The Impact of L2 Dialect on Learning French Vowels: Native English Speakers Learning Que´be´cois and European French

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Abstract: This article examines how a second language (L2) dialect affects how accurately the L2 is perceived and produced. Specifically, the study examined differences between the production and perception of French vowels /i/, /y/, and /u/ by learners of either Québec French (QF) or European French (EF). These vowels differ across the two varieties, both acoustically and because of assimilation of /t-d/ before /i-y/ for QF versus EF. As a result of these differences, QF has an additional acoustic cue with which to contrast /u/ and /i-y/. Anglophone learners of QF or EF were asked to identify and discriminate both QF and EF vowels and to produce the vowels in several phonetic contexts. Results indicate that QF learners were more accurate at discrimination and identification of these vowels as produced by both QF and EF speakers and that L2 dialect exposure affects how well learners perceive and produce these French vowels.

Keywords: second language acquisition, perception, production, French, assimilation, vowels, acoustic cues

Résumé : Le présent article examine l’influence de la locution d’une langue seconde (L2) sur la façon dont elle est perçue et produite. Plus précisément, l’étude porte sur les différences entre la production et la perception des voyelles françaises (/i/, /y/, et /u/) par les apprenants du français québécois (FQ) ou du français européen (FE). Ces voyelles sont différentes les unes des autres, tant phonétiquement qu’en raison de l’assimilation de /t/ ou de /d/ avant /i/ ou /y/ pour le français québécois par rapport au français européen. Étant donné ces différences, le FQ a une marque acoustique supplémentaire qui permet de faire contraster /u/ et /i/, et /y/. Nous avons demandé aux apprenants anglophones du FQ ou du FE d’identifier des voyelles tant FQ que FE et d’en faire la différence, et de produire ces voyelles dans plusieurs contextes phonétiques. Les résultats indiquent que les apprenants en FQ pouvaient plus précisément faire la différence entre ces voyelles et les identifier telles qu’elles étaient prononcées par les apprenants en FQ et en
Mots clés: acquisition d’une langue seconde, perception, production, français, assibilation, voyelles, marques acoustiques

Although Canada is officially a bilingual country with its own varieties of English and French, beginning French language textbooks typically focus on European French pronunciation, with little exposure to Canadian varieties such as Québécois French (see Chapelle, 2009). Likewise, for many learners of French in North America, the most frequent destination for French study-abroad programs is Europe rather than la belle province. Much of this focus on European or so-called Parisian French aligns with a trend in second language (L2) acquisition to compare the language of L2 learners against the prestige variety exemplified in textbooks. For many French learners, this variety continues to be the prestigious variety spoken in France (referred to here as ‘European French’ for ease of comparison). While French language programs in North America have increasingly adopted a more international approach to French, accepting a wider range of accents, textbooks and teaching materials have lagged behind this shift from a focus on the prestigious variety in France to a broader exposure to accents from across la Francophonie.

Researchers generally agree that a learner’s first language (L1) affects his or her perception and production of L2 vowels and consonants (Flege, 1995). However, little research has examined how the learning of L2 sounds is affected by a learner’s L1 dialect or by the L2 dialect to which learners are exposed. What research has been done demonstrates that L1 and L2 dialects play a role in L2 perception and production (O’Brien & Smith, in press; Escudero & Boersma, 2004; Teasdale, 1997). Since languages such as French have dialects that differ in their sound inventories, it is possible that exposure to varieties other than the one typically taught in classrooms can augment the learning of difficult L2 sound contrasts. This may especially be the case if the variety taught has additional acoustic cues that enhance learners’ perception of these difficult contrasts.

Building on previous research on the effects of L2 dialect, the present study examines how native English speakers’ exposure to either Québécois French (QF) or European French (EF) influences their acquisition of the French /i-y-u/ contrast. In addition to contributing to accented speech, these vowels form important contrasts...
between French words (e.g., *dit* [di] ‘3rd. sg. says’; *du* [dy] ‘of some, m. sg.’; *doux* [du] ‘soft, m.’). Consequently, incorrect perception and production of these vowels may impede communication. These two French dialects provide an excellent test case because in QF, unlike in EF, alveolar plosives */t/* and */d/* are often assibilated (affricated), becoming [t̠s] and [d̠z] respectively before the high front vowels */i-y/* (e.g., *dit* [dzi] and *tu* [tsy] ‘you, sg.’), but remain plain stops before */u/* and elsewhere (e.g., *tout* [tu] ‘all, everything’). Since assibilation occurs before */i, y/* but not before */u/*, it provides an additional cue with which to distinguish */y/* and */u/*, a contrast well known to be difficult for English speakers learning French (Gottfried, 1984; Levy & Strange, 2008). If learners can use this assibilation as an additional cue to the */y-u/* contrast, it may facilitate perception and production for QF learners in a way not available to EF learners.

**Review of literature**

Evidence suggests that exposure to one L2 dialect may be more beneficial in learning L2 pronunciation than exposure to another (Escudero & Boersma, 2004). At least two reasons may explain the influence of L2 dialect on learning L2 sounds. First, L2 dialects may differ from one another in their similarity to the L1; and, second, dialects may differ as to whether or not they contain salient acoustic cues either internal or external to the sounds themselves (e.g., QF assibilation before the high front vowels */i/* and */y/*). Each of these factors will be discussed in turn below.

**Cross-language similarity**

Researchers have studied the L1–L2 relationship for decades; although the nature of this relationship is still debated, the influence of L1 and L2 on each other is generally undisputed (Harnsberger, Shrivastav, & Skowronski, 2007; Nishi, Strange, Akahane-Yamada, Kubo, & Trent-Brown, 2008). In particular, while researchers debate the finer points of the L1–L2 relationship, most agree that L1–L2 cross-language similarity affects L2 sound learning (Best, 1995; Flege, 1995). For example, Aoyama, Flege, Guion, Akhane-Yamada, and Yamada (2004) found that native Japanese speakers perceive the cross-language similarity between Japanese */ɾ/* as greater for English */l/* than for English */t/* . These researchers also found that Japanese speakers perceive English */t/* (which is less similar to Japanese */ɾ/*) more accurately.
than English /l/, which suggests that this (dis)similarity influences the learning of the English /r-l/ contrast.

For many years, researchers have attempted to understand whether typological differences (Eckman, 1991), acoustic distance (Baker & Trofimovich, 2005), perceptual (Baker, Trofimovich, Flege, Mack, & Halter, 2008), or auditory (Aoyama et al., 2004) features affect L1–L2 similarity. This research has revealed that the L1–L2 relationship is more complex than simple acoustic or auditory comparisons would suggest. Indeed, it is unclear whether and how well acoustic, auditory, and perceptual features predict how learners will perceive the L1–L2 sound similarity (Baker et al., 2008; Strange, Bohn, Nishi, & Trent, 2005).

The impact of L1 dialect on L2 perception and production

Complicating this issue is the fact that languages often have dialects with different phonetic inventories from one another, making the L1–L2 relationship different depending on the L1/L2 dialects being compared. While little research has examined the impact of the L1 dialect on L2 acquisition, what research there has been has consistently illustrated that L1 dialect does indeed have an impact on the L2. For instance, Grosse and Hameyer (1979) found that speakers of African American English (AAE) not only differed from their North American English–speaking counterparts in the perception and production of German, but also differed from one another based on regional differences between the AAE speakers’ dialects (i.e., whether they were from the northern or southern United States).

Teasdale (1997) investigated why Québécois French (QF) speakers substitute [t] while European French (EF) speakers substitute [s] when attempting to pronounce English /θ/. This difference, she argues, results from the fact that QF speakers produce an alveolar /s/ while EF speakers produce a dental /s/. Investigating the production of German /y:/ and /u:/ by speakers from three dialects of North American English, O’Brien and Smith (in press) have likewise demonstrated that L1 dialect is the best predictor of L2 production of German vowels, although speakers do not simply transfer the phoneme from their L1 dialect to the L2. For instance, speakers from the Inland North dialect region produced English /u/ the furthest back, making it a perfect match for German /u:/. Rather than simply using their already German-like /u/ from the L1, however, this group produced German /u:/ in the least German-like way (with the most fronting) of the three groups studied. Moreover, speakers from
all three dialect regions contrasted German /y/-/u:/ in dialect-specific ways. These studies underscore the fact that dialect-specific features, such as dental versus alveolar production of /s/, can have consequences for the process of learning to produce and perceive the L2.

The impact of the L2 dialect on L2 acquisition

More recently, researchers have also established that the L2 dialect that learners are taught or to which they are exposed also affects L2 perception and production. For example, Escudero and Boersma (2004) found that native Spanish speakers learning Scottish English perceived and produced the English contrast /i-/i/ differently than Spanish learners exposed to Southern British English. Learners acquired the English contrast in a way that was specific to the target dialect and predictable in terms of where in the acoustic vowel space Southern and Scottish English speakers produced these two English vowels. That is, cross-language similarity, whether the differences across dialects occur in the L1 or in the L2, may influence the degree to which a learner can acquire L2 perception and production accurately.

This study seeks to clarify how L1 or L2 dialects affect L1–L2 cross-language similarities, and especially how the presence of a salient acoustic cue in one dialect can facilitate the learning of new L2 sound contrasts. In particular, we examine whether English-speaking learners of QF differ from learners of EF in their perception and production of French vowels. As Miller and Grosjean (1997) have shown for Parisian versus Swiss French, dialects such as QF and EF may differ from one another in terms of their cross-language similarity to languages such as English, although no known study has compared the acoustic variation between these two dialects. If such differences exist, they may provide an advantage to a French L2 learner, depending on the French dialect to which that learner is exposed.

In addition to helping language teachers better comprehend and counteract the difficulties students may encounter while learning L2 sound contrasts, research on dialect further underscores the complexity of the L1–L2 relationship. Here, the L2 is the dialect to which the learner is exposed rather than some idealized standard language. Some may argue that a cross-linguistic comparison of subtle differences between learners’ L1 dialect and the target L2 dialect is really no different than a comparison of L1 and L2 languages found elsewhere in the literature. However, dialect studies reveal that these L1–L2 comparisons are often far more complex and subtle than our current theories can account for. Indeed, these studies demonstrate
that our understanding of how L1 and L2 interact, especially when different L1 and L2 dialects are examined, is still far from clear.

**Acoustic cues**

Besides varying in cross-language similarity, L2 dialects may differ in their use of acoustic cues to mark distinctions between similar L2 sounds. This is important because both L1 and L2 learners must be attuned to acoustic cues in order to acquire sounds and sound contrasts. In L1 research, for instance, infants and young children have been shown to make use of these specific cues in learning to segment words (Johnson, 2008), distinguish between similar sounds such as /s/ and /ʃ/ (Nittrooer & Miller, 1997), and acquire word stress (Guion, Harada, & Clark, 2004). In fact, listeners seem to need such cues to distinguish language sounds from one another, even in vocoded (computer-generated) speech (Kong & Carlyon, 2007). It has recently been argued that misinterpretation of ambiguous acoustic cues results in sound change from one generation to the next (see Blevins, 2004).

Similar findings appear in L2 research; however, these studies also demonstrate that L2 learners use these cues less well than L1 speakers. For example, in a study by Altenberg (2005), non-native English speakers used voiceless obstruent aspiration to indicate word segmentation about 76% of the time. Nevertheless, they did so less often, and with less accuracy, than native English speakers, who used this same cue 96% of the time. Indeed, several studies have shown that L2 learners often use incorrect cues when attempting to distinguish between two sounds (Holt & Lotto, 2006; Bohn, 1995). Bohn, for instance, demonstrates that L2 learners of English may use temporal cues, such as vowel duration, instead of spectral cues of vowel quality to discriminate between the English vowels /i/ and /ɪ/, resulting in difficulty in distinguishing between these vowels.

Why should L2 learners not be able to use the same acoustic cues used by native L2 speakers? One reason may be their lack of L2 experience. Nittrooer and Crowther (1998) note that young L1 language learners only gradually learn to use acoustic cues to distinguish similar sounds as they gain L1 experience. Another reason for the discrepancy may be that languages differ in the types and the saliency (or perceptibility) of cues to distinguish between different sounds. For example, many languages use both preceding-vowel duration and stop-closure duration to mark the distinction between voiced and voiceless word-final obstruents; however, the degree to which languages use...
these two cues differs remarkably (Chen, 1970), which causes many L2 learners to fail to learn this voicing distinction (Mack, 1982).

Perhaps the main reason that L2 learners are not able to attend to the correct acoustic cues is that they have never before needed to make distinctions now required in the L2. Several studies have demonstrated the difficulty L2 learners encounter in acquiring contrasts not found in the L1 (Flege, Takagi, & Mann, 1995; for review see also Piske, MacKay, & Flege, 2001). For example, native English speakers have never had to distinguish between vowels such as French /y/ and /u/ – both of which are allophones of American English /u/ in dialects undergoing substantial /u/-fronting (Habick, 1979). Learners may therefore be unable to determine accurately which acoustic differences between the two sounds should be attended to for accurate perception.

One means of helping L2 learners acquire new distinctions between similar L2 sounds is to provide extra or exaggerated cues to help distinguish the two sounds during training. For example, McCandliss, Fiez, Protopapas, Conway, and McClelland (2002) found that native Japanese speakers trained on exaggerated acoustic cues marking the /r-l/ contrast in English were better able to distinguish between these two sounds than learners trained on natural stimuli. Likewise, Beach, Burnham, and Kitamura (2001) found that when Greek–English bilinguals exaggerated the production of certain sounds in Thai, they were also better able to perceive these same sounds. Perhaps this exaggeration is related to the noticing hypothesis proposed by Schmidt (1990), that learners must be able to notice a difference in L2 sounds before they can learn them.

Another line of research has demonstrated that some phonetic contexts are easier than others for learning distinctions between two similar L2 sounds, perhaps because the acoustic cues distinguishing between these two sounds are more salient in one context than in another. This has been shown to be the case for native French speakers acquiring the accurate production of English interdental fricatives (Trofimovich, Gatbonton, & Segalowitz, 2007) and for native Japanese learners acquiring the English /r-l/ contrast (Bradlow, Pisoni, Akahane-Yamada, & Tohkura, 1997). Importantly, once these learners are able to hear the distinction between these sounds in one phonetic context, they are also able to produce the same distinctions more accurately in other contexts.

Taken together, the research outlined above suggests not only that it is possible for different L2 dialects to differ from one another in terms of the acoustic cues used to distinguish between L2 sounds forming a
contrast that is absent in the learner’s L1 but, more importantly, that these differences can help learners acquire L2 distinctions more easily. This would especially be the case if these acoustic cues exaggerate the difference between the two sounds in a difficult L2 sound contrast. To our knowledge, no studies have examined this possibility. Differences between European and Québécois French, however, provide such a possibility; these are tested in the current study.

### Assibilation of alveolar stops in Québécois French

References to ‘European French’ typically refer to the variety of French spoken in France itself, particularly in Paris. In this study, both QF and EF learners were taught European French during their eight-week intensive language instruction. However, while the QF learners then spent time in the province of Québec, particularly in or near Montréal, the EF learners’ immersion took place in southern France, in and around Toulouse.

Setting aside the differences in vowel inventories (Walker, 1984) and allophonic variation (Ostiguy & Tousignant, 1993) between QF and EF, we focus our discussion on the differences manifested in the three vowels of interest in this study: French /i-y-u/. One of the salient features that sets QF apart from EF is the assibilation or affrication of /t/ and /d/ to [ts] and [dz] only before the high front vowels /i/ and /y/.3 Occurring obligatorily within lexical items but optionally across word boundaries (Kim, 2001), QF assibilation can be described as the addition of the feature [+ delayed release] (Walker, 1984) or [+ strident] (Kim, 2001). The transition from the oral closure of the /t/ or /d/ following its release to the high vocoid creates a narrow constriction between the alveolar ridge and the upper teeth, producing the turbulence of the [s] in the release of the [t] (Kim, p. 94) and reflecting ease of articulation (Shariatmadari, 2006). Ultimately, the presence of this extra cue helps to mark the contrast particularly between French /y/ and /u/ and may thus help QF learners acquire this contrast more accurately than EF learners do.

### The current study

The current study sought to determine whether this extra cue to the distinction between French /i-y-u/ helps L2 learners who are exposed to Québec French acquire this contrast more accurately than do learners exposed to European French.
The following research questions were addressed:

1. Are QF learners, perhaps because of the extra assibilation cue to the distinction before the high front French vowels /i-y/ compared to high back /u/, better able than EF learners to discriminate these vowels when they are presented in an alveolar context?

2. Are QF learners better able than EF learners to generalize their perception of these vowels to phonetic contexts other than after alveolar stops, regardless of the L1 dialect of the speaker producing the tokens?

3. Are QF learners also better able than EF learners to produce these vowels?

To examine these research questions, the researchers asked QF and EF learners to perform discrimination, identification, and production tasks for French /i/, /u/, and /y/. In experiment 1, the first research question was addressed when QF learners and EF learners were asked to discriminate between French /i-y-u/ after alveolar plosives (i.e., in the phonetic context where assibilation takes place). Experiment 2 tested question 2: whether these same learners could accurately identify the same vowels in non-alveolar contexts when spoken by native speakers of both Québécois and European French. Finally, to answer the third question – whether exposure to the extra acoustic assibilation cue permits QF learners to produce these vowels better than EF learners do – participants produced the vowels in several French words in experiment 3.

**Experiment 1: Vowel discrimination**

The goal of experiment 1 was to determine whether QF learners were more accurate than EF learners at discriminating between the three French vowels /i-u-y/. It was hypothesized that, since QF learners would have been exposed to alveolar assibilation before high front French vowels in QF, they might be able to discriminate between French /i/, /y/, and /u/ more accurately than EF learners, who would not have been exposed to this extra acoustic cue. We thus examined whether this extra cue affected their ability to discriminate between French vowels in words in which assibilation occurs.
Procedure

Participants

All participants were native speakers of North American English who learned French in the United States in a two-month intensive program, spending on average eight hours per day primarily studying French grammar, conversation, and listening. During the program they were typically not exposed to native-speaker input, since most teachers were native English speakers. However, most audio materials used by the learners were produced by native speakers of European French who did not use assimilation. By the end of this program, learners reached the equivalent of the second year of a university-level French L2 program. Participants next spent approximately 18–22 months either in Toulouse, France, or in the province of Québec. During this time, they spent eight to 10 hours per day speaking with native French speakers, while typically living with another native English speaker. Demographic information on study participants is given in Table 1.

Stimuli

The stimuli for the discrimination task were the monosyllabic real words /di/ (dit), /du/ (doux), and /dy/ (du), which occur with high frequency in French. We used only voiced and not voiceless plosive contexts in order to keep the number of stimuli manageable. Four female native French speakers (average age: 26), two from Montréal and two from southern France, produced these words in the carrier phrase ‘je dis le mot___’ (‘I say the word___’). The target words were excised from the speech stream, and these words were used as the test stimuli. Stimuli produced by both QF and EF speakers were used, in order to eliminate any advantage one learner group might have over the other.

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<th>TABLE 1</th>
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<td>Learners of QF</td>
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<td>Learners of EF</td>
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AOA = average age of arrival in target dialect; LOR = average length of residence in French-speaking country (in years)
Method

Participants were tested one at a time in a quiet room, using a laptop computer and headphones. In this experiment, which was presented using the presentation software E-prime, participants saw four response choices on the screen as they heard two sound files repeated 15 milliseconds apart. The four choices were ‘same vowel, same language’; ‘different vowel, same language’; ‘same vowel, different language’; and ‘different vowel, different language.’ Participants were told that they would hear randomized /i/, /u/, and /y/ tokens in both German and French and that they should try to distinguish between vowels both within and across the two languages. Pairings that included the German tokens are not analyzed here but are part of a larger project.

Because we were interested in whether or not the listeners were able to distinguish perceptually between French vowels regardless of the dialect, we counted any response accurate in which the listener correctly identified vowels as ‘same’ or ‘different,’ regardless of whether or not participants were able to determine that both vowels in the vowel pair were spoken by French speakers of different dialects. In other words, we did not analyze the listeners’ ability to determine whether the two vowels in a pair were produced by two native EF speakers, two native QF speakers, or one EF and one QF speaker.

For each vowel pair presented to listeners, half of the trials \( (n = 16) \) consisted of vowel pairs in which both vowels were the same (/i-i/, /y-y/, /u-u/) and half \( (n = 16) \) consisted of pairs in which the two vowels were different (e.g., /i-y/, /y-i/). Of the same trials, half \( (n = 8) \) were the same for one vowel (e.g., /i-i/) and half \( (n = 8) \) were the same for the other vowel (e.g., /y-y/) in each vowel pair. Participants heard 72 French dyad tokens altogether, presented in a different randomized order for each participant. Each vowel in the vowel pairs was spoken by a different speaker; half the vowel pairs contained one vowel spoken by a QF speaker and one spoken by an EF speaker, and half contained both vowels spoken by speakers of the same dialect. Vowel pairs never contained tokens by the same speaker, and the presentation of the vowels was counterbalanced across the two speakers and the three vowels. Because the vowel pairs were intermixed, we collapsed the listeners’ responses across both dialects.

The dependent variable for each vowel contrast was \( A' \), a measure often used in psychology experiments to reduce the effect of response bias (Snodgrass, Levy-Berger, & Haydon, 1985). The \( A' \) scores were derived from the proportion of hits (correctly choosing ‘different’ on
different trials) and false alarms (incorrectly choosing ‘different’ when both vowels were actually the same) for each participant and each vowel contrast. An $A’$ score of 1.0 indicates perfect discrimination, while an $A’$ score $\leq 0.5$ indicates discrimination at or below that attributable to chance.

**Results**

Our first research question asked whether the QF learners would be more accurate than the EF learners at discriminating French vowel pairs /i-y/, /i-u/, and /y-u/. Figure 1 shows the average discrimination scores (displayed as $A’$ scores) obtained for the three French vowel contrasts by the two groups of participants. The $A’$ scores obtained for the three contrasts were submitted to a two-way (vowel contrast (3) × group (2)) ANOVA. Results indicated a main effect of group ($F(1,19) = 19.94, p = 0.0001, \eta^2_p = 0.281$), but no effect of vowel

**FIGURE 1**

$A’$ discrimination scores for learners of European French (LE) and learners of Québec French (LQ)
contrast \( (F(2,19) = 2.72, p = 0.07, \eta^2_p = 0.097) \), nor any group by vowel contrast interaction \( (F(2,1) = 0.536, p = 0.588, \eta^2_p = 0.021) \). To put it simply, the QF learners were significantly more accurate than the EF learners in discriminating all three of the French vowel pairs (/i-u/, /i-y/, and /u-y/).

Discussion

The results of experiment 1 demonstrate that the QF learners were better able than the EF learners to discriminate among the French vowels /i-y-u/. This was true both for tokens spoken by native QF speakers and for those spoken by native EF speakers. The reason for this difference may be that the QF learners were able to use the additional assimilation cue to help distinguish /y-u/ and /i-u/ contrasts (although learners were most likely able to distinguish the /i-u/ contrast because it also exists in English). Indeed, the discrimination between /u/ and /y/ for QF learners relative to EF learners is especially striking.

Experiment 2: Vowel identification

Although the findings from experiment 1 suggested that QF learners were more accurate than EF learners in their discrimination of these French vowels /i-y-u/, a question remains as to whether they can generalize this perceptual ability to non-alveolar contexts that lack the additional assimilation cue marking /i/, /y/ more distinctly from /u/. We also examined whether the two groups of learners generalized their perceptual abilities to other dialects. To answer these questions, participants performed an identification task, identifying these three vowels as spoken by both EF and QF native speakers. This task more closely resembles what learners actually do when they perceive L2 vowel sounds; thus, experiment 2 was designed to determine whether the results found in experiment 1 could be generalized to other phonetic contexts and whether learners’ accuracy differed depending on the dialect in which the token was spoken.

Procedure

Participants

The same learners who participated in experiment 1 (10 EF learners, 10 QF learners) also participated in this task.
Stimuli

The stimuli used in this experiment were spoken by the same four female native speakers (two QF and two EF speakers) who provided the stimuli for experiment 1. The stimuli were either monosyllabic closed CVC syllables (e.g., *sud*),\(^6\) open CV syllables (e.g., *lu*), or single-vowel (e.g., */u*/) tokens; a total of 18 tokens for each vowel were spoken by each of the four native speakers, for a total of 64 tokens (see Appendix for a complete list of the stimuli). We did not analyze the three types of stimuli separately because there were not enough tokens of each type to comfortably make generalizations, so the results below are collapsed across the three stimuli conditions. A perusal of the data, however, did not indicate any differences in accuracy across the three types of stimuli.

Method

Participants heard the tokens spoken by the native QF or native EF speakers via headphones, presented in random order using the presentation software E-Prime. As they heard the word, they saw the three French words *dit*, *du*, and *doux* on the computer screen, corresponding to the high vowels */i/, */y/ and */u/*, respectively, and were asked to press the key corresponding to the word that contained the vowel they thought they heard. The number of correct responses for each participant for each vowel was tallied, separating tokens spoken by the native QF and EF speakers. If the QF learners used the additional assibilation cue to acquire the phonemic distinction between French */y/ and */u/*, then they should be more accurate than the EF learners in perceiving these French vowels (especially */y/). As in experiment 1, all tokens were randomized differently for each speaker.

Results

The proportion correct was divided for each dialect by the number possible for each participant and then averaged across the two learner groups. These results can be seen in Figure 2. To determine whether the two groups were similarly accurate in identifying vowels across the two dialects, the vowel identifications accuracy was first examined for the tokens spoken by the native EF speakers. We submitted the number of correct identifications for each vowel by each participant to a two-way (group (2) × vowel (3)) ANOVA, with group as between-group factor and vowel as within-group factor.
This analysis revealed a significant effect of vowel \( F(2,19) = 29.91, p < 0.001, \eta_p^2 = 0.512 \), but no significant effect of group \( F(1,19) = 0.132, p > 0.05, \eta_p^2 = 0.002 \), nor any significant group \( \times \) vowel interaction \( F(2,1) = 1.51, p > 0.05, \eta_p^2 = 0.050 \). In other words, neither the QF nor the EF learner group was more accurate at identifying EF vowels, although both groups were more accurate at identifying French /i/, /u/ than at identifying French /y/.

Next, the accuracy of learners’ vowel identifications for tokens produced by the native QF speakers was analyzed. A similar two-way ANOVA, again with group as between-group factor and vowel as within-group factor, revealed a significant effect of vowel \( F(2,19) = 21.05, p < 0.001, \eta_p^2 = 0.425 \) and a group \( \times \) vowel interaction \( F(2,19) = 3.31, p < 0.05, \eta_p^2 = 0.094 \). Further Tukey post hoc analyses revealed that QF learners were more accurate than EF learners at identifying the vowel /y/ as spoken by native QF speakers and were as accurate as the EF learners at identifying the other vowels.

The next analysis examined whether the two groups were more accurate at perceiving vowels produced in their own dialect than at perceiving vowels produced in the other dialect. To answer this question, two one-way ANOVA$s$, one on the number of correct identifications of QF versus EF vowels by QF learners and another on the number of
correct identifications of QF versus EF vowels by EF learners, were performed. These analyses revealed that the QF learners were equally accurate at identifying both QF and EF vowels \( F(2,9) = 1.30, p > 0.05, \eta^2_p = 0.024 \), whereas the EF learners were more accurate at identifying EF vowels than at identifying QF vowels \( F(2,9) = 4.49, p < 0.01, \eta^2_p = 0.076 \).

**Discussion**

The results of the second experiment indicate that the QF learners were more accurate than the EF learners at identifying QF /y/, which suggests that the extra assimilation cue for /y/ in the Québécois dialect may have enhanced learners’ accuracy in perceiving French /y/, a vowel with no English counterpart. These results are especially noteworthy considering that none of the words used in experiment 2, in contrast to the stimuli in experiment 1, contained vowels preceded by alveolar consonants – that is, the environment in which assimilation before QF /i/ and /y/ takes place. In other words, the QF learners were able to generalize their ability to distinguish between French /y/ and /u/ to environments lacking the assimilation cue.

Moreover, the QF learners were found to be equally accurate at perceiving vowels spoken by both QF and EF native speakers. However, the EF learners were more accurate at identifying vowels spoken by EF native speakers than at identifying those spoken by QF native speakers. This may suggest that the EF learners were less able than the QF learners to generalize their perceptual abilities to vowels produced in another dialect. Taken together, the results suggest that the assimilation cue may have afforded QF learners an advantage in perceiving /y/.

**Experiment 3: Production**

This final experiment investigated whether QF learners were also better able to produce the French vowels /i-y-u/. While the relationship between perception and production is still unclear, most L2 speech theorists believe that accurate L2 perception precedes accurate L2 production (Flege, 1995; see Smith, 2001, for arguments against this assumption). If this were the case, it would follow that the QF learners would also be more accurate than EF learners at producing French /i-y-u/.
Procedure

Participants

In addition to the participants from experiments 1 and 2 (10 EF learners, 10 QF learners), five native QF speakers and five native EF speakers (3 males and 2 females in each group) also participated in this final task. Learners’ performance was compared against that of the native speakers. Most statistical software (including SPSS, used for this study) can control for the higher numbers of participants in one group than in another, and so the size difference between the four groups was not seen to affect the results of the analysis. The native EF speakers had lived in France until adulthood (average age: 28), while the native QF speakers had lived in Montréal their entire lives (average age: 26). Acoustic analyses of vowels produced by the learners were compared against those of the native French speakers to determine how accurately the two learner groups produce the French high vowels relative to their target dialect.

Stimuli

In this task, participants produced French /i/, /y/, and /u/ in seven words for each vowel, for a total of 21 words. These words were read twice from a piece of paper in the carrier phrase ‘Je dis le mot ___.’ The second production of the sentence was used for analysis. Two of the words for each vowel were preceded by alveolar voiced or voiceless stop consonants; the other five were in various other phonetic contexts. (See Appendix for a list of all stimuli used in the experiments.) In most tokens, vowels were found in stressed position; however, some vowels were in unstressed position, a context in which speakers may lax the vowels. Listening to the vowels and examining them acoustically revealed no difference in the production of the vowels between unstressed and stressed positions.

Data analysis

The second production of each target word was excised from the carrier phrase, and F0 (fundamental frequency) and the first three formants were hand measured in the centre of the steady state of the vowel. These measurements were then normalized to the Bark scale (Whiteside, 2001): B1–B0, an estimate of vowel height; B2–B1, an estimate of the front–back dimension; and B3–B2, an estimate of lip rounding. Bark scale measurements normalize measurements for
differences in vocal tract size as well as for the consequent differences between tokens produced by male participants and those produced by female participants.

Results

Before examining the results of the learners’ productions, we compared the production of the native QF speakers to those of the native EF speakers to determine whether any acoustic differences existed between the two groups independent of the additional assimilation cue, since no known studies have examined the acoustic differences between these two dialects.

The native EF and QF speakers’ B1–B0 (vowel height), B2–B1 (vowel frontedness), and B3–B2 (lip rounding) measures were submitted to a repeated-measures univariate analysis with vowel type (/i-y-u/) and vowel dimension (height, backedness, rounding) as within-subject factors and group as between-subjects factor. Performing a repeated-measures analysis helped determine whether each native speaker produced a difference in vowel height, frontedness, or rounding between the three vowels /i-y-u/. The results of this analysis revealed that the two native-speaker groups did not differ in their production of vowel height or vowel rounding for any of the three vowels (all $F$s(1,9) $<$ 0.765, $p$’s $>.05$). The two groups did differ, however, in their production of vowel frontedness for French /y/ and /u/ (all $F$(1,9) = 8.69, $p$’s = 0.016). In particular, the native QF speakers produced French /i/ more fronted and French /y/ further back than did the native EF speakers (see Figure 3).

Results of these analyses suggest that native QF speakers may distinguish acoustically among /i/, /y/, and /u/ more than native EF speakers do. In other words, not only does QF use a specific cue external to the vowels to distinguish between these French vowels – namely, the assimilation cue marking especially /y/ as separate from non-assibilating /u/ – but QF also has a greater acoustic difference, at least in terms of vowel frontedness, than EF among all three vowels.

We next examined whether the two learner groups were able to produce a difference among the three vowels (French /i-y-u/) and whether they could produce them similarly to native speakers of their target dialect. To test this, we ran a similar analysis to that used to compare the two native-speaker groups. That is, the two learner groups’ and the two native-speaker groups’ B1–B0 (vowel height), B2–B1 (vowel frontedness), and B3–B2 (lip rounding) were submitted to a series of repeated-measures univariate analysis, with vowel type
as within-subject factors and group as between-subjects factor. We ran a separate analysis for each vowel position (height, frontedness, and lip rounding), instead of a larger multivariate analysis, because the interactions of these features did not constitute an important comparison. Since three analyses were run, the \( p \) value was set at 0.001 to allow for multiple comparisons.

For vowel height, this analysis revealed that both learner groups produced the vowels significantly lower than the two native-speaker groups (\( F(3,29) = 9.94, p < 0.001, \eta^2_p = 0.279 \)). The native EF speakers and the EF learners produced similar vowel frontedness, but they differed significantly on this measure from the native QF speakers and the QF learners (\( F(3,29) = 12.01, p < 0.001, \eta^2_p = 0.319 \)). In other words, both learner groups produced the vowels similarly to native speakers of the dialect to which they were exposed. Finally, for lip rounding, the EF learners differed from the other three groups in how they produced vowel rounding for the three vowels (\( F(3,29) = 7.423, p < 0.001, \eta^2_p = 0.224 \)). These results can be seen in Figures 4 and 5.

Discussion

Experiment 3 produced three important findings. First, Québécois and European French dialects not only differ in their use of assonation to distinguish between the three target vowel sounds but also differ in
terms of where the three vowels are produced in the acoustic space,
such that the /y/ vowel is more centralized for Québécois than for
European French. This finding is perhaps most striking because the
centralization of /y/ decreases the acoustic space between /y/ and
/u/, which would lead us to suspect that this contrast would be

FIGURE 4
Production of French /i/, /y/, and /u/ by native European French speakers (E) and
learners of European French (LE)

FIGURE 5
Production of French /i/, /y/, and /u/ by native Québécois French speakers (Q)
and learners of Québécois French (LQ)

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66, 5 (August/août), 711–738
more difficult for QF learners than for EF learners. This further suggests that the QF learners may have been using the external assimilation cue to distinguish these two vowels. This difference also seems to occur in the productions of the learners of the respective dialects – that is, the learners of Quebec French produced French /y/ more centralized (like the native QF speakers) while the EF learners produced French /y/ more fronted (like the native EF speakers).

Second, the two learner groups produced the three French vowels significantly lower in the vowel space (and perhaps more like English vowels) than the native French speakers did. That is, neither learner group, regardless of the dialect to which they were exposed, produced any of the French vowels at the vowel height used by the native French speakers (Smith & Baker, 2010, found the same for L2 learners of German).

Third, only the QF learners, not the EF learners, were able to produce the three vowels with the same degree of roundedness used by the native speakers of both dialects. The fact that the QF learners were better at producing, as well as perceiving, the target vowel contrasts, including in particular /y/, suggests that their ability to perceive the contrast between /u/ and /y/ was further reflected in their production.

**General discussion**

This study produced four important findings. First, QF learners were more accurate than EF learners at discriminating the three French vowels /i-y-u/ when these occurred in contexts (proceeding alveolar plosives) where the assimilation cue occurs in QF. Second, perceptual accuracy for /y/ was also greater for QF learners than for EF learners even when the vowels were in non-assibilating phonetic contexts. Third, the QF learners seemed able to generalize their perception of the French vowel contrasts to other dialects more readily than the EF learners, as shown by the fact that the QF learners were equally accurate at perceiving tokens from both dialects, whereas the EF learners were more accurate at perceiving EF tokens than at perceiving QF tokens. Finally, while both learner groups differed from native speakers in their vowel production in terms of vowel height, they produced the vowels with similar vowel frontedness, meaning that they produced the vowels with qualities similar only to those of the dialect to which they were exposed. Importantly, only the QF learners produced the
vowels with similar roundedness to the native speakers of both dialects.

These findings have important implications for L2 acquisition research and teaching. First, the dialect to which a learner is exposed may play a significant role in L2 acquisition. This is especially the case, as shown above, when external acoustic cues can help learners distinguish between highly similar L2 sounds (such as French /y/ and /u/), making an L2 distinction more salient in one dialect than in another. In the present study, this saliency seemed to help the QF learners perceive (and, to some degree, produce) these vowels with greater accuracy than the EF learners. This is particularly relevant for QF learners because in QF /y/ and /u/ occupy a smaller acoustic space than in EF. Nevertheless, QF learners were more accurate than EF learners at both perception and production, which suggests that the external assimilation cue outweighed the larger acoustic difference.

Such findings relate to other studies showing that L2 contrasts can be learned more easily in some phonetic contexts than in others (Trofimovich et al., 2007) and suggest that saliency may play a role in L2 phonological acquisition (DeKeyser, Salaberry, Robinson, & Harrington, 2002). Indeed, these findings may also suggest that exaggeration of acoustic cues provides learners with a better means of learning L2 sounds (McCandliss et al., 2002).

Moreover, the saliency of these cues may also have had a facilitative effect for generalizing across other dialects. QF learners were able to generalize their perceptual abilities to European French, while the EF learners were not able to generalize their perception of these vowels to Québécois French. However, it is possible that QF learners were able to generalize their perceptual abilities to EF because EF is the variety most commonly taught in classrooms and used in the media, meaning that QF learners are more likely to have been exposed to EF pronunciation than EF learners are to have been exposed to QF pronunciation. Thus, it may simply be that QF had experience with EF but not vice versa.

The implications of this research for pedagogy are as follows. First, listening exercises may be able to capitalize on the salient assimilation cues to help students notice and, ultimately, establish separate categories for French /i-y-u/. Training could first expose learners to assimilated tokens produced by QF speakers before next including tokens using other phonetic environments and produced by speakers from other varieties, such as EF, to promote generalization of their perceptual and production abilities. Such training not only
draws on McCandliss et al.’s (2002) exaggerated acoustic cues but also expands Bradlow and Pisoni’s (1999) finding that multiple talker variability increases perceptual acquisition by suggesting dialect to be an additional source of talker variability. Smith and Baker (2010) have likewise shown that learners exposed to more local varieties of southern and Austrian German in addition to Hochdeutsch (standard German as taught in textbooks) were better able to perceive and produce vowels than those exposed only to Hochdeutsch. Thus, increased exposure to varieties of French, including especially varieties with enhanced cues for a particular sound, could facilitate learning and generalization of L2 sounds.

Moreover, drawing on QF tokens in training would also address a gap in teaching materials for beginner French used in North America. As Chapelle (2009) has noted, little attention has been paid to Canada or Québec in textbooks used in the United States, with even less exposure to audio samples produced with a QF accent. Thus, learners are given little opportunity to benefit from the salient cues that QF or other such varieties could offer to enhance learning of perception and production of new L2 French sounds. QF tokens used in perceptual and pronunciation training could further serve to introduce L2 learners to Québec French while highlighting the benefits that QF holds for the L2 French learner. Such talker variability in French textbooks could likewise promote increased acceptance and awareness of the value of French varieties outside of France by providing the foundation for discussion of the use and status of French in various countries. Therefore, we concur with Chapelle (2009) and see the results of this study as a call to publishers to expand the range of French varieties to which learners are exposed during French instruction.

Finally, and perhaps most importantly, these findings suggest that dialect may play an important role in L2 acquisition and that theories of L2 acquisition should take these differences into account. While the results of this study demonstrate the importance of dialect exposure for L2 learning, we hope that further research will shed more light on the implications of exposure to a given dialect during L2 acquisition.

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Notes

1 While recognizing that multiple varieties of French exist in Europe, we use ‘European French,’ for lack of a better term, in order to avoid the clumsy term ‘France French’ and the problematic ‘Standard French,’ which may leave the reader with a sense that all other varieties are non- or sub-standard. As this is not our intent, we use ‘European French’ for simplicity’s sake while recognizing this term’s inadequacy.

2 As one CMLR reviewer noted, it is not surprising that little research has examined the impact of L2 dialects; since cross-language comparisons between the L1 and the L2 are at the heart of difficulties encountered by L2 learners (see Flege, 1995), it follows that each L2 dialect presents a unique comparison with the learner’s L1 dialect. While we concur, the research has typically ignored the unique ways in which even subtle differences between dialects (L1 or L2) can impact learning. Recent research (O’Brien & Smith, in press) demonstrates that nearly imperceptible differences between L1 dialects result in differences in L2 pronunciation in ways that are not explained by recent theories (Flege, 1995; Best, 1995). Thus, dialect research is critical in elucidating how these differences between the speaker’s L1 and the target L2 affect the learning of the L2.

3 Assibilation of /t, d/ occurs before all high front vowels ([dzy]rer ‘to continue,’ [tsj]ens ‘hold, 1st/2nd sg.’). For ease of explanation, we focus strictly on the assibilation of /t-d/ before /i-y/ since this is the environment of relevance for the study.

4 One anonymous reviewer noted the similarity of the end of the carrier phrase ‘je dis le mot dis’ to the real French word maudit ‘damned.’ Any similarity between these two utterances was coincidental and unnoticed by either the researcher or subjects.

5 Here and in Figure 2, a striking difference between the two groups is the difference in the amount of standard error. QF learners performed more homogeneously than EF learners, which suggests that they have all more systematically acquired, or are in the process of acquiring, these contrasts.

6 Although tense vowels in closed syllables undergo laxing in QF (Walker, 1984), the assibilation patterns remain the same, (pe[tsit] → pe[tsI]t ‘small, f.sg.’).

7 Although in this figure the native Québécois French speakers’ /i/ appears to overlap with the European French speakers’ /y/, statistical analyses discussed above indicate that this is not the case. Moreover, even if they were overlapping, these vowels are still primarily distinguished based on lip rounding.
References


DeKeyser, R., Salaberry, R., Robinson, P. & Harrington, M. (2002). What gets processed in processing instruction? A commentary on Bill VanPatten’s...


### Appendix

List of timuli (stimuli are listed in French spelling when they are actual words, in IPA transcription when they are not)

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<td>Experiment 2: Identification</td>
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<td>Experiment 3: Production</td>
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