Draft: Idiosyncratically Transparent Vowels in Kazakh

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(1) We argue that Kazakh backness harmony presents two clear cases of affixes which are idiosyncratically transparent to harmony, a phenomenon claimed to be unattested as recently as Mahanta (2012).

(2) We base our arguments on data from fieldwork done in California with two native speakers from different regions of Kazakhstan (Atyrau and Astana).

(3) In this paper, we summarize the theoretical status of these affixes, and provide an analysis for the relevant data under two theories of harmony: Agreement by Correspondence and Trigger Competition.

1 The Kazakh vowel inventory: a hypothesis

(4) Kazakh has a robust system of backness harmony which requires native words to contain either only back vowels or only front vowels, and suffixes alternate to match them.

(5) Harmony spreads progressively from the stem to any suffixes. We are not aware of any prefixes.

(6) Our analysis is centered on the eleven vowel system shown here (bold type indicates backness, underline indicates vowels allowed non-initially):

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(6) Our analysis is centered on the eleven vowel system shown here (bold type indicates backness, underline indicates vowels allowed non-initially):

(7) Orthographic conventions for vowels in Kazakh Cyrillic, and IPA:

<table>
<thead>
<tr>
<th>non-alternating front</th>
<th>non-alternating back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y [y]</td>
<td>Y [i]/[w]/[ua]</td>
</tr>
<tr>
<td>И [i]/[j]</td>
<td>И [о]</td>
</tr>
<tr>
<td>Ы [o]</td>
<td>О [o]</td>
</tr>
<tr>
<td>Ә [æ]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>alternating front</th>
<th>alternating back</th>
</tr>
</thead>
<tbody>
<tr>
<td>И [i]</td>
<td>И [и]</td>
</tr>
<tr>
<td>Е [e]</td>
<td>А [а]</td>
</tr>
</tbody>
</table>

* We are indebted to Dana Kismetova and Yeskendir Kassenov for presenting their native language to us, to Vera Gribanova and Rob Podesva for their guidance on this project, and to Paul Kiparsky, Bonnie Krejci, Hanzhi Zhu, Janneke Van Hofwegen, Matt Faytak, Stephanie Shih, the audience at WAFL9, and the anonymous reviewers for their valuable feedback. Usual disclaimers apply.

1 We describe a harmony system with the typologically typical [±BACK] contrast, though our purely acoustic observations cannot rule out a similarly structured [±RTR] system, as was proposed by Vajda (1994).

2 Orthographic ‘Y’ seems to represent [w] in at least some cases when it follows a vowel. Whether this is an orthographic convention or a phonological reduction process from underlying /u/ is not of consequence here. И shows similar behavior.

3 /æ/ appears to be heavily restricted in non-loan words, and Vajda claims that it is not part of the native phonology. Our study does not attempt to address this issue, but the vowel does appear in a large number of basic vocabulary items:

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(8) Generally, only the four alternating vowels appear in non-initial syllables. Exceptions to this take two forms:
   a. Loanwords and compounds:
      i. kij nominal ‘movie’ (Russian) ii. məfɨjnom ‘car’ (Russian)
      iii. askerij ‘military’ (Persian) iv. tərtərnom ‘square’ (from four-corner)
   b. The infinitive suffix, which we discuss below:
      i. qoj-uw ‘to-INF’ ii. qur-ın-uw ‘shave-REFL-INF’

(9) This description of the harmony system involves some novel claims, which we return to below.

2 The harmony system

(10) Most suffixes show alternating front and back variants which harmonize with the stem. **Suffix harmony is categorical**: we have found no stems which can be followed by both front and back affix variants.
   a. BACK: əγəs-təɾ-dən *əγəs-təɾ-dən ‘tree-ABL’
   b. FRONT: *ɪj-təɾ ɪj-təɾ ‘dog-PL’

(11) **Word internal harmony is categorical** in native roots:
   a. BACK: ɡomuɾtqyi ‘egg’ ɡəɾtəɾməq ‘garlic’
   b. FRONT: βeməɾək ‘gristle’ қəɾək ‘shovel’

(12) As above, **loanwords** may contain exceptions to harmony. In these cases, suffixes harmonize with the final syllable in the root:

2.1 Transparency in Kazakh

(13) **Neutral vowels** are those which do not alternate to undergo harmony in positions where they would be expected to do so. In a unidirectional harmony system like Kazakh’s, they take two common forms:
   a. **Opaque vowels** spread harmony rightwards onto other segments.
   b. **Transparent vowels** do not spread harmony, but instead allow previous segments to look past them to spread harmony onto subsequent segments.

(14) We have identified **multiple sources of transparency** in Kazakh, two of which follow a pattern not previously observed.

(15) **Exceptional [i]**: Of the small number of words that we have observed containing the vowel /i/, a subset appears to allow back vowels:
   a. sɪɾəq ‘knee’
   b. sij-də ‘fit-PST’
   c. miɾ-də ‘brain-ACC’

(16) Only two disharmonic /i/ tokens appeared in our sample: while this may be a synchronic property of the Kazakh phonology, we assume provisionally that these cases are loanword-like lexical exceptions that are memorized in full.

(17) The **infinitive suffix** constitutes a more robust and unusual case. It is realized as an offglide [w] following a vowel, or [uw] following a consonant, regardless of harmonic context:
   a. V-: qəɾə-w ‘look-INF’ (‘to look’)
   b. BACK VC-: qoj-uw ‘quit-INF’ (‘to quit’)
   c. FRONT VC-: kəɾ-uw ‘enter-INF’ (‘to enter’)

   a. ækə ‘father’ b. æɾpə ‘aunt’
   c. æzə ‘grandmother’ d. ðən ‘seed’
(18) Alternating affixes following INF will look past it to harmonize with the stem, shown with the front-harmonic cases here:
   a. /3yz-uw-di/ → [3yzwdi] → [3yzwUdi]  ‘take-INF-POS.3’
   c. /kr-uw-di/ → [kr-uw-di] → [kryUwdi]  ‘enter-INF-ACC’

(19) /w/, like all other consonants, is not allowed between consecutive consonants. It might be tempting to explain this disharmonic [uw], then, as a case of postlexical epenthesis:
   a. /Zyz-w-di/ → [Zyzwdi] → [ZyzUwdi]

(20) If this occurred only after the enforcement of harmony in the phonology, we would expect other native word roots to contain transparent tokens of [uw] in other environments with /w/, which is not observed:
   a. quwlAq ‘ear’  (*quwlIk)
   b. buwAz ‘pregnant (of animals)’  (*buwjez)

2.2 Past work and /u/

(21) The status of /u/ as a distinct vowel in Kazakh has been subject to some debate, and since the harmonic behavior of our /u/ suffix is not anomalous if /u/ is corresponds to multiple vowels, it is crucial for us to determine how it behaves phonetically, at least for our speakers.

(22) In Vajda (1994), Tamir (2007), and Kirchner (1998), the vowel that we call /u/ (orthographic У) is described as a pair of different vowels which alternate according to harmonic context.

(23) These two hypothesized vowels do not have distinct targets, but share initial targets with other vowels, and are differentiated from them by the presence of [w] offglides: [ow] to harmonize with back vowels, and [yw] to harmonize with front vowels.

(24) Kara (2002) makes the same claims about underlying forms, but finds that the front-back difference is neutralized on the surface. In addition, he does not transcribe the surface form as diphthongal, instead predicting the long vowel [u:].

2.3 Phonetics

(25) For our hypothesis of a single /u/ to be clearly falsified, we would expect front and back tokens of /u/ to have two clearly separated distributions.

(26) For Vajda, Tamir and Kirchner’s competing hypothesis to be verified, we would expect these two targets to align with the targets of existing vowels, and we would expect clear movement up and back during the vowel production.

2.3.1 Methodology

(27) We analyzed four tokens each of 35 words presented in random order.

(28) The words were presented in Kazakh Cyrillic, and were produced in a frame sentence. The wordlist is as follows:
   a. Nine monosyllabic words, each with a different monophthongal vowel (every vowel in (6) except /i/ and /u/). All words were of the form /tU/ except two: [sәt] and [sUz].
   b. Six minimal or near-minimal pairs containing the infinitive suffix and differing in initial vowel backness (e.g. usuɰ, isuʍ). Half of the pairs had no additional affixes, half had the accusative suffix following INF (/diU/ or /di/). The consonant just before INF was always /s/, to match the alveolar environment in (a).
   c. Three additional words with /u/ used to test other phenomena.
   d. Eleven additional words, used to test claims made by previous authors about the vowel [i].
2.3.2 Acoustic results

(31) Both speakers’ pronunciations of /ʊ/ had just a small amount of formant dynamism (distance between 25% and 75% formant values), and direction of movement was quite variable.

(32) In contrast, the true diphthong [yj] in [syjdi] ‘love-PST’ showed consistent movement across a much greater distance.

(33) The following table shows the average slope between the Bark coordinates at the 25% and 75% points for [ʊ] and [yj], as well as the standard deviation in slope, and the average Euclidean distance between them.

<table>
<thead>
<tr>
<th></th>
<th>Slope</th>
<th>Slope std. dev.</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-context ʊ, speaker 1</td>
<td>-0.0263</td>
<td>3.9652</td>
<td>0.3819</td>
</tr>
<tr>
<td>Back-context ʊ, speaker 1</td>
<td>-0.2294</td>
<td>7.1418</td>
<td>0.4871</td>
</tr>
<tr>
<td>Yj, speaker 1</td>
<td>0.4130</td>
<td>0.6702</td>
<td>1.1447</td>
</tr>
<tr>
<td>Front-context ʊ, speaker 2</td>
<td>0.9003</td>
<td>2.2534</td>
<td>0.3091</td>
</tr>
<tr>
<td>Back-context ʊ, speaker 2</td>
<td>-0.2451</td>
<td>1.1775</td>
<td>0.4902</td>
</tr>
<tr>
<td>Yj, speaker 2</td>
<td>-2.8256</td>
<td>0.2416</td>
<td>2.9975</td>
</tr>
</tbody>
</table>

(34) We observed significant ($p < 0.01$) differences between the 25% targets of front-context /ʊ/ and [y] and between back-context /ʊ/ and [o]. The plots in Figure 1 show the mean formant measurements for /ʊ/ at the 25% point, overlaid with the mean midpoint measurements for the other vowels. The ellipses encompass the area within one standard deviation of the mean.

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The script used was a modified version of Katherine Crosswhite’s FORMANT-LOGGER:

[http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/formant_logging.txt](http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/formant_logging.txt)
(35) We did find a significant difference between front- and back-context [u] in backness (Z2), and it was fairly large for one speaker. We attribute this difference to coarticulation, but we cannot robustly rule out the possibility of two phones.

(36) We found substantial inter-speaker variation in the duration of [u], but in general it is slightly longer than the other high round monophthong [y] (p < 0.05 for both speakers) and much shorter than the diphthong [yj] (p < 0.005 for both speakers). Whether this is enough evidence to warrant describing it as a long vowel ([u:]) is unclear.

2.4 Transparency in Kazakh (part II)

(37) The harmonic behavior of COM has not been documented to our knowledge, and it shows a variant of the same anomalous behaviour seen with INF.

(38) The comitative suffix */m’en/ (*/p’en/ in some consonantal environments) is also non-alternating:

a. BACK: ədum-ı’en  *ədum-man-/m’un ‘person-COM’
b. FRONT: ıstyl-m’en  *ıstyl-man-/m’un ‘table-COM’

(39) We have only found one affix that can follow COM, but this affix shows that it too is transparent:

a. bol fal  nan-ı’ien-ba  
   this old.man bread-COM-Q  
   Is this an old man with some bread?
b. bol fal  böb’ek-m’en-b’e  
   this old.man baby-COM-Q  
   Is this an old man with a baby?

(40) COM is less troublesome than INF, since there are other suffixes containing the same vowel that participate in harmony normally, like PTCP shown here:

a. tıst’e-ğlen-1 ‘bite-PTCP-POSS.3’
b. ıquar-yan-u ‘turn.über-PTCP-POSS.3’

2.5 The status of idiosyncratic transparency

(41) Transparent vowels are well documented in the harmony literature, as are morphologically idiosyncratic opaque affixes (e.g. Baković, 2000).

(42) As recently as Mahanta (2012), idiosyncratic transparent vowels were claimed to be unattested and impossible.

(43) Törkenczy (2013) describes exceptional stems in Hungarian which fail to propagate rounding harmony onto affixes (one of several unusual types of lexical exception to harmony described in that work).

(44) A potential case of idiosyncratic transparent affixes have been documented only in Karimojong (Paul Kiparsky, personal correspondence, 2013; Lesley-Neuman, 2007), but have been explained as a problem of morpheme ordering rather than of harmony, an option not viable for Kazakh.

3 A constraint-based account

3.1 The basics of a generative account

(45) *{iyuooae} – A markedness constraint (or set of such constraints) banning these vowels is needed to prevent them from appearing non-initially.

(46) IO-IDENT-INITSYLLABLE – Prevents these marked vowels from being neutralized word-initially.

(47) An indexed faithfulness constraint (in the style of Patern, 2009) is needed to prevent the /u/ in INF from being neutralized to an unmarked vowel. We choose represent the indexing on the constraint, rather than using a diacritic on the input form, and use IO-IDENT-INDEXED[INF].
(48) Demonstrated here for $køt\,ær-uw$ ‘raise-INF’

<table>
<thead>
<tr>
<th></th>
<th>INITID</th>
<th>INDID</th>
<th>*(iuyouoxe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>*[k\textsuperscript{\textdagger}t\textsuperscript{\textdagger}ær-yw]</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>*[k\textsuperscript{\textdagger}t\textsuperscript{\textdagger}er-yw]</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c.</td>
<td>*[k\textsuperscript{\textdagger}t\textsuperscript{\textdagger}ær-uw]</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>d.</td>
<td>*[k\textsuperscript{\textdagger}t\textsuperscript{\textdagger}er-uw]</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>e.</td>
<td>*[køt\textsuperscript{\textdagger}ær-yw]</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>f.</td>
<td>*[køt\textsuperscript{\textdagger}er-yw]</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>g.æw</td>
<td>*[køt\textsuperscript{\textdagger}er-uw]</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

(49) While it may be possible to analyze the idiosyncrasy of INF by claiming that /u/ is transparent non-initially (rather than in that specific morpheme), **COM must be lexically specified as transparent**, since /æ/ is demonstrably not transparent non-initially in most morphemes.

### 3.2 Approaches to harmony

(50) How to account for harmony in constraint-based grammar remains an open question, and no current proposal explicitly allows for idiosyncratic transparency, so we need to choose a system that can be straightforwardly modified to account for it.

(51) We see two basic types of proposal:

a. **Strictly local** (after Gafos, 1999; Ní Chiosáin & Padgett, 2001) accounts, most prominently those based on AGREE and ALIGN, assume that harmony is between neighboring segments at some level of representation.

b. **Non-local** accounts explicitly allow harmony to pass between non-adjacent segments.

(52) Strictly local accounts make much more focused typological predictions, but they require supplemental mechanisms (often controversial) to account for transparency at all, and cannot account for certain observed types of transparency (Bowman, 2013).

(53) Idiosyncratic transparency is incompatible with strict locality: If the harmony constraint is local, the only way to prevent a vowel from propagating harmony is from preventing it from appearing at the appropriate level of representation using an indexed constraint or diacritic, and the flexibility that this demands of the representational scheme essentially creates a new and potentially unwieldy non-local system.

(54) We focus on two non-local theories of harmony that are under active development: **Agreement by Correspondence** (ABC, Rose & Walker, 2004; Rhodes, 2010) and **Trigger Competition** (TC, Kimper, 2011).

### 3.3 Agreement by Correspondence

(55) ABC was developed for consonant harmony in Rose & Walker (2004).

(56) Core idea: Establishing **correspondences** between similar segments—alogous to the correspondences between input and output segments—and then enforcing **faithfulness** between them.

(57) Centered on two OT constraints:

a. **CORR-VV** – Let S be an output string of segments and let X and Y be segments specified [-CONS, +SON]. X and Y correspond if X, Y $\in$ S.

b. **IDENT-VV(BK)** – Let X be a segment in the output and let Y be a correspondent of X in the output. If X is [ $\alpha$ BACK], then Y is [ $\alpha$ BACK].

---

5 We follow the standard practice of ‘perversely’ assuming an underlying form that is substantially different from the intended output, but that we would expect to yield that output.
(58) If two segments share a subscript (e.g. ‘$x$’), they are in correspondence:

<table>
<thead>
<tr>
<th>/fi:t-tur/</th>
<th>INITID</th>
<th>*{iyuøoœr}</th>
<th>CorrVV</th>
<th>IdentVV[Bk]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[i₁j-t-t₄₉₄]</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>[i₁j-t-t₄₉₄]</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c.</td>
<td>[i₁j-t-t₄₉₄]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>[i₁j-t-t₄₉₄]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>[u₁s-t-t₄₉₄]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(59) We base our account on Rhodes’s (2010) account of vowel harmony with transparency, which centers on what he calls weak specification:

If vowels contrast with each other based only on carrying the opposite [back] values, both vowels are strongly specified (e.g., /a/ and /æ/ differ only in backness, so they are strongly specified for the feature). If, however, a vowel does not contrast with any other vowel based only on carrying opposing [back] values, that vowel is weakly specified. (Rhodes, 2010)

(60) He uses this to enforce correspondence only between strong vowels using a variant correspondence constraint, CorrVVV₅₅, thereby preventing the weak vowels from participating in harmony.

(61) The assumption that transparency (and here, weakness) can be inferred from the structure of the inventory does not hold cross-linguistically (Kimper, 2011; Bowman, 2013), but allowing a property of the vowel specification to determine transparency allows us to introduce exceptional transparency.

(62) We adopt the assumption that weak specification must be an independently learned part of the grammar, and newly claim that it can be learned for individual morphemes when necessary.

(63) Once this has been established, the derivation of a transparent case like kir-uw-dI, with a lexically specified weakly-back medial /u/ (marked with a † in the input), is relatively straightforward:

<table>
<thead>
<tr>
<th>/kiɾ-u¹w-duᵣ/</th>
<th>INITID</th>
<th>INDxID</th>
<th>*{iyuøoœr}</th>
<th>CorrVV₅₅</th>
<th>IdentVV[Bk]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[kt₁s-t-u₅w-duᵣ₄]</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>[kt₁s-t-u₅w-duᵣ₄]</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>[kt₁s-t-u₅w-duᵣ₄]</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>[kt₁s-t-u₅w-duᵣ₄]</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>[kt₁s-t-u₅w-duᵣ₄]</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td>[kt₁s-t-i₃w-duᵣ₄]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g.</td>
<td>[ku₁s-t-u₅w-duᵣ₄]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(64) COM is analyzed similarly, here in though there is no need for an indexed faithfulness constraint:

<table>
<thead>
<tr>
<th>/nun-m’e⁴n-b/e/</th>
<th>INITID</th>
<th>*{iyuøoœr}</th>
<th>CorrVV₅₅</th>
<th>IdentVV[Bk]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[n₁₀₂-n-m’e⁴n-b/e₅]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>[n₁₀₂-n-m’e⁴n-b/e₅]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>[n₁₀₂-n-m’e⁴n-b/e₅]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>[n₁₀₂-n-m’e⁴n-b/e₅]</td>
<td>*</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>e.</td>
<td>[n’e₁₀₂-n-m’e⁴n-b/e₅]</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(65) This leaves us with a working account of the harmony data presented above.
3.4 Trigger Competition

(66) **Trigger Competition** [Kimper, 2011; Bowman, 2013] is framed in a **weighted grammar**, and allows multiple learned **numeric parameters** to contribute to harmony behavior. Transparency can be introduced, in part, through these parameters.

(67) Trigger competition uses **autosegmental representations** with crossing lines, and captures transparency by allowing the lines indicating harmonic linking to skip segments, as in (a):

\[
\begin{align*}
a. & \quad \text{krurw} \quad \text{I} \quad \text{mrw} \\
b. & \quad \text{krwy} \quad \text{I} \quad \text{mrw}
\end{align*}
\]

(68) Set in **Serial Harmonic Grammar** (SHG, Pater et al., 2008; Pater, 2010; Mullin, 2010): the grammar is allowed to make only one step in each tableau, and repeats evaluation until no further changes are optimal.

(69) Harmony is enforced by the positively formulated constraint **SPREAD**[F], which compels segments to spread their feature values onto other segments by forming autosegmental links:

**SPREAD**[F] – Assigns one mark for every additional segment linked to a value of feature F.

A trigger strength factor, specified separately for each vowel, is multiplied by the assigned score to increase it when spreading originates from vowels that are weakly acoustically cued for F. Here, this is set to 5 for all normally alternating vowels.

(70) In this simple harmony example, the optimal first step (shown) is to spread from the initial syllable:

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
& & & & & \\
/ijtar/ & INITID & INDXID & *(iuyoøæ) & SPR[\pm BK] & \mathcal{H} \\
\hline
a. & & & & & \\
/ijtar/ & -20 & -20 & -10 & +1 & \\
\hline
b. & & & & & \\
/ijter/ & 0 & 0 & 0 & 0 & 0 \\
\hline
c. & & & & & \\
/mtar/ & 1 & 0 & 0 & 5 & -15 \\
\hline
\end{array}
\]

(71) After this, no other changes is optimal and the derivation **converges**:

---

6 Positive constraints are those that assign rewards to candidates, rather than penalties. They cause pathological behaviors in fully-parallel Optimality Theory, but are well behaved in serial grammars.

7 There is one other multiplicative factor, which does no work in Kazakh: a distance factor (here 1, usually a fraction) is multiplied by the assigned score to reduce it once for every segment skipped over by spreading.

8 I include candidate c to show that the positive spread constraint doesn’t actively encourage the epenthesis of harmonic vowels. We assume that some constraint against epenthesis (not shown) would prevent this candidate from even tying with the normal harmony candidate, a.
Transparent vowels result from a conspiracy between two things: Segments that are prevented from alternating by some other constraint are neutral, and neutral segments with low trigger strengths will not interact with harmony, and are transparent.

Our existing indexed constraint can force INF and COM to be neutral.

As in ABC, it is necessary to posit that transparency can be learned as a property of a morpheme. Here, this takes the form of learning a weaker trigger strength for /u/ in INF and /e/ in COM than for other tokens of those vowels.

For this example\(^9\), we set all vowels to have a default trigger strength of 5, and allow INF and COM to have vowels of strength 1:

\(^9\) From this point on, all examples will contain only left-to-right spreading, and not the reverse. This follows the descriptions of directional harmony languages in Kimper, and can be formally implemented as described in [Bowman](2013).
The comitative works in entirely the same way. The first tableau of its derivation is shown here:

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
 & \text{INITID}[\pm BK] & \text{IDXID} & \{iuyoo\} & \text{SPR}[\pm BK] & \mathcal{H} \\
\hline
\text{a.} & - & + & k\text{\text{-}r\text{-}uw\text{-}d\text{\text{-}t} & -20 & -20 & -10 & +1 & \mathcal{H} \\
\hline
\text{b.} & - & + & k\text{\text{-}r\text{-}uw\text{-}d\text{\text{-}t} & 0 & 1 & 0 & 5 & -5 \\
\hline
\text{c.} & - & + & k\text{\text{-}r\text{-}uw\text{-}d\text{\text{-}t} & 0 & 0 & 1 & 1 & -9 \\
\hline
\end{array}
\]

(76) Note that the \textbf{indexed identity constraint} is crucial to prevent \text{INF} from undergoing harmony, not just for preventing it from neutralizing: unlike in ABC, we cannot leave it out in accounting for \text{COM}.

3.5 \textit{Comparing the analyses}

(78) Both ABC and TC can account for the facts of Kazakh idiosyncratic transparency, and they differ primarily in the structural assumptions they make about the grammar, but they do also differ somewhat in how they approach the phenomenon.

(79) For cases like \text{INF}, where the idiosyncratic vowel (/u/) is not otherwise licenced in its position, two lexical specifications are necessary in both theories: one preventing it from neutralizing, and another preventing it from participating in harmony.

(80) For cases like \text{COM}, where the idiosyncratic vowel (/e/) is not subject to any special markedness restriction, the two theories differ.

a. In ABC as shown, as soon as a segment like /e/ in \text{COM} is marked as weak, it will neither undergo nor trigger harmony.

b. In TC, such a segment can be marked as a weak trigger, and still appear to participate, since the marking does not prevent it from undergoing harmony. To be idiosyncratically transparent, such a segment must \textbf{both be protected by an indexed faithfulness constraint and marked with an indexed weak trigger strength}.

(81) Ultimately, there are many unresolved issues in the study of vowel harmony that may bear on the choice of constraints and representations, including the relationship between consonant harmony and
vowel harmony, the relationship between inventory structure and participation in harmony, and on the articulatory reflexes of transparency. We do not mean to explicitly advocate for either of the two theories on data which both can capture.

4 Conclusions

(82) Kazakh shows two suffixes which are idiosyncratically transparent to harmony.

(83) /u/ appears to correspond to a single surface vowel in Kazakh, but even if this is not the case, the behavior of COM demonstrates the possibility of idiosyncratic transparency.

(84) Both ABC and TC can be modified admit analyses of idiosyncratic transparency, with TC placing somewhat stricter demands on what a learner must learn about a segment for it to be transparent.

References


Türkencyz, Mklös (2013). The close-ups can get rough: exceptional behaviour, transparency & variation in Hungarian vowel harmony. handout from 21mfm.
