

The articulatory characteristics of harmonic and disharmonic laterals in Turkish

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Background: The Turkish alveolar lateral approximant /l/ has been described as having two surface realizations – one similar to a dark [ɫ], and a second similar to a light [l] (Clements & Sezer, 1982; Levi, 2001; Özçelik & Sprouse, 2017). The alternation between these two realizations interacts with vowel harmony. In word root final position, if the preceding vowel is front (i.e. /i, y, e, œ/), then the following lateral will be a light [l] followed by front vowels in the affixed morphemes (e.g. *el-de* [el.de] ‘hand-LOC’). Conversely, if the stem-final vowel is back (i.e. /ı, u, a, o/), then the lateral will surface as a dark [ɫ], and followed by back vowels in the subsequent suffixes (e.g. *kol-da* [kol.da] ‘arm-LOC’). These lateral segments are considered transparent to vowel harmony, because incoming harmony from previous segments determines how the lateral will be produced and continues through to the following vowels. Thus, they are referred to as Harmonic Dark [ɫ] and Harmonic Light [l].

However, laterals in borrowed words behave differently. /l/ in word roots that were borrowed from languages like Arabic and French does not alternate with vowel harmony. Instead, it is always produced as light [l] despite the presence of a preceding back vowel (e.g. *hal* [hal] ‘situation’). Moreover, the vowels in the following suffixes are realized as front vowels (e.g. *hal-de* [hal.de] ‘situation-LOC’), blocking back vowel harmony. This sound is referred to as the Disharmonic Light [l] herein.

While two phonological explanations of this phenomenon have been offered in the previous literature—one that is based on feature geometry (Clements & Sezer, 1982; Özçelik & Sprouse, 2017) and the other proposing a two-lateral system (Levi, 2001)—both rely on impressionistic observations of the production of these sounds; there are no articulatory descriptions of Turkish laterals. The present study investigates the articulatory and acoustic characteristics of Turkish laterals. We aim to provide phonetic support for the phonological phenomenon and fill the gap in knowledge regarding lateral production in Turkish.

Methods: There were three female and three male subjects between ages 27 and 35 in this study. All participants spoke Turkish as a native language. Four of the subjects (Female 1, 2, 3, and Male 3) were from Western Turkey. The remaining two subjects (Male 1, 2) were Turkish-Kurdish bilingual brothers from Eastern Turkey, near the border with Syria. It is important to note that Kurdish is a non-Turkic language that does not have vowel harmony nor a disharmonic lateral.

The stimuli were comprised of real words that had harmonic and disharmonic laterals. These words were displayed in the carrier phrase *Mustafa bana ____ dedi* ‘Mustafa said ____ to me’ on a screen from which the participants read aloud.

The articulatory characteristics of the Harmonic Dark-Light and Disharmonic Light laterals in Turkish were recorded using a combination of 3D/4D ultrasound.

The ultrasound images were used to determine the tongue surface shape in contraposition to the palate. Data were visualized for analysis using a custom MATLAB toolbox.

Results and discussion: Figure 1 displays the average 3D tongue surfaces for the Harmonic Dark, Harmonic Light, and Disharmonic Light lateral sounds as produced by a female speaker of Western Turkish. Figure 2 represents these same sounds as produced by a male speaker of Eastern Turkish.

The Harmonic Dark [ɫ] (red) is produced by both speakers with

an occlusion between the tongue blade and the alveolar ridge, a low tongue body in the oral cavity, and a retracted tongue root. In contrast, the Harmonic Light [l] (blue) is produced by both speakers with an occlusion between the tongue blade and alveolar ridge, a high tongue body in the oral cavity, and a more advanced position for the tongue root.

The Disharmonic Light [l] (green) is produced identically to the Harmonic Light [l] for the speaker from Western Turkey. For the Eastern Turkish speaker, it is produced between the Harmonic Dark [ɫ] and the Harmonic Light [l]; The tongue body is not as high as it is in the Harmonic Light [l], nor as low as the Harmonic Dark [ɫ]; the back of the tongue is not as advanced as it is in the Harmonic Light [l], nor as retracted as the Harmonic Dark [ɫ].

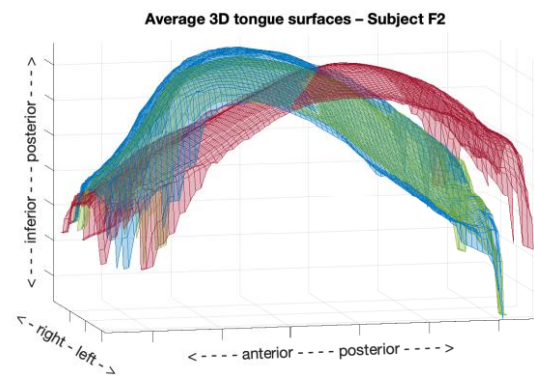


Figure 1: Average tongue surfaces for a female speaker of Western Turkish

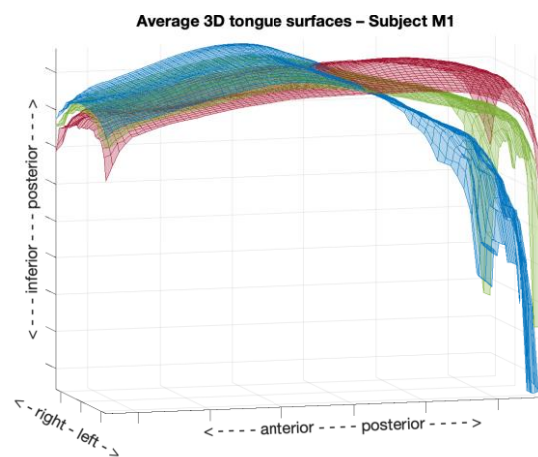


Figure 2: Average tongue surfaces for a male speaker of Eastern Turkish

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