Evidence of phonemicization
Lax high vowels in Canadian French

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Introduction: Tenseness in Canadian French

- Mid-vowels contrast in height (Landick 1995)
- The phonemic status of tenseness in high vowels is debated (see Gauthier 2016)
- High-vowel tenseness is predictable in final syllables, highly variable in non-final syllables, and is often preserved in recent borrowings (e.g. Côté 2012)
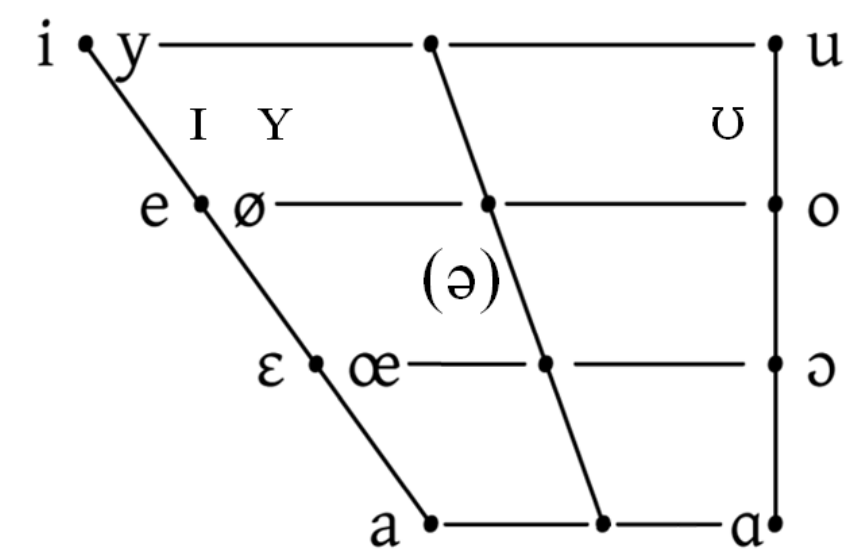

Figure 1: The inventory of monophthongal oral vowels in Laurentian French according to Côté (2012).

Mid vowels (Landick 1995)

- **Loi de position** ('law of position'): mid vowels in closed syllables tend to be lax; vowels in open syllables tend to be tense
- Tendency for **height 'harmony'** in Standard French: *étape* /etap/ [etap] ∼ [ɛtap] 'step'

High vowels: Native words in isolation (Poliquin 2006)

- **Obligatory laxing** in non-lengthened final syllables:

Phoneme	Open	Lengthened	Closed
/i/	[vi] *vie* 'life'	[viːz] *vise* 'targets'	[vɪt] *vite* 'quick'
/y/	[ry] *vue* 'sight'	[ryːz] *ruse* 'ruse'	[rʏs] *russe* 'Russian'
/u/	[ru] *roue* 'wheel'	[ruːʒ] *rouge* 'red'	[rʊt] *route* 'road'

- Optional **laxing 'harmony'** in non-final syllables: *musique* /myzik/ [my.zɪk] ∼ [mʏ.zɪk] 'music'

High vowels: Elsewhere

- Borrowings and truncations introduce exceptions to otherwise predictable tenseness in final syllables (e.g. *cheap* as [tʃip], Côté 2012)
- In phrases, tenseness can affect **meaning**:

[lɔmkilavy] [lɔmkɪlavy]

L'homme qui l'a vu 'The man who saw him'	✓	*
L'homme qu'il a vu 'The man that he saw'	*	✓

Questions

① Featural similarity can increase likelihood to be 'harmonic' Poliquin (2006) – true for mid vowels?

② If so, are mid vowels sensitive to high-vowel laxness, suggesting featural similarity?

Data

- *Phonologie du français contemporain* corpus (http://www.projet-pfc.net/, Durand et al. 2002, Durand et al. 2009)
- 67 native French speakers from 6 survey locations
- 3 age groups (young adult, middle-aged, older)
- 26 000 non-final mid vowels from spontaneous conversational speech

Key

A	Masham (Qc)
B	Hawkesbury (On)
C	Trois-Rivières (Qc)
D	Quebec City (Qc)
E	La Pocatière (Qc)
F	Chicoutimi (Qc)

Figure 2: Survey locations included.

Data extraction and analysis

- Recordings forced aligned at word and segment levels (Milne 2014)
- F1 at midpoint measured in Praat (Boersma and Weenink 2007)
- Mixed-effect linear regression with by-speaker and by-word random intercepts and slopes in R (R Core Team 2016) using lme4 (Bates et al. 2015)
- Models predict the F1, with interactions suggesting the likelihood of harmonising *more* or *less*

Effect of the following height (figures 3, 4)

- The following vowel's F1 and its phonological height are both significant predictors (both $p < 0.0001$)
- Phonologically higher vowels (featural height) and acoustically higher vowels (F1 values) both trigger more raising, even when controlling for the other height type
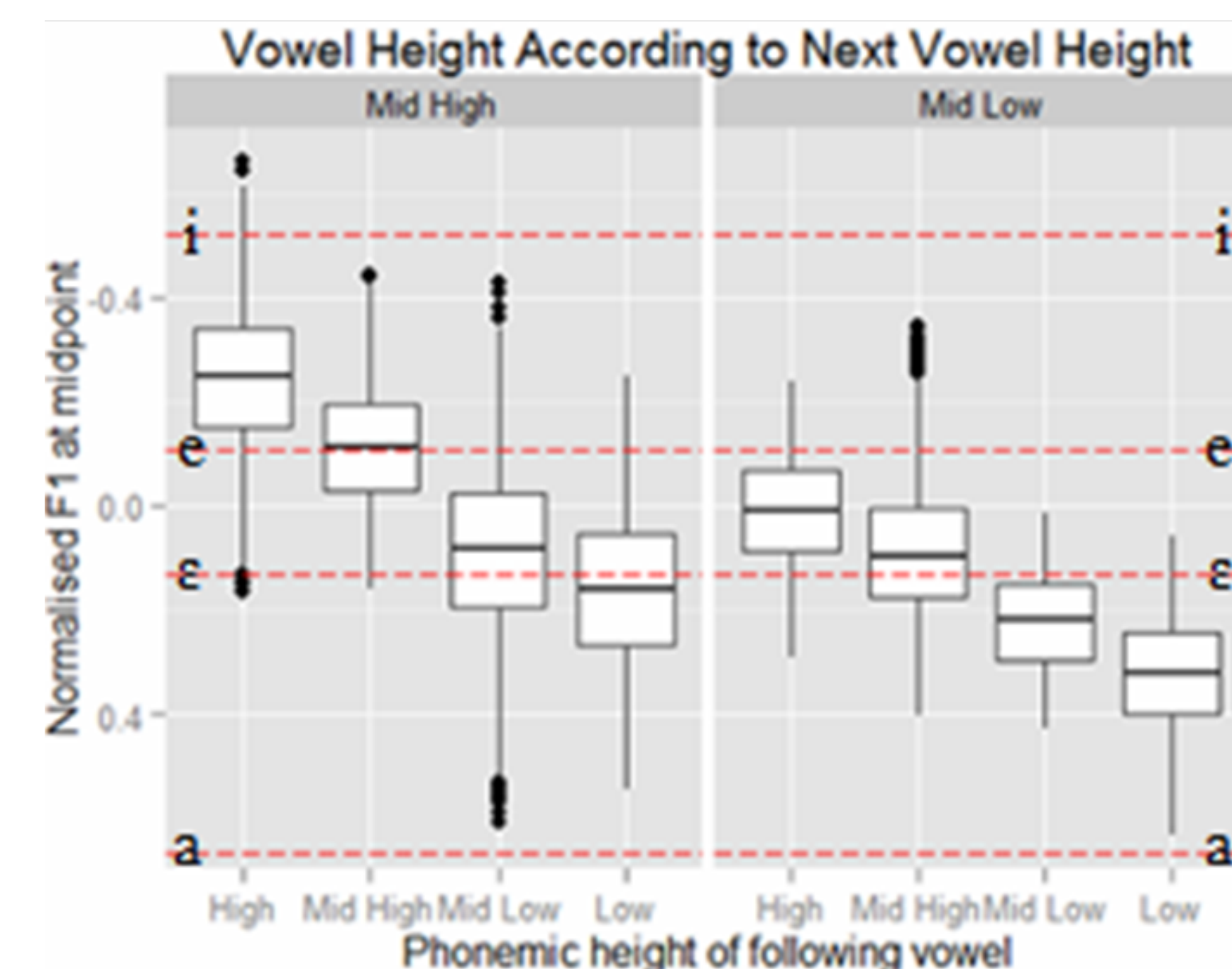

Figure 3: The effect of a following vowel's height on mid vowels' predicted F1.
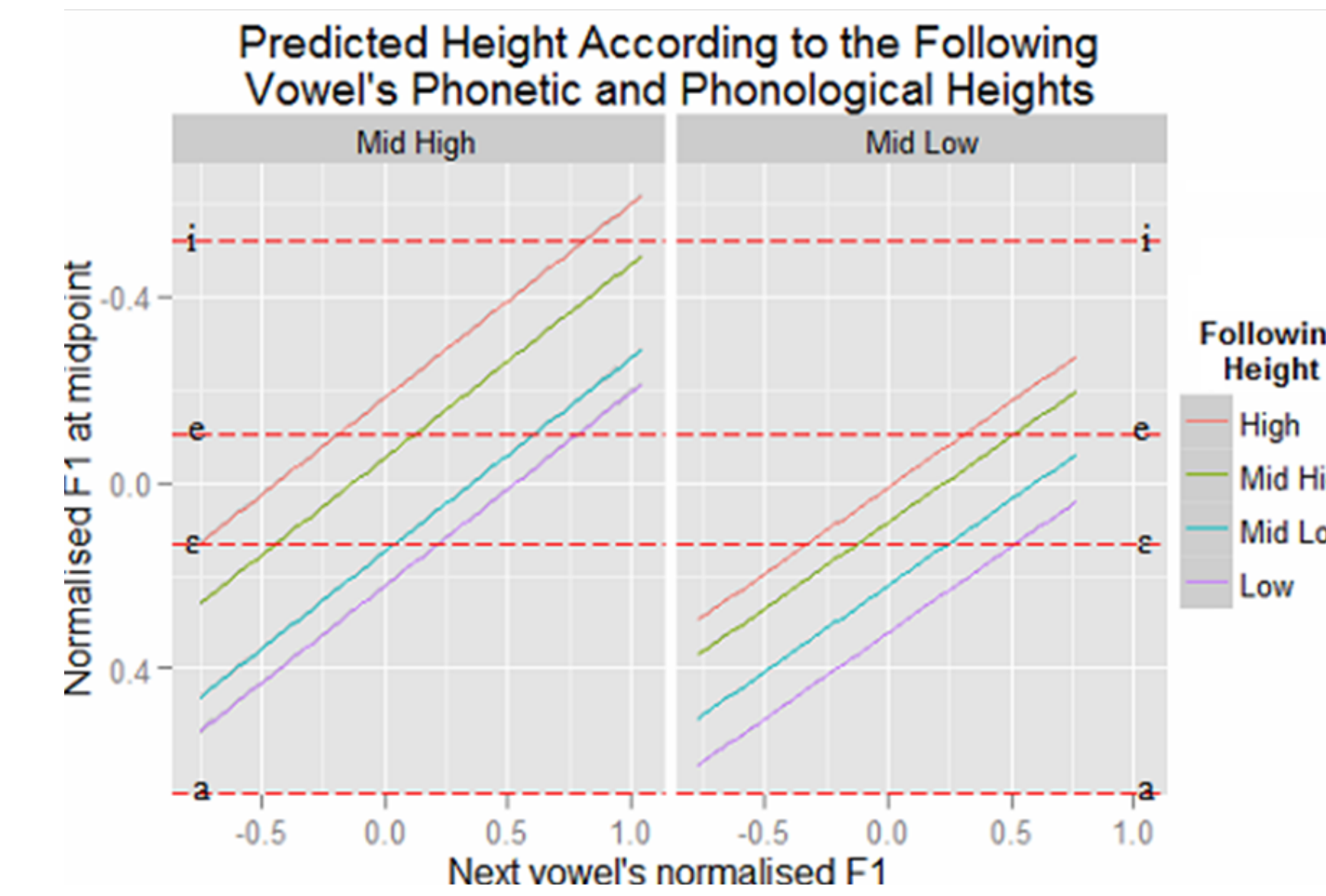

Figure 4: The effect of a following vowel's F1 and featural height on mid vowels' predicted F1.

Effect of the phonological similarity

- As found by Poliquin (2006) for high vowels' laxing harmony, mid vowels are more likely to 'harmonise' with a trigger that is more similar
- Vowels matching in backness ($p < 0.0001$) and in rounding ($p = 0.0266$) 'harmonise' more
- These effects are particularly strong when the target is in the penult ($p < 0.0001$)

Effect of tenseness (figure 5)

- Focusing on penult mid vowels vowels followed by high vowels, we find that a significant interaction between tenseness and age group ($p = 0.0012$)
- Mid-high vowels have lower F1 when followed by tense high vowels compared to lax ones
- Although tense high vowels have a lower F1, young speakers' mid-low vowels have lower F1 when the following vowel is lax than when it's tense
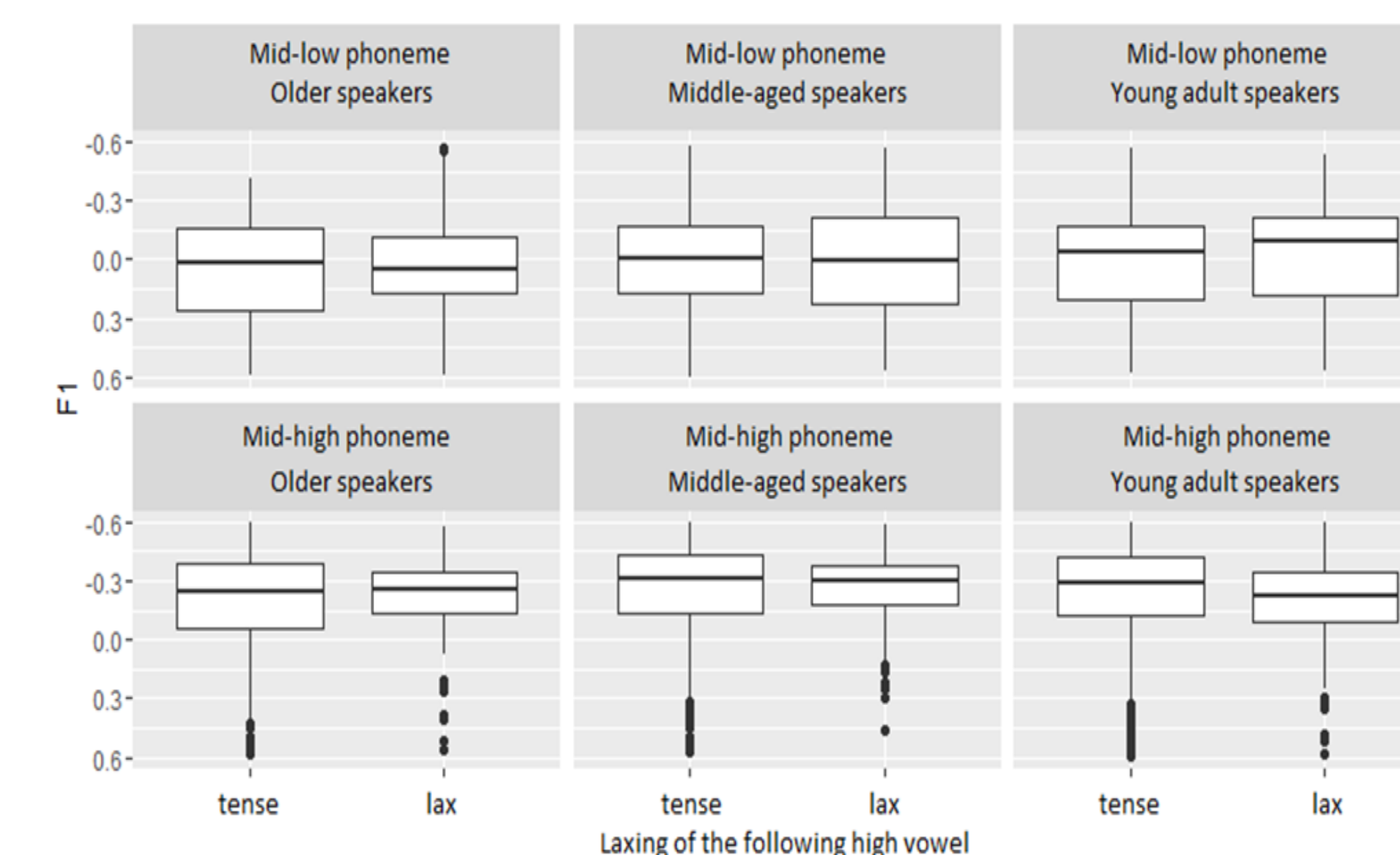- These results suggest that tenseness mediates harmony, like other phonological features do

Conclusion

① Mid-vowel laxing 'harmony' does occur, but it generally doesn't threaten phonemic distinctions and likely remains coarticulatory

② Mid vowels' laxing 'harmony' is sensitive to high-vowel tenseness, suggesting phonological similarity and consequently the phonemic status of tenseness in Laurentian French

③ Tenseness is likely contrastive in both high vowels and low vowels for younger speakers

④ There appears to be change in apparent time: the phonemic status of tenseness or the interpretation of contrasts as being one of tenseness appears to be an innovation

⑤ These results are consistent with proposals like the one by Côté (2012) that the high lax vowels are phonemic, at least for younger speakers

⑥ Phonetic processes like coarticulation could be used as a diagnostic for a segment's or a feature's phonological status

⑦ Speakers may give phonemic status not only to features that are contrastive at word-level, but also those that are contrastive at phrase-level

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Figure 5: The effect of a following high vowel's tenseness on mid vowels according to the speakers' age group.