrated to Canada over ten years ago. Tami is a female in her late twenties who immigrated at about the same time but was a teenager at the time and finished high school in Canada. Socio-economic class of the two speakers is harder to establish because Dio lived in Romania during the communist era, when personal wealth was not encouraged. Instead the participants' education level, orientation toward the linguistic market, and attitudes about the Romanian language are considered as more relevant indicators of their adherence to the standard language form.

A one hour long interview was conducted with each participant. As congruent with the larger research project four instruments were used to gather as many speech styles as possible adapted from Durand & Pukli (2004). For the purpose of vowel quality analysis a word list of 99 words was read by each participant. From this, vowel tokens were extracted using Praat voice analysis software. The list was composed using the help of the Swadesh list of 100 words (Swadesh, 1971), with a few substitutions made to reflect the stress pattern of the Romanian language.

A web-based interface for the statistical program R, NORM, was then used to create F1/F2 plots for each speaker (Thomas and Kendall, 2007). For baseline comparison, vowel samples were obtained from an online corpus of Romanian (Teodorescu et al., 2010). These were available as audio recordings and were extracted in the same way as the participants. The speakers were predominantly from the eastern part of Romania but reflect a standard accent learned through higher education and exposure to other parts of the country (Teodorescu et al., 2010)[1].

A sociolinguistic interview, about half an hour long, was also conducted in order to gather data about the background, language knowledge, language use, dialectal influences and language attitudes of the participants. The summary for each participant is presented in the next two sections.

4 Dio: Sociolinguistic assessment

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[1] The term 'average speaker' is sometimes used in this paper to refer to the control. Since all speakers in this study are native speakers the 'average' represents the current pronunciation conventions of residents in Romania.

Dio is a native speaker of Romanian, 50 years of age, male, born in north-eastern Romania. He has completed his schooling including higher education in Romanian. He was born and has lived most of his life in the north eastern province. He can be considered a speaker of the standard language based on his education level and linguistic market.

Linguistic market considers the social networks that speakers are part of. Also taken into consideration is the multiplicity of contacts and the importance of standard language for occupation (Ash, 2004). His professional training is in geo-chemistry, requiring him to spend a considerable amount of time travelling the country. As an academic, he is required to speak in the most universally understood way. These activities require him to use the standard from of the language more often than the dialectal. In addition, he self-reflects that compared to his spouse, who is born in the same region but is less integrated in the linguistic market, and other relatives he notices that they have more of a regional accent[2].

Dio moved to Toronto about ten years ago and is well integrated in the Canadian society. His friends and colleagues reflect the diverse society of Toronto. Dio uses English as his primary language with which he mediates day-to-day events. Romanian is reserved only for family, and even then he sometimes slips into English with his adult daughter and his spouse. On the other hand, he has very strong connections with his remaining family and friends from Romania, holding almost daily telephone calls and visiting for extended periods of time at least once a year. Since daily events take place in English, it is expected that there will be some departure in his pronunciation compared to the control

Of the other language Dio knows, Japanese stood out as one he could once speak with fluency. However, it has gone unused for more than a decade now and he considers himself no more knowledgeable than a beginner.

Finally, Dio sees languages as important in transmitting cultural values and for that reason he is interested in keeping Romanian alive within himself and his family so that those values are not lost.

5   Tami: Socio-linguistic assessment

Tami is a female in her late twenties, who immigrated to Canada almost thirteen years ago. She is from a town in south western Romania, and has a mixed Serbo-Croatian background with both parents born in Romania. Although most of her early schooling has been in Romanian, she finished high school in Canada and is currently in graduate studies here too.

Tami does not meet the classification requirement for "dialectal voice" as described in the Teodorescu (2010) corpus. However, her linguistic market is

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[2] The accent of the Moldova region of Romania can be characterized as a series of predictable, rule-governed changes, such as raising of the mind front vowel. The few words in the list that are prone to these changes did not show variation in the recordings.

much smaller compared to Dio. She speaks Romanian only to some of her relatives in Romania. To Romanian friends and family in Canada she often speaks in English. With her spouse she speaks mainly Spanish and with her children mostly in English. In her professional life as well, English is the norm.
To the researcher, her speech did not sound regionally affected. However, from an anecdote from a recent trip to the country's capital, Bucharest, it became obvious that her speech is altered enough to be considered "foreign" by an average speaker of Romanian. Her production of Romanian vowels will reflect this.

Tami is interested in bettering her knowledge of Romanian for herself. However, from a practical perspective she does not think she will teach her children Romanian, because she cannot at this time see that it would help them. The other languages that are available to her are also used in communications with friends and family so one can see that there is no immediate communicative need for maintaining or transmitting Romanian.

6   Vowel Plots

To compare the data obtained from the speakers to each other, a normalization technique that minimizes speaker difference and preserves dialectal differences had to be selected. The Lobanov vowel extrinsic method for normalization of speaker data was selected because it uses a single anchoring point to align speaker vowel spaces and it defines the edges of the space as well (Clopper, 2009). Since all the vowels of the speakers' system are sampled, there were no disadvantages or problems encountered with this method.

Figures 1 to 3 show the vowel spaces for Dio, Tami, and the average speaker (M) of Romanian created with the non-normalized means obtained from the raw data.
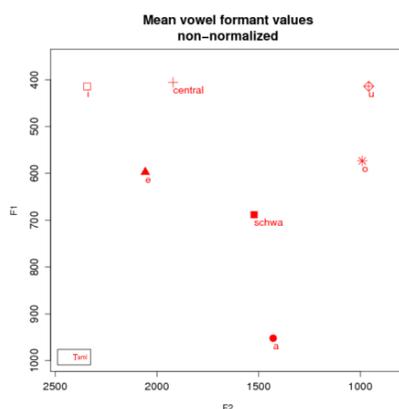

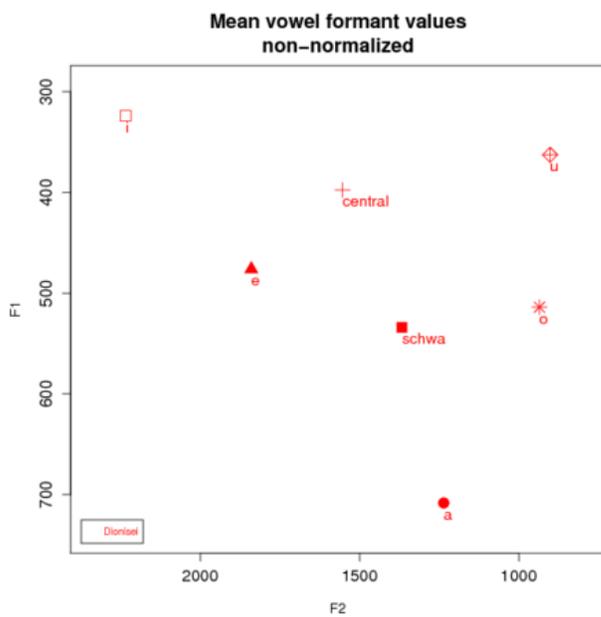*Figure 1.* Mean value formant values for Dio
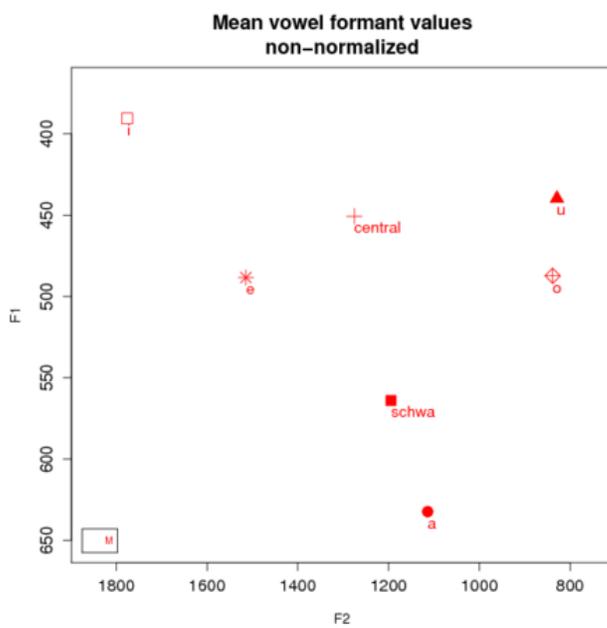
Figure 2. Mean formant values for Tami

Figure 3. Mean vowel formant values for M.

The average speaker, M, sampled for this comparison is a male between the ages of 30-40 from eastern Romania. According to the classification used in the corpus by Teodorescu et. al. (2010), the speaker is a well educated, non-dialect speaker of Romanian.

From a visual comparison of the means, there is a noticeable difference in the pronunciation of the high vowels by Tami. Her front, center, and back rounded vowels are all in line, while Dio and M show a dip in the height of the central vowel. This is, in fact, because Tami's mean F1 values for /i/ and /u/ are higher than the other participants and match those of the central vowel. The numerical means for the high vowels are shown in Table 1.

Table 1. Formant means for high vowels by participant.

Speaker	Vowel	F1	F2	F3
Tami	i	415	2343	3311
Tami	u	414	959	2526
Tami	central	405	1920	2842
Dio	i	324	2233	2980
Dio	u	363	902	2526
Dio	central	398	1553	2854
M	i	391	1775	2262
M	u	440	829	2074
M	central	451	1275	2197

Already we can see that there are considerable differences between the participants and the control, however, since speakers' vocal tracts are shaped differently, it is not clear from the raw mean alone if these differences are significant or not. Normalization methods were then applied to these means to better understand the whether the differences observed in Tami are significantly different from the average speaker. The next set of F1/F2 plots, *Fig. 4* and *5*, show the mean vowel values for Tami compared to the average speaker and to Dio using the Lobanov normalization technique. As expected from the initial observations of the raw means, Tami's high front and high central vowels differ greatly from Dio and the average speaker. While the vowels /i/ and /ɨ/ are preserving distinction in the speech of Dio as those in the average speaker, Tami's pronunciation of the two vowels appears much closer together in the vowel space. The /i/ is dropping in height while the central vowel is raising. The two vowels are matching in F1 values in Tami's inventory. There is also a difference in the position of the vowels in the mouth with respect to frontness/backness. The front vowel has a higher F2 while the central vowel has a lower F2. It seems the distinction between the vowel spaces of /i/ and /ɨ/ is lessening and the two are converging towards each other.

Figure 5 also reveals a departure in the pronunciation of the schwa. Dio seems to match Tami for this vowel, a fact confirmed by *Figure 6* which

compares all three speakers. Both participants produce the Romanian schwa much higher in the mouth than does the control. Further, there is a lowering and fronting of the mid-back rounded vowel in Dio's inventory.
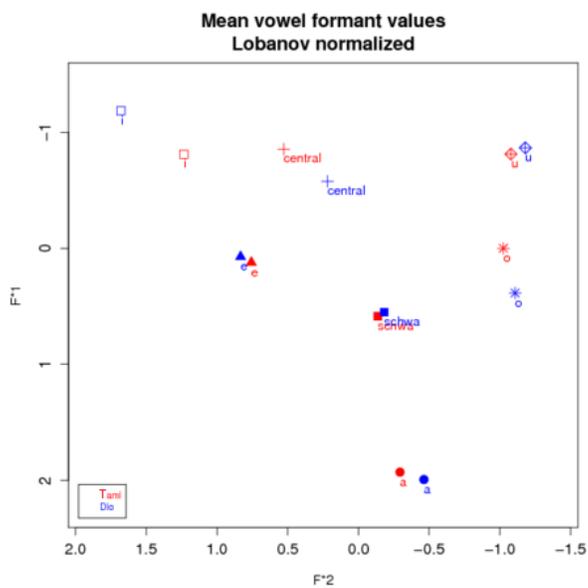

Figure 4. Comparison of normalized vowel formant means for Dio (blue) and Tami (red).
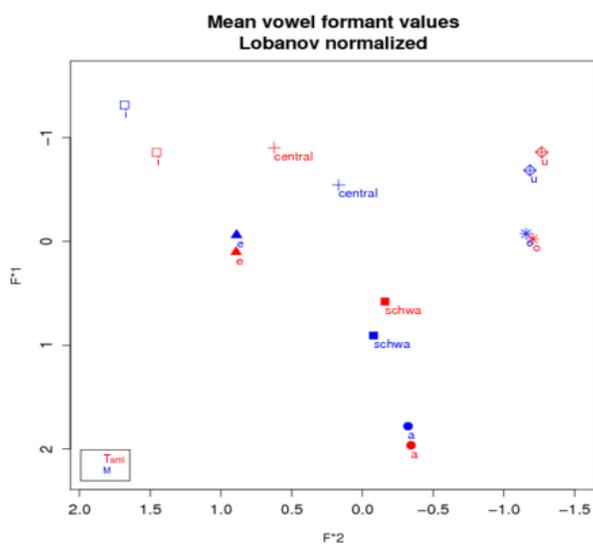

Figure 5. Comparison of normalized vowel formant means for M (blue) and Tami (red).
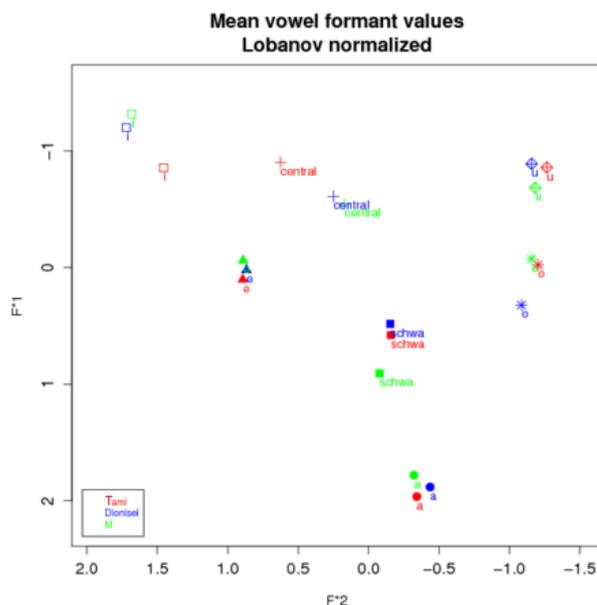
Figure 6. Normalized vowel means of all three participants.

      The mean vowel plots show that some changes in the vowel production of the speakers in Canada are similar while other changes follow differing courses. In order to better understand the behaviour of each vowel, it is important to also look at the individual occurrences and deal with any outliers. The next set of plots, *Fig. 4a* and *4b*, show the raw values for every extracted occurrence of each vowel for Dio and Tami. These unpacked means show the distribution of the vowels within their respective vowel spaces.

      With respect to the high vowels, Tami shows a close clustering of the central vowel, indicative of a consistent pronunciation even if it is more fronted than the average speaker. Her pronunciation of /i/ is however is spread along a continuum for height, showing a variation, but is not spreading to the vowel space of another vowel. The same conclusion cannot be made for the F2 values, which are fairly stable except for the three instances in the words /limba/, /mic/, and /cinci/[3], where the vowel is realized very back in the mouth, more like the high-back unrounded /ɯ/[4]. It is these three values that have affected the mean to show an /i/ with a lower F2 than in actuality. There appears to be a height ceiling above which Tami cannot produce the front vowels, corresponding with that of

[3] There is no phonological reason why these particular words should be pronounced that much farther in the mouth than the rest. The immediately preceding and following environments for /i/ do not belong to any natural class(es). While there are no minimal or near minimal pairs, the same vowel in the same immediate environment in the word /cine/ is realized at 2800Hz, radically different from the 1400Hz in /cinci/.

[4] /ɯ/ is not a phoneme of Romanian or Serbo-Croatian.

the high back rounded vowel. The problem is most obvious in the production of the central high vowel and the additional attention it receives in production. Tami also spends more time in the production of this vowel, around 40 to 50 ms longer than Dio, which could point to a possible pathology.

The unpacked means also show variation in the vowel space for the mid unrounded vowels. The variation in height seen in schwa is a reflection of the means seen in *Fig. 2b* and *3*. The values for /e/, however, which show a comparable mean to that of the average speaker, range both in height and frontness instead of clustering closer together. This is problematic for maintaining the distinction between /e/ and schwa as the vowel spaces of these are now encroaching on one another.

The low vowel is harder to judge because it has a larger vowel space in which it can be produced. However, the circular diffusion that can be seen in Dio's chart is not overlapping with any other vowel space while Tami's vertical dispersion is overlapping with the mid central vowel. It is either that, in order to keep the contrastive distinction between these two vowels, /ə/ moved into a higher vowel space to make room for the ascending /a/. The other possibility is that /a/ is being pulled to fill the gap left by the movement of the mid central vowel. The second scenario is more likely because Dio's /ə/ production is also higher than the control but without the subsequent movement of /a/.

Dio's unpacked means show much more variation in his pronunciation than the normalized means lead us to believe. The central vowel, for one, is produced in at least two distinct clusters. His production of this vowel is not as stable as Tami's. The cluster with the highest F1 value is very close to the vowel spaces of the mid vowels /e/ and schwa, but there is no actual overlap.

The high front vowels are hard to judge because the variation they display is well within its own space and does not produce any crossover.
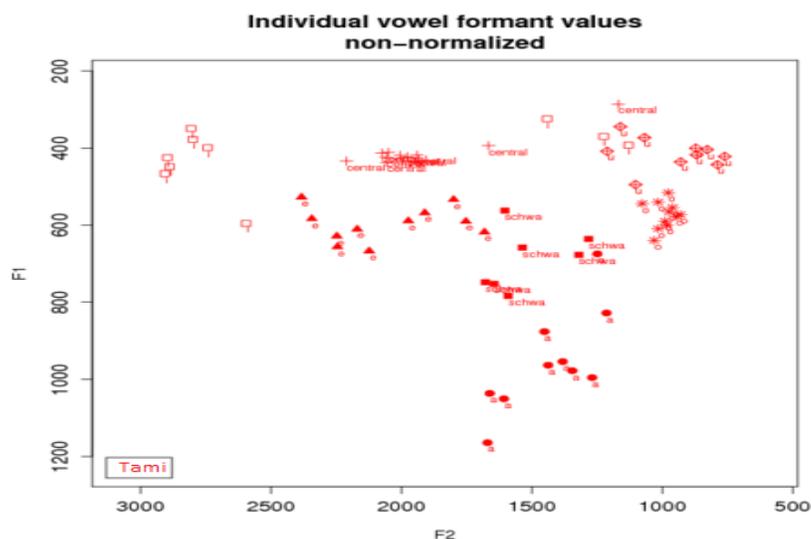

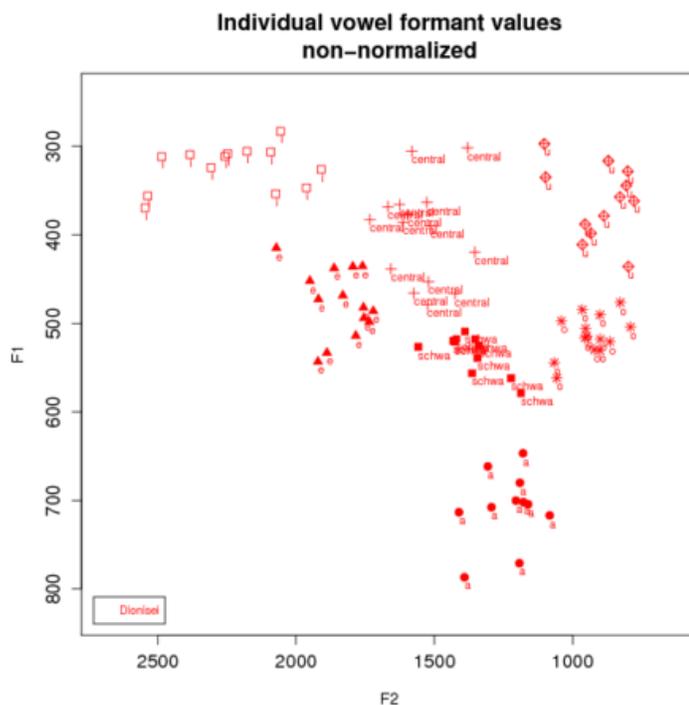*Figure 7.* Individual vowel formant values for Tami

Figure 8. Individual formant values for Dio

7   Conclusion and Discussion

There is evidence of both the preservation of distinct language features in immigrants to Canada and of the role that external factors play in creating different patterns of change.

The central high vowel is preserved for both participants. Even Tami's atypical production of /ɨ/ can be attributed to this vowel's singular position. The movement in height of /ə/ can also be attributed to efforts of preservation. While both Romanian and English have a schwa in their phonetic inventories, the two are perceptually different. The English schwa is shorter and more variable (Silverman, 2011; Crosswhite, 1999), while the Romanian is more stable. It is a full vowel that can occur in stressed positions in a word, and has a slightly higher F1 value. Crosswhite (1999) values the English schwa no longer than 40 ms, the Romanian schwa in the data averaged over 100 ms. These features were distant enough to prompt a further distancing of the vowels in order to preserve the distinction between the Romanian mid central vowel and the English one.

Differences in pronunciation could not be attributed directly to age but rather physiological differences. Further, community involvement affected the participants overall language views but it also did not translate into an observable difference in pronunciation. The younger participant has more connections

outside of Romania while the older had already established a stable social life in Romania and only partly extended it in Canada. Their different attitudes about the transmission of the language are also in part fuelled by the arrangement of their social (and professional) contacts.

There is a great difference in the language experience of the participants but their actual language, as far as phonetics goes, does not reflect this. While social factors and language use are very intertwined in contact situations, linguistic internal factor were better at predicting/explaining changes in vowel pronunciation that were due to contact.

8   Future Directions

It is clear that changes are happening in both speakers after such prolonged contact with English. Further confirmation of the observed factors can be made by expanding the analyses to include more participants. As a springboard to the larger study on heritage language change, the study has great relevance. It remains to be seen how second and third generation Romanian-Canadians interpret the schwa and high central vowels. Further, the importance or prominence of language external factors may increase as younger generations build their identity away from their parents' native land.

Finally I would like to bring to attention the need for a better corpus of Romanian to be built with more native samples and especially those of monolingual dialect speakers.

References

Ash, S. (2004). Social class. In J. K. Chambers, P. Trudgill, and N. Schilling-Estes (Eds.), *The handbook of language variation and change* (402-422). Cambridge: Blackwell.

Bullock, B. E. & Green, C. (2004). Phonological convergence in a contracting language variety. *Bilingualism: Language and Cognition, 7*(2), 95-104.

Cheshire, J. (2004). Sex and gender in variationist research. In J. K. Chambers, P. Trudgill, and N. Schilling-Estes (Eds.), *The handbook of language variation and change* (423-443). Cambridge: Blackwell.

Chinen, K. & Tucker, G. R. (2005). Heritage language development: Understanding the roles of ethnic identity and Saturday school participation. *Heritage Language, 3* (1), 27-59.

Chumak-Horbatsch, R. (1999). Language change in the Ukrainian home: From transmission to maintenance to the beginnings of loss: 1. *Canadian Ethnic Studies, 31*(2), 61.

Clopper, C. G. (2009). Computational methods for normalizing acoustic vowel data for talker differences. *Language and Linguistics Compass, 3* (6), 1430–1442.

Crosswhite, K. M. (2000). Vowel reduction in optimality theory. *Dissertation Abstracts International.*

Durand, J. & Pukli, M. (2004). *PAC project*: *Methods and tools*. Toulouse: Université de Toulouse.

Fought, C. (2004). Ethnicity. In J. K. Chambers, P. Trudgill, and N. Schilling-Estes (Eds.), *The handbook of language variation and change* (444-470). Cambridge: Blackwell.

Godson, L. (2004). Vowel production in the speech of western Armenian heritage speakers. *Heritage Language Journal, 2* (1).

Hoffman, M. F. & Walker, J. A. (2010). Ethnolects and the city: Ethnic orientation and linguistic variation in Toronto English. *Language Variation and Change, 22,* 37–67.

Kunnas, N. (2009). Ethnic loyalty as an explanatory factor behind individual differences in variation. *SKY Journal of Linguistics*, *22*, 175-219.

Silverman, D. (2011). Schwa. In M. v. Oostendorp (Eds.), *Companion to Phonology* (628-642). Chichester, U. K: Wiley-Blackwell.