

Year 2: End of year report

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1 Exploratory study on acoustic and articulatory properties of VC sequences in Italian and Polish

The following sections report a selection of results from the exploratory study run during year 1 and 2.

2 Results

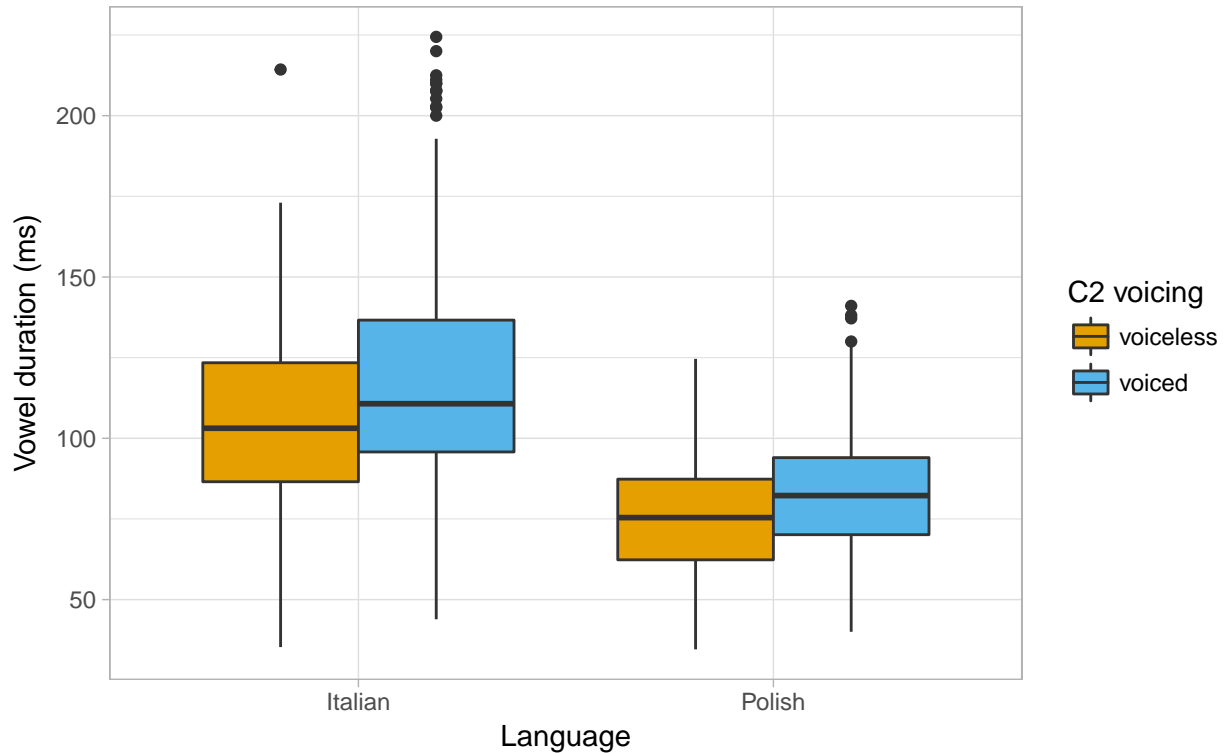
2.1 Acoustic durations

2.1.1 Vowel duration

As previously reported in @farnetani1986, @esposito2002, and @nowak2006, Italian and Polish show an effect of consonantal voicing on preceding vowel duration. Vowel are shorter when followed by voiceless stops, while they are longer when followed by voiced stops.¹

Vowel duration before voiceless and voiced stops

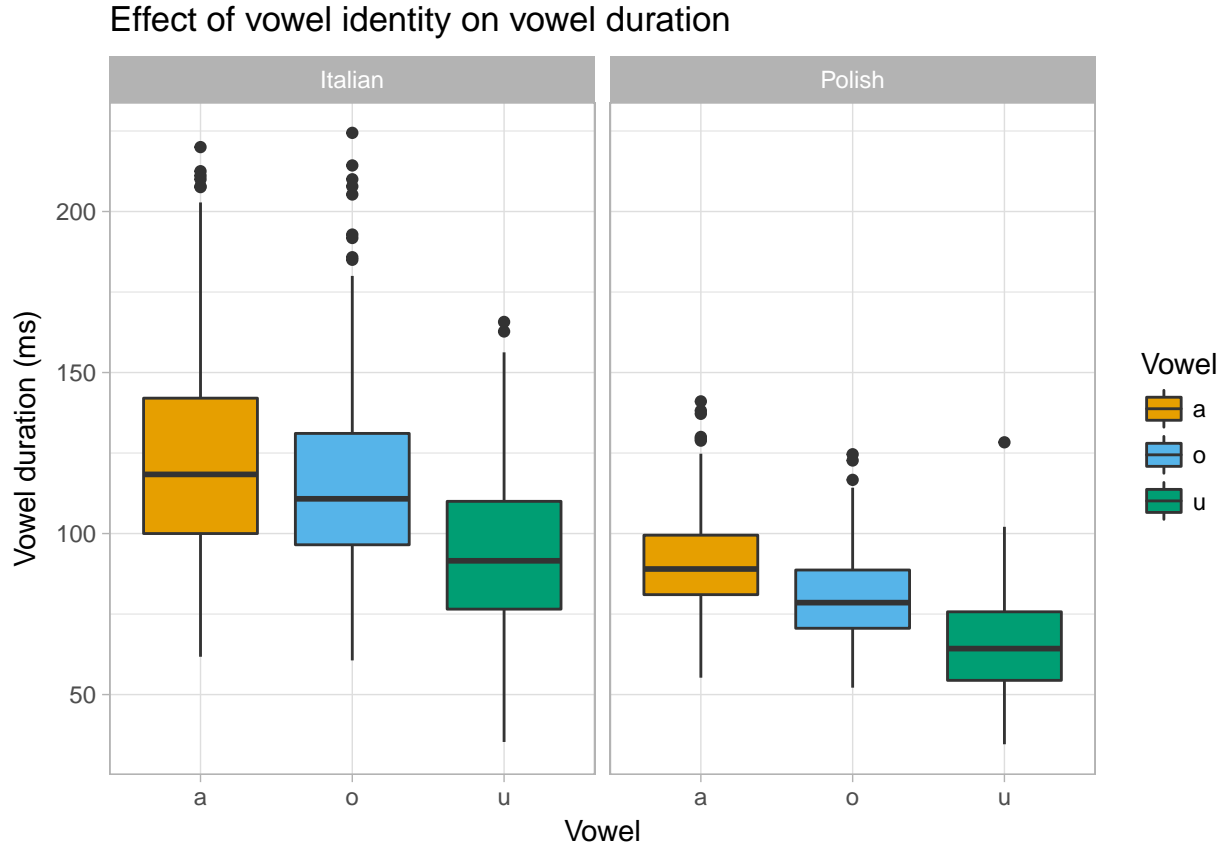
Data from 17 speakers (11 Italian, 6 Polish)



¹@farnetani1986 reported a ... ms effect in Italian, while @nowak2006 a ... ms effect in Polish.

According to linear mixed-effect models, vowels are about 15 ms longer when followed by voiced stops. Language does not have a significant effect on vowel duration, neither does an interaction between voicing and language.

Moreover, the identity of the vowel as an effect on vowel duration, a well-known but still not fully understood phenomenon []. Other things being equal, /a/ is longer than /o/, which is longer than /u/.

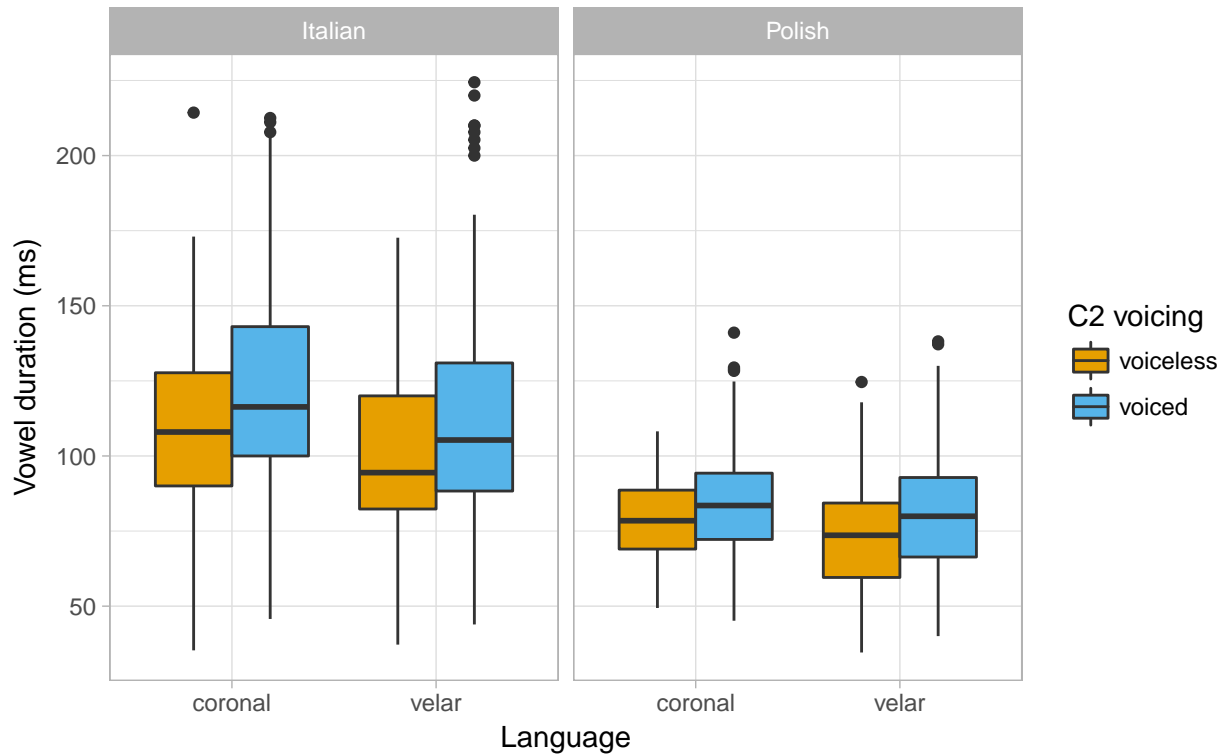


3 C2 closure duration

The closure duration of voiceless stops is 16 ms longer than that of voiced stops.

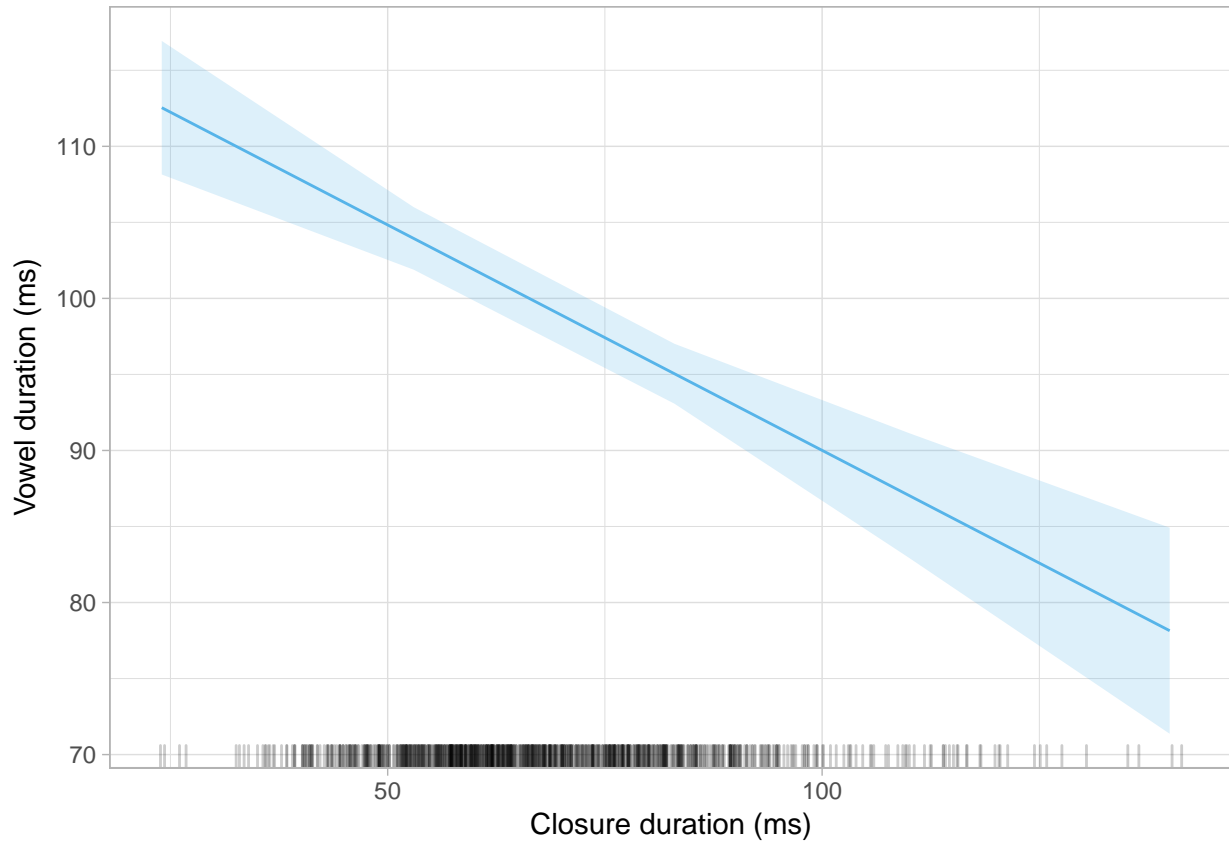
Vowel duration before voiceless and voiced stops

Data from 17 speakers (11 Italian, 6 Polish)



One of the accounts for explaining the voicing effect relies on the fact that vowel duration and closure duration are inversely correlated [1]. Vowels are shorter before voiceless stops, which have a longer closure, and, vice versa, vowels are longer before voiced stops, which have a shorter closure.

The correlation holds independently of the voicing of the consonant, such that, within a word, longer vowel duration correlates with shorter closure duration.



Based on this correlation, it has been claimed that the voicing effect is the product of a durational trade-off between the duration of the vowel and the duration of the closure of the following consonant. The trade-off would be brought about by the relative timing of the onset of closure. An earlier closure onset corresponds to a shorter vowel and a longer closure duration, while a later closure onset produces the opposite pattern, a longer vowel followed by a shorter closure.

The durational trade-off account rests on the assumption that there is a non-specified interval within which the trade-off is implemented. For the account to work, the said interval should not be affected by the voicing of the stop, in the sense that the duration of the interval should be invariant. To the best of my knowledge, previous studies failed to find such invariant interval. Although the syllable and word have been proposed as the invariant interval within which the trade-off happens, both units present problems when confronted with empirical data.

The data collected in this exploratory study bring new evidence in support to the trade-off account, by offering an invariant interval: the Release to Release interval (RR), i.e. the interval between the release of C1 and the release of C2 in CVCV words.