EXAMINING 'OPPOSING' PROCESSES IN LAURENTIAN FRENCH*

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1. Introduction

French is typically described as showing an alternation or asymmetry between the mid-high vowel series /e, ø, o/ and its mid-low counterparts /ɛ, œ, ɔ/ in which the former set is favoured in open final syllables and the latter one is preferred in closed final syllables.[1]

This tendency for the vowel to be predictable based on its context, named the *loi de position* ('law of position'), is mostly true of the native lexicon in that /e/ is not underlyingly present in closed final syllables and neither /œ/ nor /ɔ/ are found underlyingly in open final syllables (Walker, 1984). However, /ɛ/ is frequent in open final syllables – like in *aimait* 'liked (3 pl.)' – and both /ø/ and /o/ are prescribed in closed ones – as in *jeûne* 'fast (n.)' and *jaune* 'yellow', respectively. The *loi de position* is typically described as being directional in that it doesn't simply reflect a disfavouring of mid-high vowels in closed syllables and of mid-low vowels in open ones, but also predicts the repair strategy used for these two contexts; mid-high vowels are said to lower to mid-low, whereas mid-low vowels raise to be mid-high. As a result, full compliance with the *loi de position* predicts the two mid-vowel series to become allophonic, since their distributions would be fully complementary.

On one hand, Laurentian French, the dialect spoken in Canada along the St. Lawrence River and in areas French-speaking areas populated by emigrants from that area (Côté, 2012), is claimed to have extended the *loi de position* to high vowels through the high vowel laxing alternation, shown in (1), and even to low vowels, where the inability to lower the front vowel /a/ is resolved by backing it in word-final position. On the other hand, the dialect also offers an alternation that would appear to run counter to the *loi de position*'s directional predictions: /ɛ/ can lower to [a] or [æ] in final syllables before clusters beginning with the rhotic and in word-final position (Morin, 1996). This leads to a conflict between the two alternations, since a word like *français* 'French', underlyingly /fr sɛ/, could have its final vowel raised to [e] in compliance with the *loi de*

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[1] This analysis does not presume the nature of the distinction between the mid-high and mid-low vowels – it may be a tense-lax, an ATR or a height distinction. This paper will use these terms interchangeably, favouring the use of height classifications following traditional descriptions.

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position, lowered to [æ] following the Laurentian lowering alternation, or realized faithfully as [ɛ].

(1) High Vowel Laxing in Laurentian French

vie 'life' [vi]	*vite* 'quick' [vɪt]
rue 'road' [ry][2]	*rude* 'rough' [rʏd]
roue 'wheel' [ru]	*roule* 'rolls (v.)' [rʊl]

This study examines the front unrounded vowels' behaviours. Treating them distinctly from the rounded vowels is justified on several grounds, particularly that the two pattern differently with regards to their exceptions to the *loi de position*, as previously noted. Additionally, lowering /ɛ/ is deemed to be socially salient – generally associated with the Saguenay sub-variety –, while the rounded vowels' lowering appears not to be as salient, but nonetheless occurs (Lamontagne, 2014b and references therein). Finally, the time periods for the change in rounded and unrounded vowels differs, as the two rounded vowel pairs appear to have been neutralising in final open syllables at about the same time, whereas the raising of the unrounded mid-low vowel was first noted in 1902 (Nyrop, 1902) and seems to be quite variable across dialects even now.

2. The Variable Context

This analysis is reflective of two broad variable contexts: the first is comprised of cases of final-syllable /e/ and the second, of cases of final-syllable /ɛ/. Although this may seem straightforward from here, some additional circumscription to the variable context had to be taken into account. Firstly, the dialect has a phoneme that is traditionally described as being /ɛː/ (though see Côté (2012) for further discussion on it, proposing it to be transcribed as /ɜ/). This vowel, which distinguishes *fête* 'party' with /ɛː/ from *faite* 'done (fem. sg.)' with /ɛ/, does not figure into the variable context for either process because it shows diphthongisation in closed final syllables, which is categorical for most of the speakers. Secondly, /ɛ/ in syllables closed with /z/ and /ʒ/, like *seize* 'sixteen' and 'beige' (which now may be analysed as having /ɛː/), are diphthongised as well, therefore requiring exclusion as well. Thirdly, certain words show either distinct patterning or lack variability, and as such have been excluded: *elle* 'she' is typically realized with a low vowel (now arguably an underlying option), *elle est* 'she is' is excluded where the two are realized as [e] rather than distinct words due to lack of variability, and *ouais* 'yeah' was excluded because it both patterns independently and because of the lack of distinct transcriptions for the realizations with a nasal or non-nasal vowel.

3. Method

3.1 The *Phonologie du français contemporain* Project

The *Phonologie du français contemporain* project (PFC; Durand et al., 2002, 2009; www.projet-pfc.net), is a massive international endeavour to create freely available corpus data for French, with all surveys following the same protocol in order to make cross-dialectal comparisons regarding the state and evolution of French. The project currently offers surveys in four continents for a total of approximately four hundred

[2] In this example and hereafter, the rhotic will be represented by a lower-case 'r' in transcriptions. Depending on the speaker, the rhotic's realisation could be uvular (trill, fricative) or coronal (trill).

participants divided into nearly forty surveys. In each location, speakers read a list of words and a short text, and participate in both guided (more formal, interview-like) and unguided (informal) conversations. All recordings are then transcribed in Praat (Boersma and Weenink, 2010) and coded for liaison and for schwa realisations. The present analysis draws its data from a subset of the Laurentian sub-corpus (Côté, 2014, in press): four survey locations (La Pocatière, Quebec City, Saguenay and Trois-Rivières) are under analysis in order to gain a wider perspective of the dialect.

3.2 Speakers

The data here analysed come from twenty-four speakers. The table in (2) shows the speaker stratification according to social factors, for which each one has been categorised according to age, gender and region. Only the unguided conversation – that is, the most informal data available – was considered for this analysis, which was particularly important given that lowering is regionally marked and the *loi de position*, shown to be increasingly followed in Parisian French (Berit Hansen, 2012), is likely to have prestige or formality associations. The age classification is binary (*old* or *young*) both to facilitate comparison of the dialect in apparent time and to better reflect how the speakers were stratified during data collection (the PFC surveys target speakers in age categories, stratified as such and with gaps between).

(2) Speakers as Stratified by Social Factors[3]

	Older Speakers		Young Speakers	
Region	Male	Female	Male	Female
La Pocatière	rg1 (1927) jb1 (1932)	fs1 (1926)	gh1 (1985)	am1 (1981) fg1 (1995)
Quebec City	gr1 (1940) pb1 (1950)	yl1 (1923)	ar1 (1989)	rc1 (1990)
Saguenay	rt1 (1934)	gt1 (1932)	fv1 (1984) pl1 (1983)	cl1 (1982) jv1 (1979) mb1 (1985)
Trois-Rivières	bp1 (1933) wd1 (1934)	cc1 (1931) hd1 (1937)	jg1 (1987) ll1 (1986) mc1 (1987)	ad1 (1987) lc1 (1987) sb1 (1989)

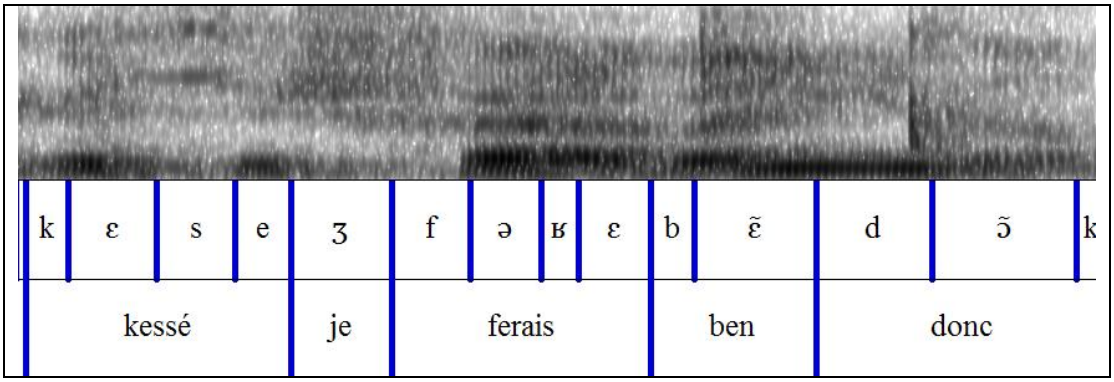
3.3 Data Extraction

The PFC recordings were aligned using Milne's (2011) forced aligner, which takes the transcript and the audio file and outputs a Praat TextGrid with tiers for both words and phones. The transcripts were adapted to increase alignment accuracy by coding for common expressions that show particular pronunciations, such as *je sais* 'I know' and *qu'est-ce c'est* 'what it is, what', often realised as [ʃe] and [kɛse], respectively. These replacements not only improve accuracy, but also are supported by research that finds some frequent expressions to behave as units in themselves for phonological patterning

[3] The speaker codes here used are those assigned as part of the corpus data collection. The years in parentheses are the speakers' birth years.

(see Bybee (2002) and references therein). Figure (3) shows an example of the script output, including the latter of the example clusters, taken from speaker coccd1's aligned unguided conversation.

(3) An Example of the Aligner's Output



A Praat script was written to automate data collection and coding.[4] In order to determine whether the token was part of the variable context, the script scanned through all phones in the aligned TextGrid and, if they were one of the phonemes sought (/e/ or /ɛ/), checked the rest of the word to see if it contained a later realised vowel.[5] Should it contain one, the script continued scanning through the words – but, if not, the script then checked if the phoneme was /ɛ:/ rather than /ɛ/ by comparing it to a list of words provided to it.[6] The factors described in section 2.5 were then coded automatically and the vowel's first two formants were measured at values specified for each speaker individually to maximize accuracy and the pitch and intensity were measured.

Certain conditions were further established to determined if a word was likely to be misaligned or otherwise a problematic token. The first targeted formants: if the formants were either undefined or were outside of reasonable ranges (whether due to a measurement error or misalignment), the token was rejected. The second criterion was that any token that was measured as having undefined pitches or intensities at any measurement point (5%, 50% and 95% of the vowel duration) was excluded. Milne (2014) found that this aligner met inter-rater agreement ranges for coding full codas, simplified ones and schwa realizations in those contexts, which reinforces the confidence placed in non-discarded tokens.

[4] Sections 3.4 and 3.5 will discuss the details pertaining to coding variants and factors, respectively.
[5] Silent schwas later in the word, if treated as underlying, were not considered. This means that *dette* 'debt' would be treated as a token word since the /ɛ/ is in the final syllable. The script additionally considered a limited number of words with /a/ in order to determine the formant values for low vowels, necessary to determine the criteria by which a mid-low vowel would be deemed to be lowered.
[6] The forced aligner does not distinguish these two vowels, so the script was first run to extract all words transcribed as having /ɛ/ in the final syllable. The words outputted were then all manually checked and the script was provided with a list of those that weren't to be considered as a result of containing /ɛ:/ in the final syllable.

3.4 Variant Coding

This analysis considers vowels in discrete categories, rather than examining the formant values as a continuous variable.[7] Coding variants consistently and objectively is a critical methodological concern for this analysis. As such, perceptual methods were deemed undesirable – as well as inefficient for larger numbers of tokens –, meaning a more empirical solution was to be sought. The result was the formula in (4):

(4) The formula used to determine the threshold between two vowel categories[8]

$$Threshold_i = \mu_{i,x} - \frac{\sigma_{i,x} * (\mu_{i,x} - \mu_{i,y})}{\sigma_{i,x} + \sigma_{i,y}}$$

This formula uses two adjacent underlying vowels' means and standard deviations to generate a threshold between the two. This threshold is the point at which those two vowels are at equal standard deviations from each other. If a given token's first formant – taken as the primary correlate of tongue height – is greater than the threshold between /ɛ/ and /a/, then it was deemed to have lowered; if it was lower than the one between /e/ and /ɛ/, then it was coded as raised; otherwise, it was determined to be the faithful mid-low variant.

3.5 Factor Coding

This analysis relies on the ability to automate factor coding in order to prepare for the statistical analysis consistently and efficiently. The first set of factors considered were the social ones previously noted: gender (male or female) and region (La Pocatière, Quebec City, Saguenay, Trois-Rivières). Regarding the phonological context, the places of articulation of the preceding and following segments were also coded – where no segment preceded or followed, it was deemed to be a pause –, as well as the number of realised consonants in coda.

The possible interaction between sandhi effects and final-syllable processes were also considered. The first is enchaînement a process by which word (here the token word) ending in at least one consonant can have its consonants realised as the onset of the following word's first syllable if the following one begins with a vowel (or otherwise can add the previous word's coda elements to its onset), making *sept amis* 'seven friends', underlyingly /sɛt#ami/, realised as [sɛ.ta.mi]. The other process considered is liaison. This is the realisation of a consonant – generally in the onset of the following syllable – that would not be present in the words spoken in isolation, but which surfaces when it can be realised in the following word's onset. This can be seen in *trois* [trwa] and *amis* [ami], which, together, are realised as [tr z̲amis]. The script noted the presence of liaison and the potential occurrence of enchaînement, which are treated as mutually exclusive

[7] For an exploratory analysis examining the *loi de position* and the Laurentian lowering process using continuous variables, see Lamontagne (2014). This analysis will compare its results with those obtained in the aforementioned analysis in order to show the respective merits of considering processes in discrete and in gradient terms.

[8] In this formula, *F* signifies formant, μ signifies the mean, σ signifies the standard deviation, superscript *N* denotes normalisation results and subscript *i* specifies the formant number. The indices of *x* and *y* denote values originating from adjacent vowel categories.

because liaison in this data will consistently have enchaînement, so marking it as two factors that overlap so much in context is not ideal.

Following the claims of a possible stress shift in Laurentian French, this analysis considered three stress correlates as potential predictors. The first, duration, was normalised for each speaker as being a percentage of that speaker's mean duration, then was divided into bins such that each interval of ten percent started a new factor value.[9] The second, the mean intensity over the duration of the vowel, was computed and normalised in the same manner as the duration. Finally, the pitch contour was included as a factor, initially presented as a percentage equivalent to the pitch at 5% of the vowel's duration relative to the one at 95% of it.

Two last factors were considered, both lexical in nature. The word's probable root was computed by removing frequent affixes (such as preverbal *re-* 're-' and inflexional suffixes) or, in the case of irregular or less predictable alternations (like *aller* 'to go' having *va* 'goes' and *allé* 'gone' in its paradigm), they were specified. The roots' and words' frequencies in the corpus (using the 67 speakers in Lamontagne (2014)) were taken and log-transformed, then regrouped into frequency groups according to their distributions and behaviour. The two frequencies consistute the final two of this analysis.

3.6 Statistical Analysis[10]

This analysis makes use of Rbrul (Johnson, 2009) in order to determine the statistically significant factors that govern variant selection. The models were designed to approximate those used in Lamontagne (2014a), therefore using fixed-effects logistic regression.[11] Where factors were sorted into bins, the final models here presented reveal the generalisations that are abstracted from this data. In other words, for example, the pitch contour bins are grouped into classes to distinguish steep rising or falling contours (greater that 40% pitch difference between the start and end points), more moderate rising or falling contours (between 10% and 40% pitch difference between those points) and stable contours (up to a 10% difference between the vowel start and end).

3.7 The Variationist Framework

The interpretation of the results obtained in this analysis is done drawing upon the Variationist framework. As described in Tagliamonte (2006), there are three elements to analyses within this framework, which seeks to go deeper than base rates or even statistically significant groups' rates: the factor weights (or coefficients, which reveal the direction and magnitude of effect of a factor), the factors' ranges (the difference between the most and least favouring weights or coefficients) and the factor hierarchy (the organisation of factors by range). The coefficients reveal details of specific factor values – like that surrounding uvular segments may strongly favour lower variants –, while the factor ranges seeks to determine the magnitude of effect of a factor as a whole. The final element of analysis, the factor hierarchy, is established by putting the factor groups in

[9] Vowel duration will not be presented in the results as it was never significant.
[10] Some crossover effects remain in the present analysis, largely the result of the lexicon. However, some factors have a certain degree of inevitable overlap should both be used – the sandhi processes and the syllabic context factors, for example.
[11] See Lamontagne (2014b) for an exploratory analysis of the two processes here targeted, using different computational models and mixed-effect logistic regression.

order of their range such that the highest factor in the hierarchy is the one with the greatest range. It is the hierarchies that are compared across speaker groups – here age groups – to determine whether the two have the same underlying grammars and, if not, in what way they differ, regardless of potentially different base rates.

4. Results

4.1 Underlying Mid-High Vowels

(5) The Factors Favouring Underlying Mid-High Vowels' Lowering[12]

Age Group	Older Speakers			Younger Speakers		
N	4642			4057		
Grand Mean; Input	19.9% ; 20.9%			20.7% ; 26.2%		
Deviance	4488.495			3925.755		
	Coeff.	%	Total N.	Coeff.	%	Total N.
Gender				p < 0.001 ; Range = 0.298		
Female				0.149	23.2	1901
Male				-0.149	18.4	2156
Processes	p < 0.001 ; Range = 0.642			p < 0.001 ; Range = 0.588		
Liaison	0.321	27.7	996	0.294	27.7	764
None	-0.321	17.8	3646	-0.294	19.0	3293
Following Place	p < 0.001 ; Range = 0.488			p < 0.001 ; Range = 0.860		
Coronal	-0.244	15.7	630	-0.430	11.3	467
Pause	0.244	20.6	4012	0.430	21.9	3590
Previous Place	p < 0.001 ; Range = 0.974			p < 0.001 ; Range = 0.855		
Non-Lingual	-0.189	19.7	142	-0.030	24.8	113
Coronal	-0.148	16.8	2208	-0.283	16.4	1916
Palatal	-0.517	17.5	286	-0.442	22.4	165
Velar	0.015	26.9	26	NA	NA	NA
Uvular	0.382	29.8	57	0.413	40.7	27
Pause	0.457	23.5	1923	0.342	24.4	1836
Root Frequency	p < 0.001 ; Range = 0.573			p < 0.001 ; Range = 0.906		
High	-0.256	19.1	3540	-0.464	19.8	3432
Mid	0.317	23.8	884	0.022	23.7	503
Low	-0.062	17.4	218	0.442	33.6	122
Intensity	p < 0.001 ; Range = 0.406			p < 0.001 ; Range = 0.871		
High	0.259	25.9	864	0.483	31.0	693
Near-Mean	-0.147	18.5	2823	-0.095	19.2	2437
Low	-0.112	18.6	955	-0.388	16.6	927
Pitch Contour				p = 0.001 ; Range = 0.122		
Rising				0.146	23.5	588
Stable				-0.170	19.9	3113
Falling				0.024	22.5	356

[12] The factors not selected as significant for older speakers were the following: Gender, Region, Orthographic vowel, Word frequency and Pitch Contour. For younger speakers, only Region, Orthographic vowel and Word frequency were not significant. Younger speakers' following velars had to be excluded as there were solely four tokens and the resulting computation was therefore highly unreliable.

The table in (5) shows the results for the underlying /e/ vowels, with the application value set at the lowered variants. Interestingly, region was not selected as significant for either age group, suggesting their grammars – or at least the resulting rates – to be the same. Additionally, younger speakers alone find gender differences, with women favouring lower realisations. In both generations – albeit with a smaller effect size in younger speakers –, the presence of liaison correlates with lowered realisations, which may suggest that, at some relevant level in the phonological processing, those final consonants may be treated as coda consonants, should the *loi de position* be respected in the vowels' lowering.

Regarding phonological context, we find that general predictions of previous consonants' coarticulatory effects hold: coronal segments reasonably favour higher realisations as do palatal ones, while uvulars favour lowering. Young speakers also saw the relatively neutral effect of non-lingual segments (bilabials and labiodentals). The case of the following pause is particular; it corresponds to three words, *ai* 'have (1 sg.)', *es* 'are (2 sg.)' and *est* 'is', all of which are highly frequent and can behave as both auxiliaries and frequent verbs (*avoir* and *être*). For the following segment, only two surfaced as the aligner determined a pause to occur between a final vowel and the following onset except where that onset was also a liaison consonant – this means that solely coronals and following pauses are here represented, reducing (but not negating) the apparent effect of liaison.

Roots' – and not words' – frequencies also come into play, with the extremely high frequency words and the relatively infrequent ones favouring faithfulness, while medially frequent ones favour lowering in contrast. Stress correlates are here a true point of interest however: we can see pitch contour gaining interest in apparent time (with falling contours very slightly favouring lowering and rising ones more strongly doing so) and the magnitude of effect of vowel intensity increasing.

4.2 Underlying Mid-Low Vowels

As presented in (6), for older speakers, we find results logistically compatible with might be expected on several fronts. Curiously, however, the lowered variant appears to be stable across the dialect, while different regions show varying favouring – or disfavouring – effects for the mid-high and mid-low variants. Only La Pocatière disfavours the faithful realisation overall, instead preferring the higher variant, while Quebec City most favours it. Saguenay and Quebec City speakers both disfavour the raised variant, though those from Saguenay do so a bit more.

Only the two lower variants are sensitive to the processes, with enchaînement disfavouring both of them, liaison favouring only lower ones, and the absence of processes increasing the likelihood of faithful realisations. For the low vowel, ê and aî – which in some contexts refer to /ɛː/ (as in *fête*) – and *e* are disfavouring, while it is instead favoured by *è* and *ai*.

The phonological context again shows coarticulatory predictions for the most part: palatals and velars favour higher realisations and disfavour lower ones, while uvulars do the opposite. Finally, in both unfaithful realisation we find an effect of intensity, with lower intensities favouring mid-high realisations and the higher intensities most favouring lower realisations.

(6) The Factors Governing Older Speakers' Variant Selection for Underlying Mid-Low Vowels[13]

Variant	Mid-High			Mid-Low			Low		
N	2646			2646			2646		
Grand Mean; Input	25.7% ; 26.9%			39.5% ; 36.6%			34.8% ; 36.3%		
Deviance	2911.449			3514.791			3328.888		
	Coeff.	%	Total N.	Coeff.	%	Total N.	Coeff.	%	Total N.
Region	p < 0.001 ; Range = 0.391			p < 0.001 ; Range = 0.504					
La Pocatière	0.234	30.8	686	-0.301	31.9	686			
Quebec City	-0.111	21.3	1120	0.203	43.9	1120			
Saguenay	-0.157	21.3	197	0.074	40.6	197			
Trois-Rivières	0.034	25.5	643	0.025	39.7	643			
Processes				p = 0.006 ; Range = 0.321			p = 0.004 ; Range = 0.107		
Liaison				-0.146	33.6	512	0.210	42.2	512
Enchaînement				-0.029	36.4	195	-0.051	35.9	195
None				0.175	41.4	1939	-0.158	32.7	1939
Orthographic Vowel							p = 0.021 ; Range = 0.502		
ai							0.278	31.5	3376
e							-0.224	28.2	1009
è							0.164	29.3	374
ê, aî							-0.219	29.3	41
Following Place	p < 0.001 ; Range = 1.906						p < 0.001 ; Range = 2.986		
Non-Lingual	-0.041	28.1	64				-0.612	29.7	64
Coronal	-0.385	17.8	483				0.408	40.0	483
Palatal	0.567	38.5	13				-1.401	23.1	13
Velar	0.801	43.4	205				0.020	22.9	205
Uvular	-1.105	10.7	28				1.585	57.1	28
Pause	0.163	25.8	1853				0.000	34.7	1853
Previous Place	p < 0.001 ; Range = 1.247						p < 0.001 ; Range = 0.72		
Non-Lingual	-0.012	29.9	1099				-0.329	29.8	1099
Coronal	-0.243	23.6	1090				0.024	38.0	1090
Palatal	0.172	27.5	109				-0.022	33.9	109
Velar	0.412	28.6	14				-0.244	35.7	14
Uvular	-0.788	15.5	297				0.181	41.4	297
Pause	0.459	35.1	37				0.391	0.38	37
Intensity	p = 0.002 ; Range = 0.501						p < 0.001 ; Range = 0.268		
High	-0.219	22.8	583				0.289	41.0	583
Near-Mean	-0.063	25.1	1622				0.021	34.5	1622
Low	0.282	31.5	441				-0.310	27.7	441

[13] The factors not selected as significant for the mid-high variant were Gender, Coda size, Orthographic vowel, Word frequency, Root frequency, Phonological Processes and Pitch Contour. For the mid-low, Gender, Coda size, Orthographic vowel, Previous and Following Places, Word frequency, Root frequency, Intensity and Pitch contour were not significant. For the low variant, the non-significant factors were Gender, Coda size, Word frequency Pitch contour, and Region.

(7) Factors Governing Young Speakers' Variant Selection for Underlying Mid-Low Vowels

Variant	Mid-High			Mid-Low			Low		
N	2140			2140			2140		
Grand Mean; Input	30.8% ; 26.8%			42.9% ; 43.1%			26.0% ; 28,7%		
Deviance	2486.595			2915.694			2295.795		
	Coeff.	%	Total N.	Coeff.	%	Total N.	Coeff.	%	Total N.
Region	p < 0.001 ; Range = 0.907			p < 0.001 ; Range = 0.84					
La Pocatière	0.079	32.0	570	-0.141	39.8	570			
Quebec City	0.024	29.8	697	0.077	46.3	697			
Saguenay	-0.505	20.0	343	0.452	53.9	343			
Trois-Rivières	0.402	37.6	561	-0.388	35.0	561			
Gender	p = 0.026 ; Range = 0.212			p = 0.023 ; Range = 0.202					
Female	0.106	33.1	1238	-0.101	40.4	1238			
Male	-0.106	27.8	933	0.101	46.2	933			
Coda Size	p = 0.001 ; Range = 5.775								
No Coda	3.257	34.4	1393						
One Segment	-0.739	24.7	716						
Cluster	-2.518	12.9	31						
Processes	p < 0.001 ; Range = 0.804						p < 0.001 ; Range = 0.627		
Liaison	-0.417	18.4	397				0.359	37.5	397
Enchaînement	0.030	22.5	173				-0.091	32.4	173
None	0.387	34.9	1570				-0.268	22.4	1570
Orthographic Vowel							p = 0.016 ; Range = 0.530		
ai							0.270	26.4	1444
e							-0.260	23.2	491
è							-0.185	29.7	185
ê, aî							0.175	30.0	20
Following Place	p < 0.001 ; Range = 1.279						p < 0.001 ; Range = 1.450		
Non-Lingual	-0.691	19.0	116				0.780	39.7	116
Coronal	-0.316	18.7	407				0.368	38.8	407
Velar	0.588	37.1	224				-0.478	15.6	224
Pause	0.410	34.4	1393				-0.670	22.8	1393
Previous Place	p = 0.002 ; Range = 1.461						p < 0.001 ; Range = 1.007		
Non-Lingual	-0.255	32.4	849				0.129	24.1	849
Coronal	-0.156	32.9	721				0.060	23.3	721
Palatal	0.074	28.0	100				0.241	32.0	100
Velar	0.262	30.8	13				-0.425	23.1	13
Uvular	-0.693	25.2	373				0.760	33.0	373
Pause	0.768	26.2	84				-0.766	0.3	84
Intensity	p = 0.048 ; Range = 0.315			p < 0.001 ; Range = 0.399			p < 0.001 ; Range = 0.824		
High	-0.111	27.0	500	-0.266	36.8	500	0.437	35.8	500
Near-Mean	-0.093	30.4	1243	0.133	44.5	1243	-0.050	24.7	1243
Low	0.204	37.0	397	0.133	45.5	397	-0.387	17.6	397
Pitch Contour	p = 0.038 ; Range = 0.812								
Steeply Rising	0.538	48.1	54						
Rising	-0.040	34.2	146						
Stable	-0.224	30.2	1707						
Falling	-0.274	29.2	233						

The table in (7) shows younger speakers' patterning.[14] Again for the young speakers the lower variant appears to be consistent across varieties, while the dialect shows different effects for specific regions. Again we find Saguenay speakers disfavouring raising, though now it is Trois-Rivières speakers who most favour itrather than those from La Pocatière who, nonetheless, do still show a relatively small favouring effect. Additionally, with respect to social factors, gender effects emerge, with females favouring raising and males favouring lowering.

In the case of the raised variant, the syllable structure increases the favouring effect of lacking a coda. This is perhaps further reinforced by the interplay between processes: liaison favours lowering and disfavours raising (though surprisingly a slight favouring effect is found in enchaînement contexts). Again orthography affects only the lowered variant, sharing the old speakers' direction of effect.

Regarding coarticulatory effect, it is again evident that they play an important role; surrounding contexts that would involve lowering or raising the tongue body have a corresponding effect on the variant selected. The stress correlates' effects now become of particular interest. Again we see the emergence of pitch contour effects in apparent time, here with steeply rising contours very strongly favouring raising and gradually reversing the contour also reverses the effect.

5. Discussion

The above results demonstrate general details the speakers' variant selection. We consistently find that the stress correlates gain significance or range in apparent time. Additionally, coarticulatory effects are found consistently and in expected directions. Regional differences only appear to be significant in the case of mid-low vowel raising, but this remains true of both generations. Finally, for the more broad descriptions, the sandhi processes can be seen to interact considerably with variant selection.

As previously noted, however, the present analysis is couched in the Variationist framework and, therefore, aims to go further still. It is evident even prior to examining factor hierarchies that some differences will be present, as evidenced by the appearance of stress effects in apparent time. (8) seeks to show just to what extent these hierarchies have shifted for underlyingly mid-high vowels.

[14] The factors not selected as significant for the mid-high variant were Orthographic vowel, Word frequency and Root frequency. For the mid-low, Coda size, Orthographic vowel, Previous and Following Places, Phonological processes, Word frequency, Root frequency, and Pitch contour were not significant. For the low variant, the non-significant factors were Region, Gender, Coda size, Word frequency and Pitch contour.

(8) Factor Hierarchy for Underlying Mid-High Vowels

Old Speakers	Young Speakers
Previous Place (0.974)	Root Frequency (0.906)
Sandhi Processes (0.642)	Intensity (0.871)
Root Frequency (0.573)	Following Place (0.860)
Following Place (0.488)	Previous Place (0.855)
Intensity (0.406)	Sandhi Processes (0.588)
	Gender (0.298)
	Pitch Contour (0.122)

This shows that the change in underlying grammar is fairly significant. While for older speakers coarticulatory effects (which, it must be noted, may also be amplified in importance due to effects of age rather than grammatical change) dominate in that the first factor is phonological, the second still looks at phonological considerations (that interact with representations and with segmental contexts) and the fourth, though before last, is segment-targeting as well. However, as the effect of the following place largely serves to reduce the effect of the sandhi process of liaison (the sole one possible here), the grammars are more similar than they first appear; frequency therefore has a greater effect than it seems to, and sandhi effects are reduced in range. However, change is evidently present, as is most evident due to the considerable gain made by prosodic factors – intensity gains importance to become second in the hierarchy and pitch contours gain significance. Furthermore, gender effects emerge only in the younger generation. It is also of note that the younger generations' factors are much closer in range overall, suggesting more variability is possible based on data size and, perhaps, that the hierarchy can shift in structure more easily.

(9) Factor Hierarchy for Underlying Mid-Low Vowels (Older Speakers)

Mid-High	Mid-Low	Low
Following Place (1.906)	Region (0.504)	Following Place (2.986)
Previous Place (1.247)	Sandhi Processes (0.321)	Previous Place (0.720)
Intensity (0.501)		Orthography (0.502)
Region (0.391)		Intensity (0.268)
		Sandhi Processes (0.107)

(10) Factor Hierarchy for Underlying Mid-Low Vowels (Younger Speakers)

Mid-High	Mid-Low	Low
Coda Size (5.775)	Region (0.840)	Following Place (1.450)
Previous Place (1.461)	Intensity (0.399)	Previous Place (1.007)
Following Place (1.279)	Gender (0.202)	Intensity (0.824)
Region (0.907)		Sandhi Processes (0.627)
Pitch Contour (0.812)		Orthography (0.530)
Sandhi Processes (0.804)		
Intensity (0.315)		
Gender (0.212)		

Looking at the hierearchies in (9) and (10), it becomes evident that the mid-low appears to be – as might be expected – a default vowel in that it does not require as much to be selected. Beginning with low variants, we find that selection is relatively stable compared to the other variants; all of the same factors are represented. Furthermore, the top two factors (both coarticulatory) remain stable, and the sole difference in the bottom three is that the effect of orthography drops, without changing the ordering of intensity and of sandhi effects. That so little change occurred here relative to other cases seems to suggest the general uniformity of lowering, both in time (across generations the hierarchy remains fairly little changes) and across space (region is significant for neither generation). For faithful realisations, region is consistently of interest, balancing out the differences in mid-high selection. In younger speakers, however, intensity becomes of interest and gender effects emerge, while the sandhi processes cease to play a significant role. The raised variant shows the greatest change over time. Not only does the number of predictors increase considerably – namely due to the evident change in stress correlates –, but the effect of the *loi de position* there appears to be on the rise, becoming the dominant factor. Sandhi processes also become significant, which mirrors its presence in selecting the low variant.

6. Conclusion

It seems to be that the behaviour of the mid vowels is in flux. One of the most notable changes in this respect is the gain in significance and in effect size of the stress correlates in apparent time, which may support the proposal that Laurentian French is seeing a shift in its stress system. Additionally, although the *loi de position*'s primary factor is only significant in one case, it does get some representation in other factors, as following pauses are inevitably also a sign of word-finality. Sandhi effects, however, show the greater effect overall, being significant in nearly all models.

Future research can seek to establish new models to determine the interaction between raising and lowering in the mid-low vowels more fully. One option is to pursue more specifically tailored models, as in Lamontagne (2014b), where the interplay was examined not only in exploring variant selection, but also in models designed to examine selection as a case of process application. However, one of the greatest lacunae at present with regards to *loi de position* research within the Variationist framework is that fully cross-dialectal comparisons are currently not possible due to the behaviour of other

dialects not being analysed to this point. Additionally, it would be of interest to consider other languages and seeing if the proposed tendency towards the complementary distribution of mid vowels reflects a tendency of languages more broadly.

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