Effects of morphology on consonant assimilation: Evidence from ultrasound imaging

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consonant clusters, place assimilation, articulation, ultrasound imaging, Polish

Introduction

The objective of the talk is to present articulatory data on place assimilation in two-member consonant clusters C1C2 in Polish. Our research question focuses on whether the degree of assimilation in consonant sequences depends on the morphological composition of clusters under consideration. We test the hypothesis that the more transparent the morphological boundary, the lower the degree of assimilation in casual speech. Although it is a well established fact that casual speech processes are affected by the morphological composition of words (Shockey 2003) and that morphology contributes to phonotactic complexity (Dressler and Dziubalska-Kołaczyk 2006), the effect has not been studied in articulation. Early articulatory work on Polish involved X-rays (Koneczna & Zawadowski 1951; Wierzchowska 1967), while recent studies on the gestural coordination of clusters were related to syllable parses (Hermes et al. 2017; Mücke et al. 2010). The present study fills the gap by providing detailed kinematic measures of the tongue body and the root using 3D/4D ultrasound images.

Data and procedure

Stimuli were words and phrases containing C1C2 clusters composed of anterior fricatives and affricates, with C1 represented by /s z/ and C2 by /ɕ ʑ tɕ dʑ/. Five types of stimuli were designed depending on the presence and strength of a morpheme boundary within the clusters: (1) intramorhemic C1C2 (e.g. /zdʑ/ *Zdzisiek* – proper noun), (2) containing a weak morpheme boundary (e.g. /z-ʑ/ *zziajany* 'breathless'), (3) a strong morpheme boundary (e.g. /zdʑ/ *roz+dzielić* 'distribute'), (4) a clitic boundary (e.g. /s++ɕ/ *przez siostrę* 'by a sister') and (5) a word boundary (e.g. /s#ɕ/ *włos siwy* 'a grey hair'). All the test words were controlled for frequency using the *plTenTen19* corpus available in *Sketchengine* (4.3 billion words).

The data were collected from 8 native speakers of Polish. The test items were first presented in phrases (e.g. *Zdzisiek pali* 'Zdzisiek is smoking') on the screen. The task was to remember the phrase and embed it into a carrier sentence *One mówiły...* 'they said' at a regular and fast pace. The data were recorded with the Philipps EpiQ7G system using an xMatrix x6-1 digital 3D transducer secured under the chin using an Articulate Instruments ultrasound stabilization headset. In the evaluation of the ultrasound images, we measured the relative fronting, raising and fronting+raising using a custom Matlab toolbox *WASL.*

Results

The results of the study show that consonant assimilation in Polish is morphologically-driven. First, we demonstrate that the stronger the morphological (or word) boundary, the weaker the assimilation of dental /s z/ in C1 to palato-alveolar /ɕ ʑ/ in C2. The strongest assimilation is observed in the intramorphemic context, while word-final C1 is rarely assimilated at the C1#C2 juncture. Second, assimilation is stronger in items produced at a faster pace. The findings contribute to our better understanding of the mechanics of consonant assimilation in terms of the coordination of articulatory gestures. Moreover, they provide new insights into the morphonotactic complexity of Polish.

Word count: 480