1. **Background.** In many languages with tense-lax contrasts, tense and lax vowels are allowed to contrast in word-final syllables before consonants (_C#) but not word-finally (_#), where only tense vowels are permitted. This pattern of contextual neutralisation is found in Dutch (Trommelen, 1983) and Standard French (Tranel, 1987) among other languages.

   (1) a. Dutch
   _C# [a]-[a] [ram] ‘window’ [ram] ‘ram’
   _# [a]*-[a] [mika] ‘mica’ *[mika]

   b. Standard French
   _C# [ɔ]-[ɔ] [olk] ‘hoarse’ [olk] ‘rock’
   _# [ɔ]*-[ɔ] [mo] ‘word’ *[mo]

   Why do word-final vowels tense in these languages? A common answer is that tensing is directly due to word-final lengthening: word-final vowels are required to be long and lengthening mechanically results in tensing (e.g. Féry 2003 on Standard French). However, the connection between lengthening and tensing is problematic from a phonetic perspective. Indeed, acoustic theory predicts that vowel lengthening should result in less coarticulation with adjacent consonants (e.g. Lindblom 1963) but not necessarily in tensing: as a vowel becomes longer, its first and second formant realisations get more faithful to its formant targets but not necessarily more peripheral. For instance, when lengthened, an underlying /ɔ/ becomes lower and not higher (see Gendrot and Adda-Decker 2005 for evidence in French and German). Therefore, lengthening alone cannot explain why lax /ɔ/ is realised as tense [o] word-finally.

2. **Proposal.** This paper proposes an alternative analysis according to which tensing is an indirect consequence of the loss of duration contrasts word-finally. Word-final positions are well known contexts for the neutralization of duration contrasts (Myers and Hansen, 2007). In languages where tense and lax vowels differ both quality- and duration-wise, word-final neutralization of duration contrasts results in tense-lax pairs differing only quality-wise. If this quality difference is not sufficient to support a phonemic contrast, speakers might be reluctant to maintain the contrast or listeners might fail to identify vowels correctly in this context, resulting in neutralization of tense-lax quality distinctions word-finally. The preference for tense vowels in case of loss of quality distinctions can be explained as an effect of vowel dispersion: tense vowels are more peripheral in the F1 x F2 space (Stevens, 1998) and therefore should be more distinct from each other than lax vowels. This account differs from the lengthening-based account because what matters here is not word-final lengthening per se but its effect on contrast distinctiveness.

3. **Predictions.** Prediction 1. The contrast-based account crucially predicts that word-final tensing should be observed only in languages where tense and lax vowels differ both in quality and duration. Languages that are reported to have word-final tensing in the literature happen to have tense-lax pairs differing in both quality and duration, with tense vowels being both more peripheral.
and longer than their lax counterparts (e.g. Stevens 1998 on Germanic and Gottfried and Beddor 1988 on [o]-[ɔ] in Standard French).

**Prediction 2.** In a language using duration as a cue for tense-lax contrasts and allowing tense and lax vowels both in _C# and in _, the difference in duration should be smaller in _ than in _C#. This prediction can be tested in varieties of French that allow some tense-lax contrasts in both contexts, i.e. Parisian French or Swiss French. In these varieties, [o] and [ɔ] contrast in _C# (as shown in (1b)) and [e] and [ɛ] in _ (as shown in (2)).

(2) Standard French tense-lax front vowels contrast word-finally

_# [e]-[ɛ] [vale] ‘valley’ [vale] ‘servant’

The contrast-based account predicts that the durational difference between [o] and [ɔ] in _C# should be larger than between [e] and [ɛ] in _. To test this hypothesis, we used the acoustic data collected in Nyon (11 speakers) and Neuchâtel (13 speakers) in Switzerland by PFC (Projet de phonologie du français contemporain; Andreassen 2003; Racine and Andreassen 2012). These data include a list of words read by the 24 Swiss speakers and with occurrences of [e e o ɔ] in the relevant contexts. The acoustic data were aligned automatically. Vowel duration, F1, and F2 were measured (F1 and F2 values were measured at vowel midpoint). Mixed-effects analyses were carried out, with duration, F1, and F2 as dependent variables and tenseness (tense vs. lax), context (_ vs. _C#), and geographic origin as fixed effects (with all interactions). The models also included by-speaker random intercepts and slopes for tenseness, context and their interaction. The results are compatible with the predictions of the contrast-based account. Quality distinctions are maintained both word-finally and before word-final consonants (for [e]-[ɛ] and [o]-[ɔ], respectively) but tense and lax vowels differ in duration only before word-final consonants (for [o]-[ɔ]): word-finally, tense vowels are not significantly longer than lax ones (for [e]-[ɛ]; see Figure 1).

4. Conclusion. This paper makes two main contributions: (i) it proposes a phonetically motivated account of word-final tensing and (ii) provides evidence for some key predictions of this account.

**References**


