On how and why vowel harmony decays

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32a.1 Introduction

Phonetic coarticulation as well as misperception have been linked to the emergence of vowel harmony (Öhman 1966; Ohala 1994a, b; Przezdziecki 2005). This link, however, does not explain the ways that phonological vowel harmony may change. This subchapter lays out some observations about how and why vowel harmony patterns may change. Although the focus here is on decay, the mechanics discussed below also provide plausible pathways for the emergence of harmony if we assume a symmetrical model of emergence and decay in harmony. A symmetrical model of change provides a way to understand the various types of restricted harmony patterns that exist somewhere in between phonetic coarticulation and robust, iterative harmony without requiring access to historical data. In the absence of historical and textual data, the analyst may wonder whether the pattern in question is moving toward canonical harmony or away from it. If symmetry is assumed, the pathways are analagous to an out-and-back hike up a mountain. In an out-and-back hike, one encounters the same things coming down that were seen on the way up, as opposed to a loop hike, where the scenery changes throughout the hike. Throughout this subchapter I lay out some paths down the mountain from harmony back to phonetics, and where possible, connect these with evidence from the trip up the mountain from phonetics in the emergence of harmony.

32a.2 How: The mechanics of change

There are at least four pathways along which harmony may change. The first is lexically-specific change. Anderson (1998) observes that rounding harmony in Old Turkic was lexically conditioned. We can observe in Turkic a range of behavior, ranging from almost exceptionless harmony in Kyrgyz, to lexically specific behavior in Chaghatai (Eckmann 1966:33-36;

Bodrogligeti 2001:15-16) and modern Uzbek (Jarring 1937; Ibrohimov 1967; Reshetov and Shoabdurahmonov 1978; Razhabov 1996). In Chaghatai, the historical predecessor of Uzbek, roughly half of [+high] suffixes underwent harmony, whereas the number of suffixes that alternate for round is much smaller in most contemporary Uzbek dialects, and notably absent from the standard written variety. Thus, in one direction harmony may obtain throughout the lexicon via diffusion, while in the other direction successively fewer affixes are subject to harmony (see Harrison and Kaun 2003 for a very lexically-restricted pattern in Namangan Tatar). Another instance of lexically-specific decay is seen in the Kwa language, Avatime. Whereas the sister languages Tafi and Tutrugbu both exhibit prefix-initiated progressive rounding harmony (Bobuafor 2013; McCollum and Essegbey to appear), Avatime does not, except the recurrent prefix alternates for rounding among older speakers (Defina 2016:56).

Additionally, harmony may change by augmenting or reducing the domain of application (see also ch. 4i). In Southern Crimean Tatar, rounding harmony affects all non-initial high vowels while in the Central dialect, harmony obtains only on the second-syllable. In the Northern dialect, rounding harmony is completely absent, and in many cases, high rounded vowels in the initial syllables are optionally unrounded (Kavitskaya 2010). These dialectical differences are evident in forms like burun-lu (Southern), burun-lɯ (Central), and burɯn-lɯ ~bɯrɯn-lɯ (Northern) 'nose-ADJ'. As another example, both proto-Uralic and proto-Finnic have been constructed with robust vowel harmony, but harmony is now reduced or absent in some modern Finnic languages (Janhunen 1982; Binnick 1991). In Southern Veps for instance, frontness harmony applies to second and optionally to third-syllable vowels only, and in Central and Northern Veps, harmony is completely lost (Zaiceva 1981). Southern Veps and Central Crimean Tatar thus constitute intermediate cases between full harmony and no harmony. To my knowledge, there are no convincing cases of harmony domains whereby *n* vowels are assimilated, unless $n = 1$, i.e. non-iterative harmony. If harmony may emerge or decay by changes by domain of application, and if *n*-ary syllable-counting domains are possible, a language might innovate a four-syllable window for harmony from a prior two-syllable window, or something similar. The lack of this bounded iterativity (see also ch. 4i.3) suggests that domain changes in harmony are not incremental, but rather evolve from non-iterative to iterative within some domain. Similarly, harmony appears to decay from iterative to non-iterative, as in Central Crimean Tatar, bypassing any intermediate domains between the two.

Changes in the domain of application is also closely connected to increased variability and/or gradience in harmony. By variability, I mean optionality, as in the optional assimilation of third-syllable vowels in Southern Veps or the optional unrounding of high vowels in Northern Crimean Tatar. I use the term gradience specifically to refer to incomplete subphonemic assimilation of a target vowel. Recently, backness harmony in Kazakh and Uyghur has been shown to be gradient (McCollum 2019a,b). I found that in these languages the backness of words like the Kazakh form [qɯs-ɯm-dɯ] 'winter-POSS.1S-ACC' diminishes monotonically while front vowel words, e.g. [tɪs-ɪm-dɪ] 'tooth-POSS.1S-ACC' exhibit no shifts in backness. In these instances harmony partially assimilates all targets rather than categorically assimilating some subset of targets and leaving the rest unaffected.

Finally, harmony may change when the featural conditions for harmony become more or less restricted. The common Turkic pattern of rounding harmony involves the assimilation of high vowels. However, rounding harmony in some Turkic languages augments the size of the featural space controlled by harmony by assimilating some non-high vowels, as well. Compare Turkish [tyrk-ler] with no harmony to its equivalent in Kyrgyz [tyrk-tør] 'Turk-PL'. If the feature space is divided in terms of target height and backness, with an additional dimension for trigger height, Turkish rounding harmony operates over only the topmost half of the diagram while Yakut exploits a larger portion of the featural space in Table 32a.1 (see also Kaun 1995, 2004; ch. 4b). Consider also the pattern in Kachin Khakas, a South Siberian Turkic language, where rounding harmony only targets high vowels if the trigger is also high.

Table 32a.1: A schematic representation of rounding harmony in Turkish, Yakut, and Kyrgyz

Target height	Trigger height	Turkish		Yakut		Kachin Khakas	
		[-bk]	[+bk]	[-bk]	[+bk]	[-bk]	[+bk]
[+hi] target	[+hi] trigger	✓	✓	✓	✓	✓	✓
	[-hi] trigger	✓	✓	✓	✓		
[-hi] target	[+hi] trigger						
	[-hi] trigger			✓	✓		

The Yakut and Kachin Khakas patterns schematized in Table 32a.1 demonstrate that changes in the operation of harmony may result in the augmentation or reduction of the featural space exploited by harmony. In these terms, the most robust type of harmony would subject the entire feature space to harmony. As an excellent case study of featural asymmetries and their relevance

for language reconstruction and diachrony as it relates to Bantu height harmony, see Hyman (1999).

32a.3 Why: The causes of change

In the previous section I surveyed some ways in which a harmony pattern may change, but in this section I attempt to lay out some of the reasons why a pattern may change. This is a fundamentally more challenging task, and the forces that result in change are numerous. I group these forces into two categories, external and internal.

32a.3.1 External factors

One commonly encounters the claim that harmony decay is directly related to the influx of loans. Among external forces undermining harmony, this appears the least convincing. As Harrison et al. (2002) discusses, even in a language saturated with loans, this is effect is not likely, in and of itself, to compel decay. Similarly, Binnick (1991) observes that in the majority of cases, loans do not drastically affect the operation of harmony in Uralic and Turkic, since the final vowel of the loan controls the realization of following suffixes, just like the native pattern. For instance, after the Turkish loan [mikrop] 'microbe' backness and rounding harmony proceed as usual from the root-final vowel to following suffixes [mikrop-lar] 'microbe-PL' and [mikrob-u] 'microbe-POSS.3S'. Thus, it is not likely that loans can dismantle an operative harmony system.

In addition, it is often noted that different loans from different time periods are treated differently. While these differences may reveal grammatical differences between the relevant time periods, this is more likely indicative of differing social factors. Harrison et al. (2002) notes that Russian loans adopted in the 18th and 19th centuries were typically repaired to obey Tuvan phonotactics whereas more recent loans are not repaired. These differences in loan adaptation also coincide with significant differences in Russian language policy. Earlier Imperial practice differs substantially in its practice and the tools at its disposal when compared to later, 20th century Imperial and Soviet practice, whose goal, as observed in Weinreich (1953) was complete assimilation (see also Dave 1996; 2004; Fierman 1998 for discussion related to Russian influence on Kazakh).

In some cases, decay of vowel harmony has occurred among speakers from a subordinate group as a result of a dominant contact language. For instance, the Slavic contrast in consonantal palatalization has affected the harmony patterns in Karaim and Crimean Tatar (Csató 1999; Nevins and Vaux 2004; Németh 2015; Kavitskaya 2010). In Crimean Tatar, palatalization is contrastive, whereas similar effects in most related languages are byproducts of vowel harmony, having no phonological status on their own. This suggests that consonantal features, which were once derivable from either syllable-level or adjacent vowel effects are now contrastive, as in Slavic. Taking this a step further, in Karaim, vowel harmony has largely been lost, being reinterpreted as consonant harmony. Thus, the distinction between front and back has been transphonologized to a distinction in palatalization and velarization, restructuring the Turkic pattern.

However, in other cases, vowel harmony in the dominant language is affected by contact with languages from subordinate groups. Dombrowski (2013) argues that vowel harmony in West Rumelian Turkish was lost due to the influence of subordinate Indo-European languages in the Balkans. He suggests that the Indo-European grammatical requirement for vowels to have underlyingly-specified [back] and [round] features undermined the harmony pattern in West Rumelian Turkish, the regional lingua franca, producing invariant suffix morphemes. Presumably, the West Rumelian Turkish spoken by subjugated Balkan populations drove change in the dominant speech community. Notable, Dombrowski rejects the claim that incremental adoption of loans drove this change, but rather a more abstract structural preference. Relatedly, Pajusalu (2012) suggests that prosodic and grammatical structures adopted during contact with neighboring Germanic languages drove the loss of frontness harmony in Estonian and Livonion. He speculates that the development of fusional morphology and prosodic restructuring led to the loss of harmony in these languages.

The two cases just mentioned support the potential role of contact-induced grammatical restructuring in decay, but this kind of abstract restructuring is not limited to decay scenarios only. Consider a case of grammatical restructuring in the development of rounding harmony Turkic that may be due to contact (see also Anderson 2005:6). By and large, the Turkic pattern of rounding harmony involves the assimilation of a high vowel target after any round vowel, exemplified by Turkish in Table 32a.2. In contrast,

the general Mongolic pattern involves the assimilation of non-high vowels after a non-high round vowel trigger, which is represented by Khalkha Mongolian in Table 32a.2 (Svantesson 1985).[1] When these two general genetic patterns are compared with the patterns found in Yakut, Shor, Kyrgyz, and Altai, two things are worth noting (Krueger 1962; Korn 1969; Harrison 1999; see also Kaun 1995). First, the rounding harmony patterns found in Central Asian and Siberian Turkic languages are more complex (in a descriptive, not computational sense) than other attested rounding harmony patterns. Second, this complexity is potentially derivable from the union of the basic Turkic and Mongolic patterns. The rules describing Yakut's harmony are exactly the union of the two, and the patterns in Shor, Kyrgyz, and Western Tuvan and can plausibly be construed as variations of this union of Turkic and Mongolic harmonies.

Table 32a.2: A schematic representation of some rounding harmonies in Mongolic and Turkic (~ indicates that harmony is optional in this context)

Target height	Trigger height	Turkish		Khalkha		Yakut	
		[-bk]	[+bk]	[-ATR]	[+ATR]	[-bk]	[+bk]
[+hi] target	[+hi] trigger	✓	✓			✓	✓
	[-hi] trigger	✓	✓			✓	✓
[-hi] target	[+hi] trigger						
	[-hi] trigger			✓	✓	✓	✓

Target height	Trigger height	Shor		Kyrgyz		Altai	
		[-bk]	[+bk]	[-bk]	[+bk]	[-bk]	[+bk]
[+hi] target	[+hi] trigger	✓	✓	✓	✓	✓	✓
	[-hi] trigger	✓	~	✓	✓	✓	✓
[-hi] target	[+hi] trigger	✓		✓		✓	~
	[-hi] trigger	✓	✓	✓	✓	✓	✓

32a.3.2 Internal factors

Although external factors my shape the diachronic trajectories of harmony systems, Binnick (1991:38) ultimately rejects the primacy of these, arguing instead that "vowel harmony is inherently unstable" He further contends, "[w]hile foreign influence may accelerate or even trigger certain changes, it does not dictate the nature of sequence of such changes." One

[1] One thing to point out is that while Turkic exhibits backness harmony, Mongolic exhibits ATR harmony, although scholars assume a single pattern in the proto-language (Poppe 1960; Vaux 2009).

possibility is that harmony is unstable because it relies on a variety of structures and independent grammatical patterns, including morphology, vowel contrast, and reduction; in the absence of these, the likelihood of initiating or maintaining a harmony system diminishes.

First among internal factors that may contribute to harmony's emergence or decay, it is clear that harmony is most obvious as a set of morphophonological alternations, which require the existence of morphology sufficient to display the pattern. The critical role morphology plays in harmony is manifest in the history of Nilotic (Andersen 1990). In Nilotic languages that lost agglutinative morphology, evidence for any active harmony pattern was lost, as in Nuer and Dinka (Remijsen and Gilley 2008). In Nilotic languages where agglutination was preserved, e.g. Mayak (Andersen 1999), harmony persists, but in those where suffixation has been replaced by stem-internal changes, harmony has also been lost.

In addition, vowel mergers may erode the harmony system. If the development and decay of harmony are construed as the expansion and diminution of the featural space subject to harmony, then mergers provide a clear case of decay due to the reduced featural space that alternates for harmony. For instance, the vowels /ɪ i ʊ u/ have merged to /i u/ in Agoi, an Upper Cross language of Nigeria (Yul-Ifode 2003). Harmony used to operate over vowels of all heights but now, as a result of the loss of the ATR contrast among high vowels, ATR harmony now operates on non-high vowels only. Similar mergers are noted in other languages, reducing the number of vowels subject to harmony (see Stewart 1971 for discussion related to Kwa).

Language-internal disharmony is another force that may disrupt or erode the larger harmony system. Disharmony may exist either as the simple co-occurrence of vowels from distinct harmony sets or as the contextual neutralization of harmonic contrasts. This sort of contextual neutralization is typically a byproduct of consonant-vowel interactions, and may produce either the basic disharmony, as in the Kyrgyz case described by Wurm (1949:101), e.g. /ʤɯjɯrmɑ/ [ʤiːrmɑ] 'twenty.' In Kyrgyz, the presence of the palatal glide fronts the two flanking /ɯ/ vowels to [i], yielding a disharmonic surface form. However, consonantal effects can also introduce opacity into the system. In Tofa (Harrison and Anderson 2008), /ɑ/ is fronted to [e] around palatal consonants, and yet the underlying rather than surface backness of the root still spreads,

e.g. /ɲɑʃtA/ [ɲeʃtɑ] ‘tree-LOC’. A similar allophony-related opacity is found in Crimean Tatar, where speakers typically back /ø y/ to [o u] before the lateral, and yet spread [-back] throughout the word, e.g. /øl-mAK/ [olmek] *[olmaq] ‘die-INF’. Contextual neutralization may also occur due to umlauting or other vowel-to-vowel interactions. In Uyghur, the low vowels are raised and fronted preceding /i/, e.g. /ɑl-ip/ [elip] ‘take-CVB’. In Uyghur, the underlying backness of the root vowel spreads despite umlaut, yielding opaque forms like /ɑl-in-mAK/ [elinmaq] *[elinmek] ‘take-PASS-INF’ (Nadzhip 1971; Lindblad 1990; Hahn 1991; cf. McCollum 2019c on the status of /i/ in Uyghur).

Finally, Binnick (1991:45-47) argues that reduction obscures harmonic alternations, and thus contributes to the erosion of harmony. In languages with initial stress, like Mongolian, the reduction of non-initial vowels to a very central, schwa-like quality conceals the propagation of the harmonic feature. Also, in languages with final stress, like Kazakh, the reduction of the initial syllable may mask the backness of the trigger, which is recoverable from the backness of following vowels, as in /tʊs-tA/ [ts.tɑ] ‘side-LOC’ and /tys-tA/ [ts.t͡ie] ‘dream-LOC’.

In sum, a variety of language-internal factors appear to play important roles in the development and decay of harmony systems. As such, cases of decay cannot simply be attributed to external factors without further examination of language-internal forces that have likely influenced the trajectory of the harmony system.

32a.4 Conclusion

In conclusion, extant evidence supports the role of a wide range of factors on the development and decay of vowel harmony systems. Both language-internal and external factors may promote or undermine the existence of harmony, which is realized at the lexical, morphological, and phonological levels of the grammar. Although the exact causes for development and decay may be difficult to tease apart, the mechanisms of change are clearer. In decay, general patterns may become lexically-specific, the domain of harmony may be reduced, harmony may become optional or gradient in its effect, and harmony may dictate the realization of a smaller portion of the feature space. More generally, the claim that the emergence and decay of harmony exploit the same pathways

offers testable predictions for particular languages as well as a broader theory of diachronic vowel harmony.

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