Idiosyncratic transparency in Kazakh vowel harmony

We present a phonetic and phonological study of the Kazakh backness harmony system, and argue that it presents two clear cases of affixes which are idiosyncratically transparent to harmony—a phenomenon not documented in the formal linguistic literature. We show that the dismissive prior treatment of one such affix, /+uw/ (Vajda, 1994, Tamir, 2007), relies on a transcription that does not reflect the speech of our speakers, and introduce another such affix whose behavior has not been documented previously. We show that both Agreement by Correspondence (ABC, Rhodes, 2010) and Trigger Competition (TC, Kimper, 2011) can be straightforwardly modified to account for these facts, and that TC makes the strongest predictions about the rarity of the phenomenon.

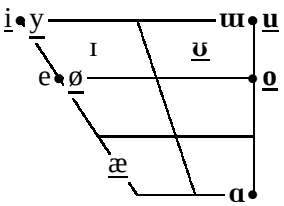

Figure 1: The proposed Kazakh vowel inventory.

We hypothesize eleven phonological vowels, which can be divided into front and back vowels by their harmonic behavior. The chart in Figure 1 indicates the approximate targets of these vowels, with back vowels indicated in bold type, and vowels restricted to initial syllables underlined. Harmony requires that native word stems contain either only front vowels or only back vowels, and limits the inventories of consonants that can appear with each:

(1) FRONT ROOT: ʃømʲelʲe ‘haystack’ bʲerɪk ‘mighty’ myjɪz ‘horn’
BACK ROOT: qɯrbɑqɑ ‘frog’ bɑwɯr ‘liver’ qʊjrɯq ‘tail’

Though Vajda (1994) argues that the primary alternating feature is [RTR] rather than [BACK] (we ignore the limited rounding harmony), we use the areally typical terminology of backness, and do not commit ourselves to either analysis.

Nearly all suffixes that contain vowels participate in harmony categorically:

(2) FRONT ROOT: søjlʲe-gʲen *søjlʲe-ɣɑn ‘speak-PST.PTCP’
BACK ROOT: *ɑjuw-lʲer ɑjuw-lar ‘bear-PL’

Two suffixes break that generalization by showing harmonically neutral behavior: the comitative case marker /+mʲen/ and the infinitive marker /+uw/. Both occur after both front and back vowels, and both are transparent to harmony, requiring that following suffixes ignore them and harmonize with the root:

(3) FRONT ROOT: syt-pʲen-bʲe *syt-pʲen-bɑ ‘milk-COM-Q’
BACK ROOT: *nɑn-mʲen-bʲe nɑn-mʲen-bɑ ‘bread-COM-Q’

(4) FRONT ROOT: ʒyz-uw-dɪ *ʒyz-uw-dɯ ‘swim-INF-ACC’
BACK ROOT: *ɑl-uw-dɪ ɑl-uw-dɯ ‘take-INF-ACC’

Vajda and Tamir attempt to account for INF (/+uw/ above) by describing it as a normal harmonizing suffix with two phonological variants: /ʊw/ is used in back contexts and /yw/ in front contexts. This allows this common suffix to be accounted for under most standard theories of harmony, but it runs counter to both the standard Kazakh orthographies—which treat the suffix as surfacing with a single vowel—and to our own casual observations. To test this claim, we conducted a systematic acoustic analysis of two native speakers’ vowel systems. We recorded speakers from two regions of Kazakhstan reading a wordlist, and focused our analysis on six minimal or near-minimal pairs of front and back words containing INF. These pairs did not differ in preceding consonant nor in the height and roundedness of the surrounding vowels. To test the effects of harmonic environment, we measured F1 and F2 at a point 25% of the way through the vowel in INF (taken as the nucleus of the diphthong) and converted frequencies to Bark values (to facilitate distance calculations).

We found that harmonic context had a significant effect on the realization of the INF affix (especially in Z2), but that the initial target of the vowel did not come particularly close to any other vowel, including [ʊ] and [y]. The differences in Z2 between front-context INF and /y/ and between back-context INF and /ʊ/ were significant ($p < 0.01$ for both speakers and for both contexts), and the Euclidean distance between

the front-context INF and /y/ was relatively large (in Bark: 2.7 for speaker 1, 1.1 for speaker 2). Given the minimal spectral overlap between INF and either /y/ or /ʊ/, we conclude that the fronting effect can be ascribed to phonetic coarticulation rather than phonological harmony. Thus, we include /u/ as a vowel phoneme alongside the other ten, and we treat its behavior in INF as a case of idiosyncratic transparency.

INF and COM both show behavior that cannot be predicted on the basis of the general phonology of the language: except in COM, /e/ participates in harmony, and except in INF, /u/ is neither transparent nor even licit in non-initial syllables. As such, both must be lexically marked in some way, but this alone is not sufficient: both interact with stems and following suffixes in predictable ways, and the grammar must be able to explicitly account for those interactions.

Many current approaches to harmony offer accounts for lexically idiosyncratic opaque affixes (e.g. Baković, 2000, Nevins, 2010) by introducing lexically-indexed protection constraints, but there is only one clear case of an idiosyncratically transparent affix in the literature (Lesley-Neuman, 2007), and that case can be explained on the basis of morphosyntactic facts that do not hold in Kazakh. We claim that the Kazakh facts can be most readily accounted for in a harmony system that allows for non-local agreement.

Harmony in ABC presents the simplest account. Since it can selectively establish long-distance links between segments, it is possible to build a grammar in which all alternating segments are compelled to enter into a relationship that the idiosyncratic segments avoid. We follow Rhodes's terminology in claiming that these two affixes are idiosyncratically stored with weak backness specifications, allowing a strength-sensitive correspondence constraint to skip them. For COM, this is all that is necessary, and for INF (as in 4), we need only add an indexed constraint to protect the /u/ from neutralizing to a less marked back vowel:

/ʒyz+uw+dɯ/	IO-IDENT-σ_1	IO-ID-INDEXED	*{iuyʊoøæ}	CORRV$_{Str}$V$_{Str}$	IDENTVV[BK]
a. [ʒy$_i$z+u$_j$w+dɯ$_k$]			**	*	
b. [ʒy$_i$z+u$_j$w+dɯ$_i$]			**		*
c. ☞ [ʒy$_i$z+u$_j$w+dɪ$_i$]			**		
d. [ʒy$_i$z+ɯ$_j$w+dɪ$_i$]		*	*		

The newer and less widely adopted TC framework claims to offer a more typologically sound approach to non-local harmony, and also accounts for Kazakh. Normal transparent vowels are modeled as vowel *types* which are too well cued for backness to trigger harmony, but which are blocked by another constraint from alternating. To account for idiosyncratic COM, we allow that lexical items can be specified to have this weak trigger property, inducing transparency. In addition to this, it is necessary to use a lexically indexed constraint to protect both vowels from *undergoing* harmony triggered by a preceding vowel.

It may seem undesirable to require, as we do for both frameworks, that idiosyncratically transparent morphemes be lexically specified both as protected and as weak, but there are typological benefits to this approach. Idiosyncratic transparent vowels are clearly rare, and requiring them to be doubly specified encodes this rarity. Proposing a grammar that allows for both kinds of specification does not yield any other novel behavior: if a vowel is protected but not weak, then it is an idiosyncratic opaque affix of the observed sort. If a vowel is weak but not protected, TC ensures that it will participate in harmony normally, and ABC still allows the rare but observed idiosyncratic transparency behavior to surface for some vowels.

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