Deconstructing Canadian French Vowel Harmony

Will Dalton, University of Ottawa
wdalt017@uottawa.ca

High vowels in Canadian French (CF) undergo a process commonly labeled as vowel harmony or laxing harmony. A lax high vowel in a word-final closed syllable optionally spreads or copies its laxness to a high vowel in the preceding syllable, as in (1). The non-final high vowel (the harmonic vowel) may be pronounced as either tense or lax (Dumas 1987, Poliquin 2006). Aside from the observed optionality, CF vowel harmony is subject to inter- and intraspeaker variation, speculated to arise from factors such as lexical frequency, formality or the "learnedness" of particular words (Walker 1984 and references therein). Such variation is not characteristic of typical vowel harmony systems observed cross-linguistically. Further differences – including the non-contrastive nature of the output phones and the lack of a corresponding "tensing" harmony – suggest that the observed assimilatory process affecting high vowels in CF should not be identified as harmony. One possible alternative is that laxing assimilation is best characterized as vowel-to-vowel coarticulation of the type described by e.g. Öhman (1966). Coarticulatory effects are usually not salient and can be observed most readily in vowel formant transitions, however the output of CF laxing harmony is a vowel of noticeable lax quality, suggesting a longer gestural duration than is typical of V-to-V coarticulation.

The answers to the following questions can help to disambiguate between phonological harmony effects and phonetic coarticulatory effects: (a) Is the effect gradient, rather than categorical? (b) Is it blocked by certain consonants, e.g. dorsals? (c) Is there an effect of the number of intervening consonants? This paper presents the results of an experiment designed to answer these questions and clarify the nature of the purported harmony process in CF. Fourteen native speakers of CF dialects participated in a production study. Audio recordings were subjected to acoustic analysis. Articulatory data were obtained using ultrasound imaging, which allows tracking and recording of tongue position in real-time during speech.

Impressionistic coding of harmonic vowels as either tense or lax confirm the optionality and variability of laxing harmony in CF. Acoustic analysis show that (a) values of F1 (the primary acoustic correlate of the tense-lax distinction in CF high vowels) measured at the midpoint of harmonic vowels were intermediate between mean F1 values of non-harmonic tense and lax vowels (Fig. 1), (b) the place of articulation of the intervening consonant had a significant effect on the extent of coarticulation, and (c) there was less coarticulation when two consonants intervened between the vowels as opposed to one. Taken together, these results demonstrate gradient and variable effects more typical of coarticulatory effects than harmony. However, the fact that coarticulatory effects were significant at the midpoint of the target vowel indicate a more persistent gestural duration than would otherwise be expected of V-to-V coarticulation. Articulatory results echo those of the acoustic analysis: images of the tongue recorded at target vowel midpoints show that the intermediate values of F1 for harmonic vowels are caused by variation in tongue dorsum height between the mean positions for non-harmonic tense and lax vowels (Fig. 2).

The findings of this experiment can be summarized succinctly: the spreading of "laxness" from one vowel to another in CF is less than harmony, but more than coarticulation. Ohala (1994) hypothesized that the origin of synchronic vowel harmony systems can ultimately be traced to patterns of vowel-to-vowel coarticulation, wherein the coarticulatory effects of one vowel on the other become phonologized over generations of speakers. The existence of intermediate stages in the development of harmony is supported by stochastic computational modeling (Mailhot, 2010) but such stages have not been formally identified in any existing language. The results of this study

suggest that the putative laxing harmony of CF (and perhaps more generally, similar processes of metaphony observed in various Romance languages) is a potential candidate to represent an intermediate stage in the development of vowel harmony from vowel-to-vowel coarticulation.

Examples

(1) /kli.nik/ → [klɪ.nɪk] ~ [kli.nɪk] *clinique* (“clinic”)

Figures

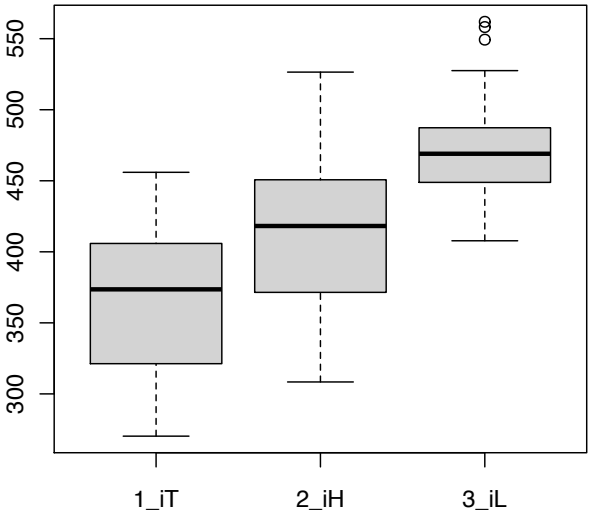

Figure 1: Boxplot of mean F1 midpoint values of tense, harmonized and lax /i/ (subject: frr10)

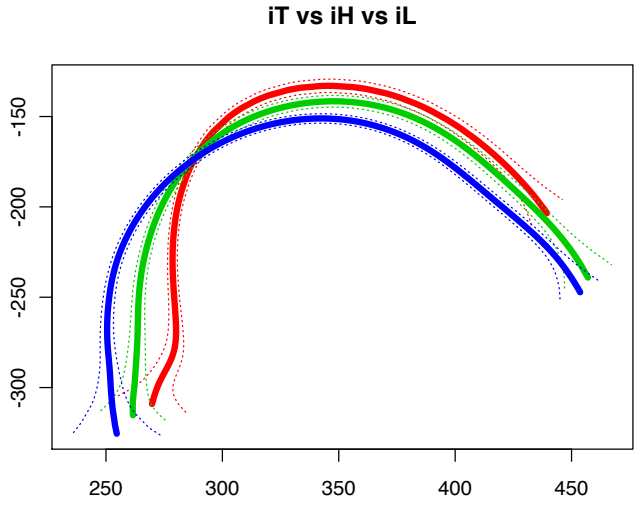

Figure 2: Smoothing spline ANOVA of mean tongue position of vowel midpoint (red: tense, green: harmonized, blue: lax) (subject: frr5)

References

Dumas, D. (1987). *Nos façons de parler: Les prononciations en Français Québécois*. Québec: Presses de l’Université du Québec.

Mailhot, F. (2010). *Modelling the Acquisition and Evolution of Vowel Harmony*. PhD dissertation, Carleton University.

Ohala, J. J. (1994). Towards a universal, phonetically-based, theory of vowel harmony. *ICSLP* **3**: 491-494.

Öhman, S. E. G. (1966). Coarticulation in VCV utterances: Spectrographic measurements. *Journal of the Acoustical Society of America* **39**: 151-168.

Poliquin, G. (2006). *Canadian French Vowel Harmony*. PhD dissertation, Harvard University.

Walker, D. (1984). *The Pronunciation of Canadian French*. Ottawa: University of Ottawa Press.