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Article abstract

This paper presents findings of a descriptive study that suggest that the deletion of high vowels, a process that is generally associated with Laurentian French, may have begun to spread across francophone regions of New Brunswick. The study examines the pronunciation of /t, d/ + /i, y/ sequences in a small number of lexical items, with a focus on vowel deletion. Based on acoustic phonetic analyses of sentences read by 136 speakers from the five main French-speaking regions in New Brunswick, results indicate that /i, y/ deletion rates are relatively high in the NorthWest, a region that is located adjacent to Quebec, but lower in other regions, with the lowest rates occurring in the SouthEast. Deletion rates are significantly higher among younger speakers than older speakers, indicating that this may be a sound change in progress. The results highlight an interaction between high vowel deletion and /t, d/ affrication. These preliminary observations provide guidelines for future dialectological and phonetic research on this process.

Regional variation in high vowel deletion in New Brunswick French: Preliminary observations

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1 Introduction

Devoicing and deletion of the high vowels /i, y, u/ is generally associated with varieties of Laurentian French. Walker (1984) notes that these vowels can be either devoiced or deleted in unstressed positions, especially when the vowel is adjacent to a voiceless consonant. For example, *univers/i/té* can be pronounced as [ynivɛrsi̥te, ynivɛrste], *s/u/pport* as [sy̥pɔr, spɔr], and *c/ou/teau* as [ku̥to, kto]. In addition, sequences of high vowels can be deleted. Couturier (1995, p. 65, p. 72) documents the example of the seven-syllable sequence in *la municipalité* /la.my.ni.si.pa.li.te/ that is pronounced with four syllables [la.mn.spal.te]. This phenomenon of high vowel devoicing and deletion is widely attested in Laurentian varieties spoken in Quebec (Cedergren & Simoneau, 1985; Côté, 2012; Couturier, 1995; Dumas, 1987; Gendron, 1959, 1966; Martin, 2004; Santerre, 1987). At least one description of Ontario French mentions it – Tennant (2012) for Hearst French – although a few others do not, including Thomas (1986, pp. 91-92) for Sudbury French and Léon and Cichocki (1989) for Welland French. Walker (2012) observes it in Albertan French.

High vowel devoicing and deletion are not associated with Acadian French, the family of varieties of French spoken in regions of Atlantic Canada that are located geographically east and south of the Province of Quebec. Surveys of Acadian French mention neither devoicing nor deletion of the /i, y, u/ vowels. This includes descriptions of varieties in southeast New Brunswick (Lucci, 1973), northeast New Brunswick (Flikeid, 1984), several regions of Nova Scotia (Flikeid, 1988; Ryan, 1981) and Prince Edward Island (King & Ryan, 1989). This phenomenon is also not mentioned in Falkert's (2010, pp. 172-175) survey of French spoken on the Îles-de-la-Madeleine, an area where younger speakers have started to show a shift from Acadian French features toward Quebec French features. However, a study of Tracadie French in northeast New Brunswick (Cichocki, 2012) notes some occurrences of high vowel devoicing in spontaneous speech.

The present study is a descriptive work that was motivated by observations made in the context of research on speech rhythm in New Brunswick French (Cichocki, Selouani & Perreault, 2019). In examining the acoustic spectrographic displays of sentences read by speakers, we came across unexpected pronunciations of three words: *Acad/i/e*, *pet/i/te* and *vend/u/*. Noticeable were the durations of the /i/ and /y/ vowels: in some cases, these vowels were very short, in others, they were partially devoiced, which created issues of how to measure the duration of the vowel; there were also cases of deleted vowels. Given the presence of high vowel devoicing and deletion in varieties of Laurentian French, which is a geographic neighbour of Acadian French, we decided to look more closely at the nature of these pronunciations – and specifically at the deletion of /i, y/. (Note that no cases of /u/ devoicing or deletion were observed in the corpus.) Thus, the research reported here is not a systematically designed study but an exploration of /i, y/ deletion in a few lexical items and, more precisely, in the phonological environment of /t, d/ + /i, y/ sequences. Nevertheless, the corpus used in the original speech rhythm study contains 136 speakers from five regions of New Brunswick, which suggests that the analysis can contribute useful – albeit preliminary – information about external factors that may be associated with this phenomenon.

Cedergren and Simoneau (1985) consider that /i, y, u/ can undergo three separate processes: deletion, devoicing, and vowel reduction. Based on acoustic analyses of the speech of 60 speakers of Montreal French who are part of the Sankoff-Cedergren corpus recorded in the early 1970s, the authors develop variable phonetic rules for each process. One of their conclusions is that high vowel deletion is a sound change in progress, and it is the variable nature of this high vowel deletion that is of interest in this paper. Among the contexts that favour

the deletion is the presence of affricates that precede the vowel (Cedergren, 1986; Dumas, 1987). This detail is relevant for our study because, in New Brunswick French, the consonants /t, d/ are currently undergoing affrication – also called /t, d/ assibilation – a process by which /t, d/ become affricates, [t͡s, d͡z], when they occur before high front vowels and front semivowels, that is /i, y, j, ɥ/. Cichocki and Perreault (2018) report that /t, d/ affrication is spreading from northern regions of New Brunswick to southern regions, with younger speakers leading in this spread. This suggests that speakers with affrication may also have high vowel deletion. The specific relation between high vowel deletion and affrication is not widely discussed in the literature on Quebec French, and only a few studies (Dow, 2019a, 2019b) have examined the interaction between high vowel devoicing and affrication.

The goal of the present study is twofold: to present phonetic observations about the realizations of the /i, y/ vowels in New Brunswick varieties of French, with a focus on high vowel deletion, and to provide insights into how three external factors – region, gender, and age – and one internal factor – word – condition this high vowel deletion. The study also provides a few observations about the interaction between high vowel deletion and /t, d/ affrication.

This study is carried out in the same spirit of variationist sociolinguistic inquiry that Alain Thomas displayed in his research on the variety of Laurentian French spoken in Sudbury, Ontario. Alain and I were graduate students in the early 1980s at the University of Toronto's Experimental Phonetics Laboratory. We worked as research assistants in the lab, under the direction of the late Pierre Léon, and we were very fortunate to have collaborated with a congenial and dynamic group of research associates and graduate students who were interested in phonostylistics, sociophonetics, and the analysis of speech prosody. Several decades later, I still recall conversations with Alain about practical issues related to our work in the lab: making quality audio recordings of sociolinguistic interviews (before digital audio recorders were widely available); carrying out acoustic phonetic analyses with the classic Kay Elemetrics sonagraph and with Philippe Martin's state-of-the-art pitchmeter, that performed (and continues to perform) f_0 extraction in real time; doing quantitative analyses of language variation data (several years before the Varbrul software package was developed for personal computers). Accordingly, I am very happy to participate in this festschrift that honours Alain and that recognizes his many contributions to our discipline. Alain's PhD dissertation about sociophonetic variation in Sudbury French, published in 1986, makes a significant contribution to our knowledge of variation in language-contact communities, and it underscores the need for research on less well-documented language varieties (see the review in Cichocki, 1989).

2 Methodology

2.1 Speakers and speech materials

Speech materials are from the RACAD (*Reconnaissance automatique de l'acadien*) corpus (Cichocki, Selouani & Beaulieu, 2008) that has been used for research on the automatic speech recognition of French spoken in New Brunswick. The section of the corpus used in the present study consists of recordings by 136 native speakers of French from 11 localities in the five main regions of New Brunswick where there is a sizeable proportion of French speakers. The map in Figure 1 shows the geographic distribution of these regions and localities: NorthWest (Edmundston, Saint-Quentin), North (Campbellton, Allardville), NorthEast (Paquetville, Shippagan, Néguac), the urban area of Moncton-Dieppe, and SouthEast (Richibouctou, Bouctouche, Cap-Pelé). Although the corpus is not evenly balanced with respect to region and locality, each region has a reasonably large representation in the corpus: NorthWest (26 speakers), North (26), NorthEast (39), Moncton-Dieppe (24), SouthEast (21). The corpus is representative of age and gender: ages range from 18 to 69 years and fall into two groups, younger adults from 18 to 27 years of age (mean: 21.2 years; std. dev.: 2.0) and older adults from 38 to 69 years of age (mean: 48.2 years; std. dev.: 6.7); both age groups have about the same number of males and females, and so do the five regions.

Figure 1

Map of New Brunswick showing the five main francophone regions and eleven localities surveyed in the RACAD Corpus (Cichocki, Selouani & Beaulieu, 2008)

Following the protocol of the TIMIT corpus of American English that was designed for research on automatic speech recognition, the RACAD corpus consists of readings of a total of 212 sentences of which two are "calibration" sentences; these sentences contain several segmental shibboleths that are expected to show significant regional differences in pronunciation. The present study focuses on three lexical items – *pet/i/te*, *Acad/i/e*, *vend/u/* – that were originally included in the calibration sentences to elicit /t, d/ affrication. As it turns out, when the participants read these lexical items, they produced not only affricates but also a wide array of pronunciations of /i/ and /y/ that includes high vowel deletion, The two calibration sentences are:

> *Je viens de lire dans l'Acadie Nouvelle qu'un pêcheur de Caraquet va monter une petite agence de voyage. C'est le même gars qui, l'année passée, a vendu sa maison à cinq Français d'Europe.*

All participants read these calibration sentences, in addition to ten other sentences. They were instructed to read at a normal rate and, in the case of hesitations or false starts, they were asked to repeat the sentences. The recordings of these readings were usually made in the speaker's home. The quality of the audio recordings is very good.

2.2 Procedures and measurements

Sentences were segmented into vowels and consonants following generally accepted segmentation criteria. Annotation for the three target words was done manually. As demonstrated by Santerre (1987) and others, impressionistic auditory transcription can be inaccurate in contexts where high vowels undergo deletion and/or devoicing. Thus, oscillographic and spectrographic analyses – using Praat (Boersma & Weenink, 2022) – served as the basis of the transcription of each of the 408 occurrences in the corpus (136 speakers x 3 target words). As described below, acoustic criteria were used to determine cases of /i, y/ vowel deletion.

Statistical modelling was carried out with logistic regression: the presence vs. absence of the /i, y/ vowels was analyzed with respect to four predictor factors – region, age, gender, and word. All statistical analyses were carried out using SPSS version 28 software.

3 Results

3.1 Phonetic descriptions

Acoustic phonetic analyses revealed that, in addition to being pronounced as [i] and [y], the underlying /i, y/ vowels are also realized as deleted vowels, devoiced vowels, fricativized vowels, and reduced (or short) vowels. Our focus in this study is on vowel deletion, but it is useful to give a brief description of the other pronunciations observed in the RACAD corpus data.

3.1.1 Deleted vowels

Vowel deletions were characterized by the absence of any acoustic trace of periodicity or of stable vowel formants. The most frequent occurrences were in cases where the preceding /t, d/ consonants underwent affrication, as shown in the spectrograms in Figures 2a-c. In Figure 2a, the /i/ in *pet/i/te* is absent and the underlying /t/ that precedes /i/ is pronounced as a voiceless, pre-alveolar affricate, [t͡s]. Figure 2b displays a similar situation: the /i/ in *Acad/i/e* is absent, and the underlying /d/ is pronounced as a pre-alveolar affricate, [dzs]; there is a partial devoicing of the fricative part of the affricate. In Figure 2c, the /y/ in *vend/u/* is absent and the underlying /d/ is pronounced as an affricate [ts:]; the entire affricate has been devoiced and it is also lengthened, likely because of fusion with the following /s/ in *sa*. In the three spectrograms, there is no trace of vowel formants inside the zones of frication.

In a small number of tokens, vowel deletion occurred when the preceding /d/ did not undergo affrication. This pronunciation was observed only in *Acad/i/e* – in 4 of the 19 tokens with /i/ deletion. In Figure 2d, the /i/ in *Acad/i/e* is absent, and the /d/ is pronounced as a voiced stop, [d].

Figure 2a
Deletion of /i/ in "pet/i/te a(gence") (spoken by a 22-year-old male from Shippagan)

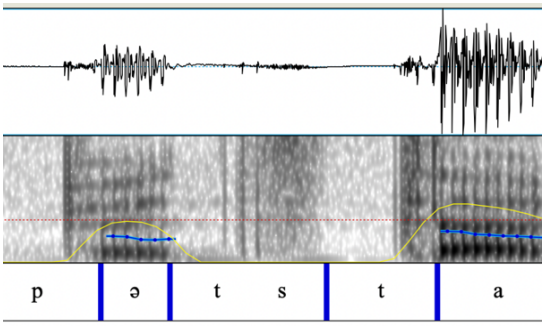


Figure 2b
Deletion of /i/ in "Acad/i/e Nou(velle") (spoken by a 21-year-old female from Shippagan)

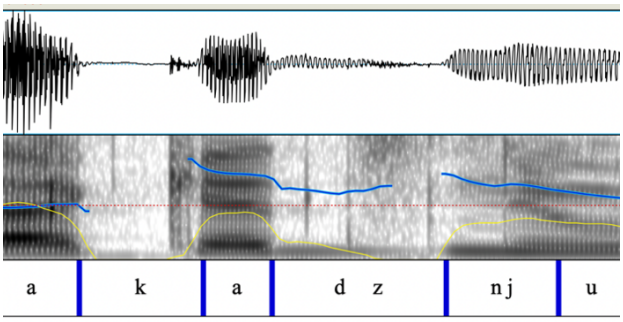


Figure 2c
Deletion of /y/ in "(v)end/u/ sa m(aison)" (spoken by an 18-year-old female from St-Quentin)

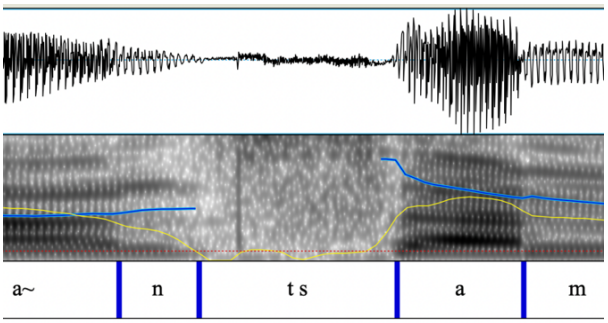
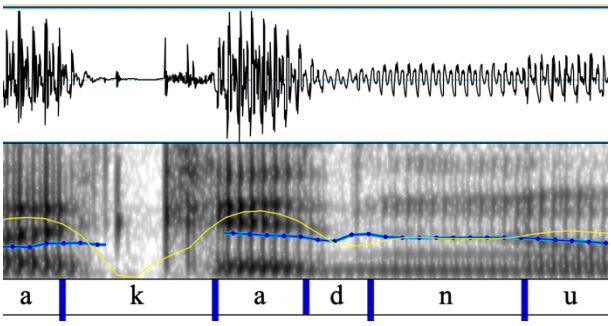


Figure 2d
Deletion of /i/ in "Acad/i/e Nou(velle") (spoken by a 19-year-old male from Richibouctou)



3.1.2 Devoiced vowels

In cases of vowel devoicing there is a presence of acoustic intensity in regions of the spectrograph where vowel formants normally appear, and there is also an absence of voicing. The devoicing can affect the entire vowel, as in Figure 3a; the first three formants of the vowel (transcribed as [ɪ̥]) are weak, and the waveform has a very small amplitude. Figure 3b presents an example of partial devoicing: the /i/ in *pet/i/te* is realized as a relatively short [ɪ] (with a duration of 30 msec); the first three formants are clearly visible, and the waveform has a relatively strong amplitude. The underlying /t/ that precedes /i/ is pronounced as an affricate consonant, and the transition

from the affricate to the vowel includes a fricative-vowel interaction, which we consider to be a voiceless vowel. This section of the spectrogram (transcribed as [ɪ̥]) shows that there is a faint presence of the second and third formants of the vowel inside the frication; however, the segment is voiceless, and the waveform associated with this voiceless vowel has a very small amplitude. Dow (2019a, 2019b) reports similar findings in Quebec French and suggests that this voiceless or devoiced vowel is in fact an intermediate phase in the "multi-phased" realization of the affricate consonant. In this study we consider that this kind of fricative-vowel interaction is a voiceless vowel and that it is part of the affricate; this affricate is transcribed here as [tsɪ̥].

Figure 3a
Devoicing of /i/ in "pet/i/te a(gence)" (spoken by a 40-year-old male from Allardville)

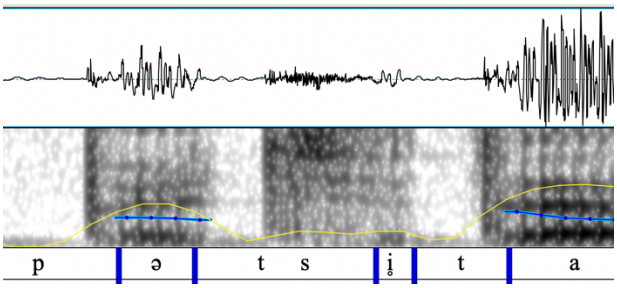
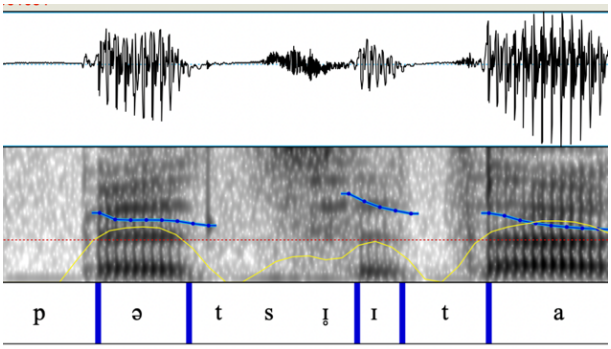


Figure 3b
Partial devoicing of /i/ in "pet/i/te a(gence)" (spoken by a 19-year-old male from Edmundston)

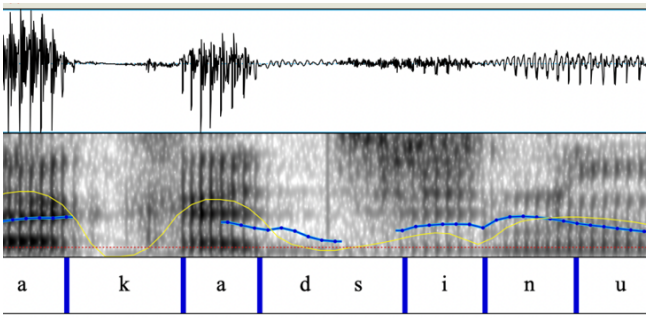


3.1.3 Fricativized vowels

Fricativized vowels are another result of fricative-vowel interaction. As shown in Figure 4, these segments have the recognizable formant structure of a vowel (note the presence of the second and third formants in the [i] segment) but the spectral features of a fricative appear at higher frequencies. The segment is voiced, and the waveform has a small amplitude. We have represented this pronunciation with [i], emphasizing that there is a vowel present. Some phoneticians (Faytak, 2014, p. 55) transcribe this segment as a syllabic voiced fricative, [ʑ].

Often associated with fricativized vowels is the partial or total devoicing of the affricates that are the realizations of the underlying /d/ that precedes the /i/. The pronunciation of the affricate in *Acadie* shown in Figure 4 is [ds]. Among the pronunciations that we observed in our data are the following: *Acadie* is realized as [akadzsi, akadtsi]; *vendu* has pronunciations such as [vãdzsy, vãdsy]. Bento (1998) and Dow (2019a, 2019b) report similar partial and total devoicing of affricates in this phonetic context by speakers of Quebec French.

Figure 4
Fricativized /i/ vowel in "Acad/i/e Nou(velle)" (spoken by a 56-year-old male from Edmundston)



3.1.4 Reduced vowels

Vowels are considered to be reduced – or short – when they have a duration under 30 msec (Cedergren & Simoneau, 1985, p. 112). These authors found that 7.9% of /i, y, u/ vowels in their Montreal French corpus are reduced. A similar proportion of /i, y/ vowels in the RACAD corpus – 8.3% – also have durations under 30 msec. The range of /i, y/ vowel durations is wide: 16.2 to 295.2 msec (mean 63.1, median 57.7, std. dev. 32.2). There are differences in /i, y/ vowel length among the three lexical items, and this is reflected in the number of occurrences of reduced (or short) vowels: /i/ in *petite* has the largest proportion of vowels with durations under 30 msec – 15.2%; /i/ in *Acadie* has 8.3%, and /y/ in *vendu* 2.4%.

3.2 Quantitative analysis of vowel deletion rates

The overall rate of /i, y/ vowel deletion in the corpus is 14.7% (60 out of 408 tokens). Table 1 gives a breakdown of the deletion rates with respect to three external factors – region, age group, gender – and one internal factor – word.

Table 1
Relative frequencies of /i, y/ deletion by region, age group, gender and word

Factor	Relative frequency and number of occurrences
Region	
NorthWest	47.4% (37/78)
North	9.0% (7/78)
NorthEast	9.4% (11/117)
Moncton-Dieppe	5.6% (7/72)
SouthEast	1.6% (1/63)
Age Group	
Younger	22.6% (44/195)
Older	7.5% (16/213)
Gender	
Females	15.7% (32/204)
Males	13.7% (28/204)
Word	
pet/i/te	20.6% (28/136)
Acad/i/e	14.0% (19/136)
vend/u/	9.6% (13/136)
Overall	14.7% (60/408)

Logistic regression was conducted to assess whether these four factors significantly predict the absence of /i, y/. The dependent variable is binary (absence vs. presence of the vowel); age is a continuous predictor variable; gender, region and word are categorical predictor variables. When all predictors are considered together, they significantly predict /i, y/ vowel deletion: $\chi^2 = 99.63$, df = 8, N = 408, $p < .001$. Results show that there are three significant factors: region ($p < .001$), age ($p < .001$), and word ($p = .013$); gender is not significant ($p = .966$).

Modelling also shows the following:
(a) the NorthWest region is significantly more likely to have /i, y/ deletion than the other four regions; there are no significant differences among these four regions
(b) age has a negative correlation with deletion, that is, as speakers' ages increase, there are likely to be fewer cases of /i, y/ deletion
(c) deletion is significantly more likely to take place in *pet/i/te* than in *vend/u/*; there are no significant differences between *pet/i/te* and *Acad/i/e* and between *Acad/i/e* and *vend/u/*.
Full details of the modelling are given in Table A1 in the Appendix.

The bar graphs in Figure 5 illustrate the main patterns of deletion rate with respect to the two significant external factors, region and age. (For ease of presentation we present age as a binary factor – younger and older speakers – instead of drawing graphs with age as a continuous factor.) Figure 5 shows the large difference between the NorthWest region (with an overall deletion rate of 47.4%) and the other four regions (with deletion rates ranging between 1.6% and 9.0%). The bar graphs also clearly show that in each region younger speakers (with an overall deletion rate of 22.6%) have higher deletion rates than older speakers (with an overall rate of 7.5%).

Figure 5
Bar graphs showing relative frequencies of /i, y/ vowel deletion (in %) by region and age group

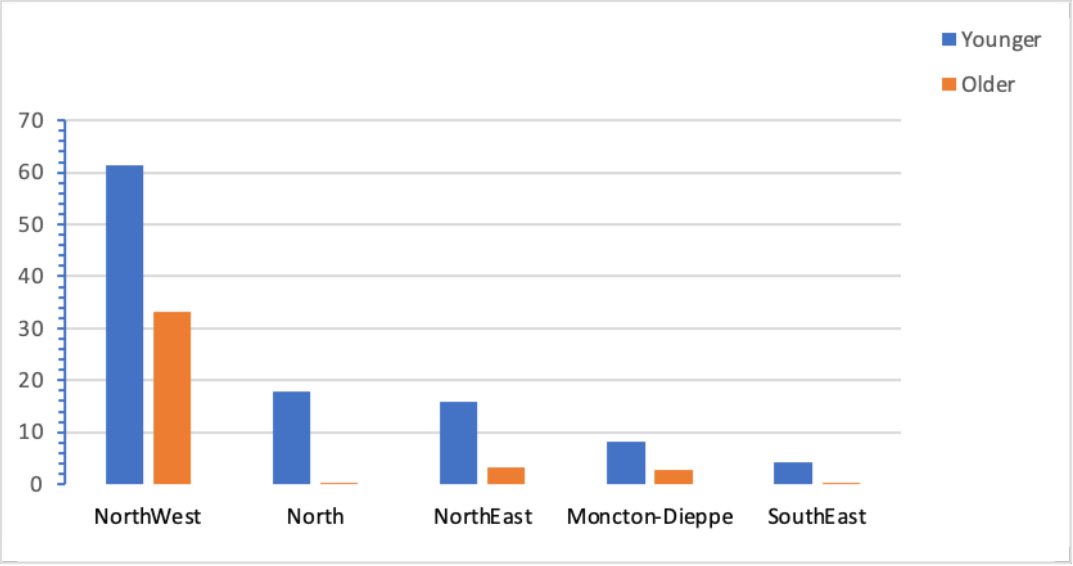
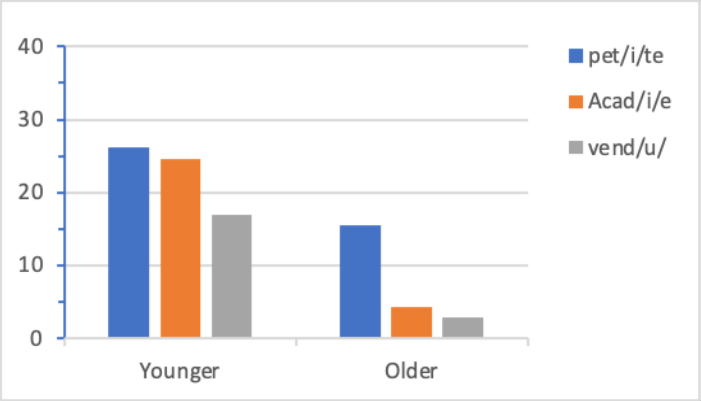


Figure 6 provides bar graphs for the breakdown of deletion rates by word and age group. In both age groups, the order of words with respect to deletion rate is the same: *petite* has the highest rate (20.6%), followed by *Acadie* (14.0%) and then by *vendu* (9.6%).

Figure 6
Bar graphs showing relative frequencies of /i, y/ vowel deletion (in %) by age group and word



4 Discussion

The first goal of this study is to provide phonetic observations about /i, y/ deletion in New Brunswick French. The acoustic phonetic analyses indicate that the /i, y/ vowels – specifically those found in /t, d/ + /i, y/ sequences – have several realizations. In addition to [i] and [y], these include deleted vowels, devoiced vowels, fricativized vowels, and reduced (or short) vowels. The acoustic characteristics observed in the New Brunswick French data are complex and resemble those described in acoustic phonetic studies of these vowels in Quebec French (Cedergren & Simoneau, 1985; Couturier, 1995; Martin, 2004; Santerre, 1987). The acoustic details of the /t, d/ affrication that often accompanies these realizations also resemble those reported for Quebec French (Bento, 1998; Dow, 2019a, 2019b). Perhaps the most important takeaway from the phonetic description is that acoustic phonetic techniques should occupy an important place in future work on the /i, y/ vowels in New Brunswick French.

The second goal of this study is to provide insights about the role of external and internal factors in accounting for variation in /i, y/ deletion. Of the three external factors studied, statistical modelling shows that region and age are significant predictors of deletion while gender is not significant. Only one internal factor, word, was examined in the modelling, and it too has a significant effect on variation.

4.1 External factors

The /i, y/ deletion rates follow a regular geographic pattern from the northwest to the southeast of New Brunswick (see Table 1 and Figure 5). The region with the highest rate, the NorthWest, is located adjacent to the Province of Quebec. The regions with the lowest rates – Moncton-Dieppe and the SouthEast – are in the southeast corner of New Brunswick, which is geographically quite far from Quebec. Deletion rates between these two extremes are found in the North and NorthEast regions, which are closer to Quebec. Thus, geographic proximity to Quebec appears to be an important factor in determining deletion rate: the closer to Quebec, the higher the deletion rate.

It is noteworthy that the logistic regression analysis indicates that the /i, y/ deletion rates in the NorthWest are significantly higher than those in the other four regions. The NorthWest is a dialect contact area that was originally settled by both Québécois and Acadian speakers, and Francophones who reside there today tend to identify as *Brayons* and as members of the *République du Madawaska* (McKillop, 1987). This identity is distinct from the strong *acadien* identity found in the other four regions, and it may provide a reason why NorthWest speakers have a greater attraction to this Laurentian French phonetic variant. How long the /i, y/ deletion process has been present in the NorthWest region remains an open question.

Age is also a significant predictor of deletion. The statistical modelling indicates that deletion is likely to increase as age decreases, that is, younger speakers can be expected to have significantly higher deletion rates than older speakers. Indeed, the age group differences in the graphs in Figure 5 show that this pattern is present in each of the five regions. This suggests that the deletion process is an ongoing sound change and that it is spreading across the entire province. Furthermore, the very low frequencies of occurrence of deletion – between 1.6% and 9% – in four of the five regions suggest that this putative change is likely to be in its early stages. Of course, a larger study is needed to confirm this prediction.

Gender was not found to be a significant factor in the variation. Similarly, gender was also not a significant predictor of /i, y/ deletion in Montreal French. Cedergren (1986) finds that deletion is associated with speaker's education level: specifically, deletion is more frequent among speakers who have "a lower level of educational attainment" (p. 194). The limited social information about the participants in the RACAD corpus prevents us from further studying external factors that may be involved in the putative spread of the deletion process.

Future research on this variable will need to consider a broad set of social factors. We suggest that these might include education level, social network, and degree of contact with other varieties of French. One other relevant factor is style. Couturier (1995) finds that deletion is more frequent in relaxed or informal style than in formal style; he also points out the importance of identifying "lento" and "allegro" styles when analyzing high vowel deletion.

4.2 Internal factors

Statistical modelling also shows that word, the only internal factor considered, is a significant predictor of /i, y/ deletion. Among the three words in the study, *pet/i/te* has a significantly greater rate of deletion than *vend/u/*; the deletion rate for *Acad/i/e* falls between the rates for these two words. There are likely various reasons for the individual differences among the words, such as word class and word frequency. Given the small number of words in the study, it seems prudent not to make any claims. Instead, our discussion focuses on the phonological context of the words – the /t, d/ + /i, y/ sequences – and on the prosodic and segmental factors that have been mentioned in the literature on high vowel deletion.

The general process of high vowel deletion in Quebec French occurs in unstressed positions, that is, in word-initial and word-internal syllables. More precisely, vowels in word-final syllables do not undergo this process because they are considered to be (metrically) strong (Couturier, 1995). The examples given in section 1.1 – *univers/i/té*, *s/u/pport* and *m/u/n/i/c/i/pal/i/té* – illustrate this condition, and words such as *pet/i/te* are excluded (Cedergren & Simoneau, 1985, p. 87). The three words in our study do not meet this requirement because the /i, y/ vowels appear in the final syllable of polysyllabic words. Thus, one would expect no deletion of the target vowels in *pet/i/te* and *vend/u/*, although deletion might be possible in *Acad/i/e* because the /i/ vowel is in word-internal position in the compound noun [[*Acadie*]$_N$[*Nouvelle*]$_N$]$_N$. (Note that *Acadie Nouvelle* is the name of the main French-language daily newspaper in New Brunswick.) How then might one explain that almost 15% of the high vowels observed in the data from the RACAD speech corpus are deleted?

One possible explanation involves affrication. In many tokens, /i, y/ deletions occur when the preceding /t, d/ stop is affricated. Because studies have shown that the presence of fricative and affricate consonants before high vowels favours high vowel deletion (for example, Cedergren & Simoneau, 1985; Dumas, 1987), it seems reasonable to suggest that these deletions are an effect of affrication and not of high vowel deletion. Indeed, in all tokens of *petite* and *vendu*, the vowel deletion occurs following an affricated stop. However, vowel deletion in *Acadie* can also occur following an un-affricated stop, as shown in the spectrogram in Figure 2d. This suggests that the deletion is not restricted to affricated contexts and that a general rule of /i, y/ deletion may be involved. The number of such cases is not high, but it is noteworthy that these tokens are produced by younger speakers (between 19 and 23 years of age), suggesting that we may be observing elements of a change.

Another possible explanation lies in a revised version of the general rule of high vowel deletion: high vowels in unstressed positions can be deleted, including word-final vowels that are unstressed. This explanation is related to one of the prosodic factors mentioned in Cedergren and Simoneau's (1985, pp. 85-86) analysis: the position of the syllable in an Accentual Phrase ("le groupe rythmique"). The authors' modelling found that this factor is statistically significant and that it is a stronger predictor of deletion than position of the syllable within the word. In our data, two of the target words are part of larger phrases, which leaves the target word-final vowel in an unstressed position: [*une petite agence*]$_{NP}$ and [*Acadie Nouvelle*]$_{N}$. In the third word – [[*a vendu*]$_{V}$ [*sa maison*]$_{NP}$]$_{VP}$ – the /y/ vowel is more likely to occur in phrase-final position, which leaves the target vowel in a stressed position. This explanation would predict that there should be fewer deletions in *vend/u/* than in the other two words. Of course, this explanation assumes a revision of the general rule of deletion established for Quebec French.

Further investigation is needed to gain a better understanding of the phonological issue raised by our observations. Of course, a greater number of words need to be observed and, specifically, words in which the /t, d/ + /i, y/ sequences appear in various prosodic environments – including word-final syllables that occur in non-final positions of Accentual Phrases. In addition, to better understand the overlap or interaction between high vowel deletion and /t, d/ affrication presented by our data, studies need to look beyond /t, d/ + /i, y/ sequences and consider segmental factors that condition the general process of high vowel deletion, as documented by Cedergren and Simoneau (1985, pp. 82-83). The list of factors includes the context preceding the vowel; segments such as stops and fricatives favour deletion, and liquids, nasals and [dz] disfavour it. The list also includes the context following the vowel; voiceless stops, /s/ and nasals that are in this context tend to favour deletion, while /ʀ/, voiceless fricatives and voiced stops tend to disfavour it. This kind of information will enable us to get a clearer understanding of the applicability of the general rule of high vowel deletion that has served as the setting for this paper.

5 Conclusion

This paper has presented a descriptive investigation of over 400 realizations of /i, y/ vowels by speakers of New Brunswick French, with a focus on vowel deletion in /t, d/ + /i, y/ sequences. The list of realizations, as identified by acoustic phonetic analysis, includes deleted vowels, partially and completely devoiced vowels, fricativized vowels, and reduced (that is, very short) vowels. These pronunciations resemble those reported for varieties of Quebec French.

Analysis of patterns of vowel deletion indicates that this is a variable process that is conditioned by external factors. Regional variation is significant: the NorthWest region, located adjacent to Quebec, has the highest deletion rates, and regions that are geographically more distant from Quebec have smaller deletion rates. In addition, differences between younger and older speakers suggest that this deletion appears to be a sound change in progress.

The /i, y/ deletion is also conditioned by at least one internal factor, the word that contains the target vowel. Specific to this exploratory study, deletion was found to be significantly more frequent in *pet/i/te* than in *vend/u/*. These preliminary observations point to an overlap or interaction between two processes: /i, y/ vowel deletion and /t, d/ affrication. Future research will need to look beyond /t, d/ + /i, y/ sequences and consider the complex set of prosodic and segmental contexts that condition the general process of high vowel deletion, as documented in earlier research.

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Appendix

Table A1. *Logistic Regression Predicting /i, y/ Vowel Deletion*
Model is significant: $\chi^2 = 99.63$, df = 8, N = 408, p < .001
-2Log likelihood = 241.107; Cox & Snell $R^2 = .217$; Nagelkerke $R^2 = .383$

References: NorthWest, *vend/u/*

Variable	B	S.E.	Wald	Odds ratio	p
Region			60.65		< .001
North vs. NorthWest	-2.55	0.49	26.85	.078	< .001
NorthEast vs. NorthWest	-2.42	0.42	32.49	.089	< .001
SouthEast vs. NorthWest	-4.23	1.05	16.16	.014	< .001
Moncton-Dieppe vs. NorthWest	-3.14	0.60	27.80	.043	< .001
Gender (reference: female)	-0.01	-0.33	0.001	.992	.981
Age (continuous)	-0.53	0.01	16.89	.948	< .001
Word			8.71		.013
Acad/i/e vs. *vend/u/*	0.58	0.45	1.71	1.79	.191
pet/i/te vs. *vend/u/*	1.25	0.43	8.40	3.49	.004
Constant	1.14	0.57	3.92	3.11	.048

References: Moncton-Dieppe, *Acad/i/e*

Variable	B	S.E.	Wald	Odds ratio	p
Region			60.65		< .001
NorthWest vs. Moncton-Dieppe	3.14	0.60	27.75	23.05	< .001
North vs. Moncton-Dieppe	0.59	0.66	0.79	1.81	.373
NorthEast vs. Moncton-Dieppe	0.72	0.62	1.37	2.06	.243
SouthEast vs. Moncton-Dieppe	-1.10	1.14	0.92	0.33	.337
Gender (reference: female)	-0.01	-0.33	0.001	.992	.981
Age (continuous)	-0.53	0.01	16.89	.948	< .001
Word			8.71		.013
pet/i/te vs. *Acad/i/e*	0.67	0.39	2.90	1.94	.089
vend/u/ vs. *Acad/i/e*	-0.58	0.45	1.71	0.56	.191
Constant	-1.42	0.69	4.27	0.24	.039