

The link between tongue root advancement and the voicing effect: an ultrasound study of Italian and Polish

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Abstract

In this paper I demonstrate that longer vowel duration before voiced stops is linked to another correlate of obstruent voicing, namely tongue root advancement. A wide variety of languages have been reported to show the so-called voicing effect, whereby vowels tend to be longer before voiced than before voiceless stops. Using acoustic and ultrasound data from eight speakers of Italian and Polish (reportedly a voicing-effect and a non-voicing-effect language respectively), I show that voiced stops produced with tongue root advancement correlate with a stronger effect of voicing on the duration of the preceding vowels. The results of this study indicate that, contrary to previous findings, both Italian and Polish have a voicing effect. Vowels followed by voiced stops are on average 22 ms longer in Italian and 8 ms longer in Polish. Crucially, the size of the voicing effect is greater in speakers producing voiced stops with root advancement compared to speakers without it, independent of their language. I suggest that the relationship between the size of the effect and tongue root advancement points to a new articulatory account of vowel duration as a covariate of voicing, by which root advancement is proposed as a plausible diachronic precursor of the voicing effect.

Introduction

This paper reports a previously undocumented link between tongue root advancement in the production of voiced stops and longer duration of the preceding vowels. Using ultrasonic data from speakers of Italian and Polish, I demonstrate that the presence of tongue root advancement correlates with that of the so-called voicing effect, whereby vowels tend to be longer before voiced than before voiceless stops. I further suggest that such correlation points to a new articulatory account of vowel duration as a covariate of consonantal voicing, by which tongue root advancement is proposed as a plausible diachronic precursor of the voicing effect.

An extensive number of studies show that vowels tend to be longer when followed by voiced obstruents than when they are followed by voiceless obstruents [?????????]. This phenomenon, known as the voicing effect, has been reported in a variety of languages, including (but not limited to) English, German, Hindi, Russian, Italian, Arabic, and Korean (see ? for a more comprehensive list). A common stance in the literature is that the magnitude of the voicing effect differs depending on the language (although see ?),

and that this phenomenon is not a universal tendency, since the duration of vowels is not affected by the voicing of the following obstruents in some languages, like Polish and Czech [?]. Although several attempts have been made to explain the voicing effect, an account that survives all empirical data is still lacking [??].

To provide a rationale for the language-specificity of the voicing effect, ? propose that the source of the effect is to be found in the perceptual system. They argue that speakers actively manipulate vowel durations to enhance the closure-duration difference which can cue the voicing distinction in obstruents. However, ? shows by means of perceptual experiments that speakers judge vowels to be longer if the consonant closure duration is increased, and that, conversely, consonant closure is perceived to be longer when vowel duration is increased. Fowler's experimental results thus challenge the premise that speakers exploit durational contrasts to enhance voicing distinctions.

In the light of the difficulties incurred by perceptual explanations, we have reason to seek an alternative account of the voicing effect with the following attributes: (1) it allows for a language-specific implementation of the voicing effect, and (2) it places the source of the effect in articulatory properties of voiced or voiceless obstruents that could favour longer or shorter vowel durations. One of the first articulatory accounts to be

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