

A comparison of the voicing effect in Northern English, Italian and Polish

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Background. Vowels followed by voiced consonants are known to be longer than vowels followed by voiceless consonants (Mittleb 1982, Wells 1990). While most work on the so-called "voicing effect" has focussed on English, other languages have been investigated. However, direct cross-linguistic studies are lacking (with the exception of e.g. Laeuffer 1992 and de Jong 2002), which cast doubt on claims that the voicing effect is larger in English less empirically sound. Research on English monosyllabic words suggests that the voicing effect is so large that it may be considered 'phonologised' (a term whose interpretation depends on one's theoretical framework). On the other hand, Italian and Polish have been described as having a small voicing effect or none at all respectively (Farnetani & Kori 1986 and 24 ms in Esposito 2002, Slowiaczek & Dinnsen 1985, Nowak 2006, Malisz & Klessa 2008, Keating 1984a). This study is an attempt to contribute to the cross-linguistic comparison on the voicing effect in three languages reported to display different voicing effect magnitudes: English, Italian and Polish. It is argued that, while it is possible that the effect in Italian and Polish disyllabic words is smaller than that in English disyllabic words, a larger sample size is needed to reach higher levels of certainty.

Methods. We modelled vowel duration data from two studies (Coretta 2019a and Coretta 2019b). The studies contain data from disyllabic words from English, Italian and Polish, and monosyllabic words from English. We extracted the duration of the stressed vowels in the first syllable of each word, where the consonant following the stress vowel was either a voiceless or a voiced stop. We used custom Bayesian Gaussian model in Stan (Stan Development Team 2025). The model included logged vowel duration as the outcome (logging makes the model equivalent to a log-normal model), three intercepts of vowel duration before a voiceless stop in disyllabic words (one for each language), three coefficients for the voicing effect (one per language), one coefficient for the voicing effect in mono- vs disyllabic words in English, and one coefficient for the interaction between voicing and number of syllables in English.

Results and discussion. Figure 1 shows the expected values of the effect of voicing on vowel duration based on the model. According to the model, the ratio of vowel duration before voiced stops vs that before voiceless stops is, at 90% confidence, between 1.08-1.15 in Italian (disyllabic words), 1.06-1.15 in Polish (disyllabic words), 1.12-1.18 in English disyllabic words, 1.17-1.25 in English monosyllabic words. At 90% probability, the difference between the ratio in English mono- vs disyllabic words is 0.02-0.1, in Italian vs English disyllabic words is -0.09 to 0.01, in Polish vs English disyllabic words is -0.10 to 0.01, and in Italian vs Polish disyllabic words is -0.06 to 0.05. Overall, while we can be confident that the voicing effect ratio is positive (albeit small) across all contexts, and that the ratio is higher in English mono- than disyllabic words, there is a certain level of uncertainty regarding differences between Italian and Polish and between these and English. However, the fact that the CrIs of the Italian/English and Polish/English comparison are mostly negative suggests that the ratio in Italian and Polish disyllabic words might be smaller than that of

English disyllabic words. At 70% probability, the difference is entirely negative (70% CrI [-0.07, -0.01] for Italian-English and [-0.08, -0.01] for Polish-English). A larger sample size is needed to assess this further.

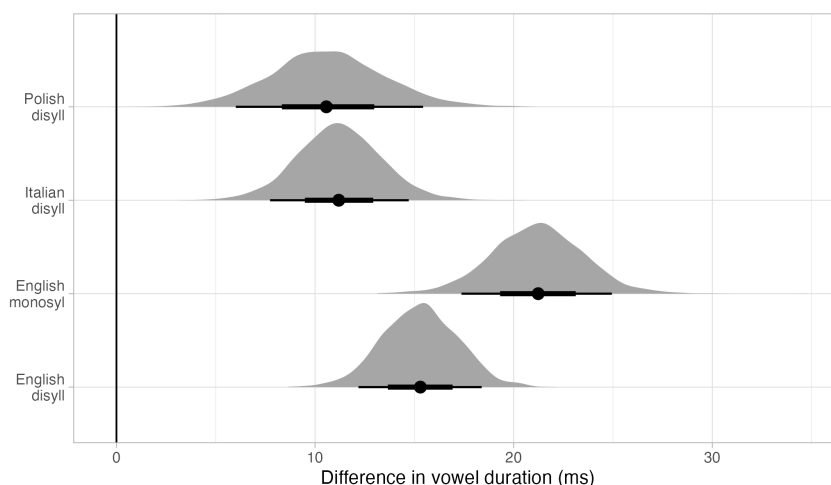


Figure 1. Expected values of the difference in vowel duration (in milliseconds) in four contexts, from a Bayesian model. Dot: median, thick line 66% CrI, thin line 95% CrI.