

Syllabic harmony in Turkish

Mehmet Can Dadan*, Alper Canberk Balçı, Furkan Dikmen† & Stefano Canalis*

*Boğaziçi University, †Université Côte d’Azur, CNRS, BCL

Vowel harmony is routinely described as an assimilation process operating across vowels. In this paper, we propose an alternative perspective on Turkish vowel harmony, drawing inspiration from van der Hulst (2018) and Johanson (2022): harmonic features are associated with entire syllables, and vowel harmony is better understood as a process occurring among syllables. This approach offers a compelling explanation for why vowel harmony appears to non-locally skip intervening consonants. If harmony operates among adjacent syllables, it is always local; furthermore, consonants are not skipped, as they share the harmonizing feature(s) with their tautosyllabic vowel. We argue that this hypothesis also accounts for several specific aspects of Turkish vowel harmony that would otherwise require additional stipulations or remain unexplained. These include asymmetries in the distribution of plain and palatalized consonants, seemingly contradictory directionality requirements, and aspects of the phonetic implementation of consonants. With regard to the latter point, we present articulatory evidence supporting the existence of rounding harmony in consonants.

Asymmetric distribution of plain and palatalized consonants. Our empirical starting point is the well-documented observation that many Turkic languages exhibit ‘intrasyllabic’ (Johanson 2022) front vs. back harmony: frontness/backness is a feature of whole syllables. In Turkish, this is especially evident with velar and lateral consonants (Clements and Sezer 1982): they are always palatalized next to tautosyllabic front vowels (1a), whereas plain velars and velarized laterals can only be found adjacent to tautosyllabic back vowels (1b).

- (1) a. *kel* ‘bald’ [k^jel^j] b. *kol* ‘arm’ [koɫ]

Contrastively palatalized consonants occur next to a back vowel in a few roots (2a).

- (2) a. *alo* ‘alo’ [aɫ^jo], *kar* ‘profit’ [k^jaɾ] b. *[keɫ]

At first glance, this seems to contradict the hypothesis that palatalization is always a syllable-level feature. However, closer analysis shows that the distribution of these consonants is not entirely unrestricted: velar stops and velarized laterals never occur in syllables headed by a front vowel (2b). We assume that palatalization (as well as rounding) are privative properties, i.e. the features [Front] and [Round]: front and rounded vowels enforce the surrounding consonants to be palatalized and/or rounded, while syllables headed by back/unrounded vowels lack a syllable-level specification. This correctly predicts that contrastively palatalized consonants can occur if their tautosyllabic vowel is back (2a), while velar stops and velarized laterals cannot occur if their tautosyllabic vowel is front (2b).

Directionality. Left-to-right directionality is an inherent property of Turkish VH. Since some suffix vowels are opaque, describing harmony as root-controlled is not always sufficient to predict the correct target vowel in the presence of such vowels. For instance, alternating vowels between two opaque suffix vowels assimilate to the opaque vowel to its left: in (3) the penultimate vowel is front and unrounded as the preceding opaque /i/, and unlike the following back and round opaque /o/.

- (3) *yapabiliyor* ‘he/she can do’ [jap-abil-ijor] /jap-Abil-Ijor/

Yet, word-initial consonants are palatalized when followed by a front vowel – cf. (1a) – seemingly showing right-to-left assimilation. However, if Turkish harmony consists in a syllable-level left-to-right assimilation of [Front], both progressive vowel harmony and regressive consonant harmony can be explained by the same mechanism.

Phonetic implementation of consonants. Our hypothesis makes specific predictions regarding the phonetic realization of consonants: consonant palatalization and/or rounding are applied to all consonants in a [Front] and/or [Round] syllable. Palatalization in all consonants occurring in a [Front] syllable was already reported in Waterson (1956) using palatographic data. Regarding secondary rounding, unlike secondary palatalization, it is not contrastive for any Turkish consonant. However, our hypothesis predicts an allophonic ‘intrasyllabic’ rounding harmony: lip rounding should either extend throughout the entire syllable or be entirely absent. Boyce (1990) did find that Turkish speakers maintain continuous lip rounding in consonants surrounded by rounded vowels. Moreover, previous descriptive work has reported ‘bilabial’ allophones [ɸ, β] for the labio-dental fricatives /f, v/ (Göksel and Kerslake 2005; Erguvanlı Taylan 2015). First, the distribution of these continuants is syllable-based: they appear word-initially before rounded vowels (4a-5a), medially when they are (4b-5b) preceded by a rounded vowel and followed by a consonant or (4c-5c) intervocalic and followed by a rounded vowel, and (4d-5d) word-finally after a rounded vowel – basically, whenever their tautosyllabic vowel is [Round].

- | | | | |
|-----|---|-----|-------------------------------------|
| (4) | a. <i>funda</i> ‘heather’ [ɸunda], | (5) | a. <i> vur</i> ‘hit’ [βur], |
| | b. <i>köfte</i> ‘meatball’ [k ^j øɸte], | | b. <i>kovmak</i> ‘to fire’ [koβmak] |
| | c. <i>küfür</i> ‘swear’ [k ^j yɸyɾ], | | c. <i>tavuk</i> ‘chicken’ [taβuk] |
| | d. <i>kof</i> ‘hollow’ [koɸ] | | d. <i>söv</i> ‘swear’ [søβ], |

Second, in line with our hypothesis, they seem to share the lip rounding of their tautosyllabic vowel. We processed video data of lip gestures of Turkish speakers using pre-trained models with Dlib (King 2009) and OpenCV (Bradski 2000), which allowed us to extract frames, detect lip landmarks, and visually annotate them. Our data suggest that the so-called ‘bilabial’ continuants of Turkish are likely a labiodental articulation with added lip rounding, resulting in labialized labiodentals, as during their production upper incisors are never fully covered by lips, and lips show rounding and protrusion (Fig. 2).

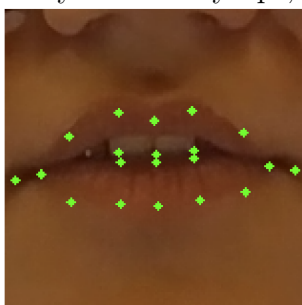


Figure 1: Offset of /f/ in *kafa* ‘head’.

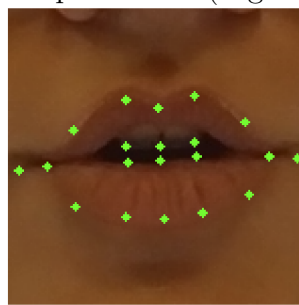


Figure 2: Offset of /f/ in *ufuk* ‘horizon’.

References

- Boyce, S. E. (1990). Coarticulatory organization for lip rounding in Turkish and English. *Journal of the Acoustical Society of America*, 88:2584–2595.
- Bradski, G. (2000). The OpenCV Library. *Dr. Dobb’s Journal of Software Tools*.
- Clements, G. N. and Sezer, E. (1982). Vowel and consonant disharmony in Turkish. In van der Hulst, H. and Smith, N., editors, *The Structure of Phonological Representations*, volume 2, pages 213–255. Foris, Dordrecht.
- Erguvanlı Taylan, E. (2015). *The Phonology and Morphology of Turkish*. Boğaziçi University Press, İstanbul.
- Göksel, A. and Kerslake, C. (2005). *Turkish: A Comprehensive Grammar*. Routledge Comprehensive Grammars. Routledge, London.
- Johanson, L. (2022). The Structure of Turkic. In Johanson, L. and Éva Á. Csató, editors, *The Turkic Languages*. Routledge, 2nd edition.
- King, D. E. (2009). Dlib-ml: A machine learning toolkit. *Journal of Machine Learning Research*, 10:1755–1758.
- van der Hulst, H. (2018). *Asymmetries in Vowel Harmony: A Representational Account*. Oxford University Press, Oxford.
- Waterson, N. (1956). Some aspects of the phonology of the nominal forms of Turkish words. *Bulletin of the School of Oriental and African Studies*, 18:578–591.