Do Belgians reverse cross-linguistic trends to maintain phonological contrasts? A study of Belgian French final devoicing.

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This contribution investigates the phonetic realization of phonological voicing contrasts in the fricatives of Belgian French, compared with Hexagonal French. Maintaining voicing at the end of prosodic units is cross-linguistically challenging (e.g., Blevins, 2006). As French is a prototypical true-voicing language (e.g., Beckman, 2013) and allows both word-final stops and voicing contrasts in word-final position, French provides an ideal testing ground for investigating the mechanisms underlying the maintenance of voicing contrasts in final position (e.g., Jatteau, 2025).

To maintain voicing, speakers can circumvent the *Aerodynamic Voicing Constraint* by resorting to different strategies: (i) lengthening the preceding vowel, (ii), reducing the duration of the fricative or (iii) increasing the V/VC ratio (Ohala, 2011). These strategies have been shown cross-linguistically to support the maintenance of voicing in fricatives, particularly in final position. However, Belgian French has been described as a variety in which vowels are lengthened before fricatives when the fricatives are devoiced, with fricatives tending to be devoiced in syllable-final position (Hambye, 2005). However, no lengthening is expected when the fricative is voiceless. This thus raises the question of how durational and voicing cues are weighted and how they interact to convey the voicing contrast in Belgian French fricatives.

To answer this question, fricatives in syllable-final position were extracted from two corpora: the *Corpus de Référence du Français Parlé* for Hexagonal French (Delic, 2004; 36 hours of speech) and *VALIBEL* for Belgian French (Francard et al., 2009; 43 hours of speech). The data were force-aligned using the Montreal Forced Aligner (McAuliffe et al., 2017). A total of 24,867 fricatives in final position from 540 speakers were analyzed. The duration of the fricative, the duration of the preceding vowel, and the V/VC ratio were extracted. The voicing properties of the fricatives were assessed following the two-pass filtering method described in Al-Tamimi & Khattab (2018), allowing us to calculate the proportion of each fricative exhibiting voicing. All cues were speaker-normalized, and their weights were estimated via logistic regression.

The results show a significant interaction between country (Hexagonal vs Belgian French) and the weights assigned to duration and voicing cues. Marginal-effects analyses reveal that French speakers tend to follow the expected cross-linguistic pattern. The more a fricative is phonetically devoiced: i.e., the lower the proportion of vocal-fold vibration during the fricative, the shorter the preceding vowel, as shown by the increasingly lower orange line across the panels from left to right in Figure 1. In Belgian French, however, the pattern appears to be reversed: when a final fricative is devoiced, a longer preceding vowel is associated with a higher probability that the fricative is phonologically voiced (left panel in Figure 1). Conversely, when the fricative is voiced, the probability that it is phonologically voiceless also increases as the duration of the preceding vowel increases.

In conclusion, the results show that, in Hexagonal French, the correlation between voicing and durational cues is consistent with the phonetic principles used to maintain voicing. In contrast, the patterns observed in final fricatives in Belgian French are not accounted for by the same cue-weighting relationship. Belgian French speakers appear to encode phonological voicing in the duration of the preceding vowel and, consequently, in the V/VC ratio, making greater use of this cue when the fricative is devoiced. This suggests a cue-trading relationship between voicing and vowel duration (see Repp, 1982; Clayards, 2017).

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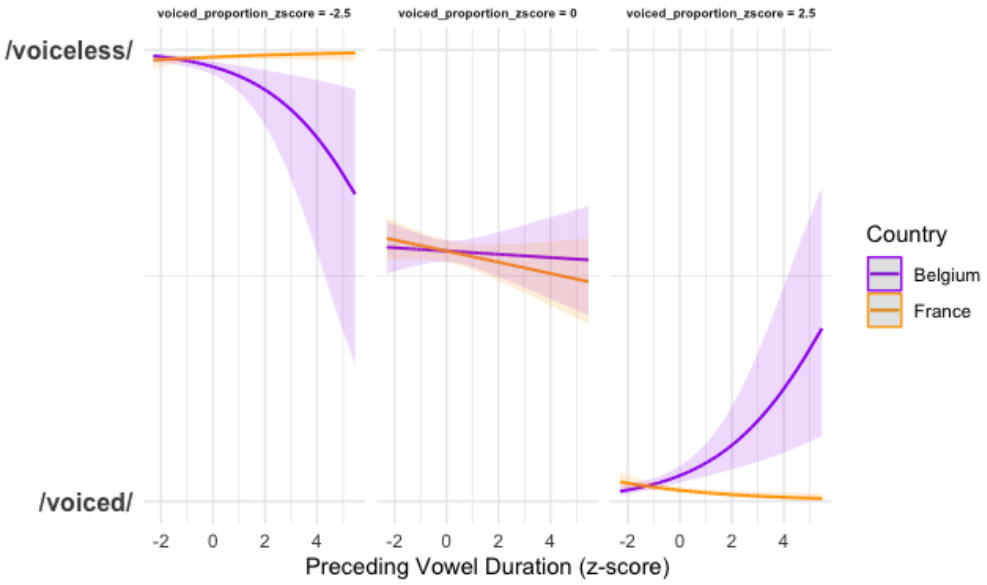


Figure 1: Predicted marginal effects of vowel duration and proportion of phonetic voicing on phonological voicing probability in Belgian and Hexagonal French.