

Palatalized Turkish consonants and vowel harmony

Stefano Canalis – Furkan Dikmen
Boğaziçi University

Introduction and problem. Vowel harmony is one of the most studied and well-known aspects of Turkish grammar, and probably the most studied aspect of Turkish phonology. Yet, some of its properties are still not wholly clear. The goal of this paper is to discuss a seemingly exceptional disharmonic pattern in Turkish vowel harmony, i.e. the occurrence of front vowels after some stems ending in a back vowel followed by a consonant or consonant cluster. We will also report the results of a phonetic survey and discuss its implications for the analysis of vowel disharmony.

Some consonant-final Turkish stems (mostly loanwords, and hereafter called “irregular” stems) select suffixes with front vowels in spite of having a back vowel in their final syllable (e.g. *petrol* ‘fossil oil’ – *petrol-ü* ‘acc.’, *saat* ‘clock’ – *saat-ler* ‘pl.’, *harp* ‘war’ – *harp-te* ‘loc.’), thus seemingly violating vowel harmony (or at least palatal harmony – rounding harmony is regular also in these words, as e.g. *petrolü* shows). The analysis of ‘irregular’ stems ending in a lateral is actually fairly straightforward and uncontroversial; that consonant is a palatalized lateral [lʲ] (or a palatal lateral [ɭ], according to some sources – we believe that ‘palatalized lateral’ is a phonetically more accurate description; however, either description is compatible with our analysis of its phonological properties). Palatalization is contrastive in Turkish laterals (e.g. [solʲ] *sol* ‘G note’ vs. [soɫ] *sol* ‘left’), implying that a word such as [solʲ] ends in a consonantal phoneme with a [–back] underlying secondary articulation. They can therefore function as blockers of [+back] spreading and start their own [–back] harmony domain over suffix vowels (this is basically the hypothesis put forward by Clements & Sezer 1982, and more recently by Levi 2001). However, the ‘irregular’ stems ending in a non-lateral consonant (*saat*, *harp* and so on) are much more problematic because, apparently, they are not (unequivocally) palatal(ized). At least three different approaches are conceivable.

1. According to Avar (2015), Turkish has more vowels than the eight which are standardly assumed; in the acoustic data she collected the vowel (usually low and unrounded) in the last syllable of the ‘irregular’ stems appears to be phonetically front, when compared to the vowel in e.g. *kat* ‘floor’ (and so it should be transcribed as [a̟]). This would make the vowel [–back], and front vowels in the following suffixes would just be a regular case of vowel harmony. However, this analysis leaves unexplained why similar vowels preceded by a palatal consonant (such as in [cʰaɾ] *kâr* ‘profit’) do not trigger palatal harmony (*kâr-ı*, ‘acc.’), and why they can never occur in absolute word-final position.

2. According to Clements and Sezer (1982), final consonants in ‘irregular’ stems are underlyingly palatal(ized), just like /lʲ/, and thus [–back]. Consequently, the analysis is the same as that for final /lʲ/: the stem-final [–back] specification starts its harmonic domain, the only crucial difference being that palatalization is supposedly neutralized word-finally in non-lateral consonants.

3. A further hypothesis, adopted here, is that *all* final consonants in the ‘irregular’ stems, not only /lʲ/, are phonetically palatalized also when word-final. If it were true, it would allow to avoid a certain amount of circularity present in Clements and Sezer’s (1982) analysis: they explain [–back] vowels in suffixes assuming a preceding underlying palatalized consonant, but the only empirical justification they provide for assuming palatalization in (non-lateral) consonants is the very presence of [–back] vowels in the following suffixes.

Presence of palatalization in the final consonant of e.g. *saat* has indeed been reported on the basis of articulatory data already by Waterson (1956), and is a possibility mentioned by Clements and Sezer (1982: 242) at least “for some speakers”. However, we are not aware of any systematic acoustic analysis on the palatalization (or lack thereof) of these stem-final consonants. Such an analysis would provide the crucial data to confirm or dis-confirm hypothesis 3.

Experiment. With this goal in mind, a list of 14 ‘irregular’ stems was created, and then each of them was matched with a corresponding ‘regular’ stem having the same last vowel, but ending with a plain consonant (*had* ‘limit’ – *hat* ‘line’, *yar* ‘lover’ – *yar* ‘to split’, and so on). 15 native Turkish speakers were asked to read these words within a carrier sentence. We investigated differences between the stems’ final vowels as well as between their final consonants. With regard to the vowels, their F₂ value at vowel onset, center and offset was measured: if the vowel of e.g. *had* were more advanced than that in e.g. *hat*, it would be expected to have a higher F₂. With regard to the consonants, F₁ and F₂ values at

the onset of the following vowel in the carrier sentence were measured for stops: if the stem-final consonant in e.g. *had* had a secondary palatal articulation, the formant transition of a following vowel would be expected to start with a lower F_1 and higher F_2 value than if the previous word were e.g. *hat*. As for sonorants, their F_1 and F_2 values at onset, center and offset were measured.

Results and analysis. Compared to ‘regular’ stems ending with a plain consonant, the final stop consonants of ‘irregular’ stems are associated with a significantly higher F_2 value (see Fig. 1) and, to a lesser degree, a lower F_1 value at the onset of a following vowel, with usually a clearly different formant transition (see Fig. 2). These findings are expected if the final consonant of the ‘irregular’ stems has a palatal secondary articulation. Similarly, stem-final sonorant consonants have lower F_1 and higher F_2 values in ‘irregular’ stems than in ‘regular’ ones.

Vowels were also found to have a somewhat higher F_2 in ‘irregular’ stems than in ‘regular’ ones. However, while their offset has a higher F_2 value than in ‘regular’ stems, the difference fairly rapidly decreases at the center of the vowel, and at vowel onset F_2 values are very similar in both ‘regular’ and ‘irregular’ stems. Furthermore, we also included in our experiment one word having a prevocalic palatal consonant, i.e. *kâr* ‘profit’, and we observed the pattern of F_2 to be the opposite: highest F_2 at vowel onset, and then decreasing values through the vowel. This suggests that, while a certain amount of fronting is a phonetic reality in the final vowel of ‘irregular’ stems, it can be more economically explained as the result of phonetic co-articulation with the preceding/following palatalized consonant than as a phonological [–back] specification of the vowel. On the contrary, formant patterns in consonants tended to remain relatively stable across their whole duration. Finally, we also found some speakers realizing a clearly plain, unpalatalized final consonant in some supposedly ‘irregular’ stems. However, this is a case of regularization rather than of phonological exceptionality: the same speakers also produced back-vowel suffixes in the inflected forms of these words.

Conclusions. The empirical results of our experiment suggest that Turkish has more underlyingly palatalized consonants than usually assumed, at least in word-final position: not only /i/, but also for example /ti/ in e.g. *saat*, or /ri/ in e.g. *yar* ‘lover’. This conclusion is motivated by the formant values and patterns in our data, which seem to imply the presence of a palatal secondary articulation in these consonants. Palatal(ized) consonants being phonologically [–back], they can block a harmonic domain and start their own domain over the following suffix vowels. Vowels in ‘irregular’ stems are indeed slight fronted, but their fronting is best accounted for in terms of phonetic co-articulation rather than as an underlying phonological property of these vowels.

References

- Avar, Begüm. 2015. ‘Save Harmony! – Rebellious Roots Troubling GP’. Poster presented at the 12th Old World Conference in Phonology (OCP12), Barcelona, 27-30 January 2015.
- Clements, G.N. & Engin Sezer. 1982. ‘Vowel and Consonant Disharmony in Turkish’. In Harry van der Hulst & Norval Smith (eds), *The Structure of Phonological Representations (Part II)*. Dordrecht, Foris Publications: 213-255.
- Levi, Susannah V. 2001. ‘Glides, Laterals, and Turkish Vowel Harmony’. In Mary Andronis, Christopher Ball, Heidi Elston & Sylvain Neuvel (eds), *CLS 37-1: The main Session: Proceedings from the Main Session of the Thirty-seventh Meeting of the Chicago Linguistic Society*. Chicago, Chicago Linguistic Society: 379-393.
- Waterson, Natalie. 1956. ‘Some Aspects of the Phonology of the Nominal Forms of the Turkish Word’. *Bulletin of the School of Oriental and African Studies*, 18(3): 578-591.

