Uyghur Umlaut as Vowel Reduction

Aidan Sharma

Rutgers University

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Background on Umlaut

Umlaut/metaphony: partial vowel harmony affecting only a limited number of word-internal syllables that usually interacts with stress

(1) Servigliano Italian partial height assimilation[1]

	No Metaphony	***Metaphony***	
high-mid → high	ˈv̲erde	ˈv̲irdi	‘green’ *sg./pl.*
low-mid → high-mid	ˈpɛ̲d	ˈpe̲di	‘foot’ *sg./pl.*

(2) Ascrea Italian metaphony in stressed syllables[2]

No Metaphony	***Metaphony***	
meˈte̲sse	meˈti̲ʃʃi	‘reap’ *2sg./pl. impf. subj.*

[1] Calabrese 2011
[2] Walker 2005

Uyghur Umlaut

- Targets low vowels /æ, ɑ/ in initial, open syllables and outputs a mid front vowel [e]

(3) a. /χæ̲t-i/ [χe̲.ti] letter-3.POSS
b. /bɑ̲r-ʃ/ [be̲.riʃ] go-GER

(4) a. /æ̲t-siz/ [æ̲t.siz] meat-PRIV
b. /bɑ̲r-dI/ [bɑ̲r.di] go-3.PST

(5) /bɑ̲r-Am-siz/ [bɑ̲.rɑm.siz] go-NONPAST.Q-2SG.FML

- Claimed to be an instance of partial harmony
  - Better analyzed as moderate vowel reduction

More Uyghur "Umlaut"

- Also occurs before the low front vowel [æ][3]

(6)

a. /jæ-mAK/	[je.mæk]	eat-INF
b. /bær-Am-siz/	[ber.æm.siz]	give-NONPAST.Q-2SG.FML
c. /kæl-Aj/	[ke.læj]	come-1SG.OPT
d. /bɑr-Aj/	[bɑ.rɑj]/*[be.rɑj]	go-1SG.OPT

- Not assimilatory

[3] Mayer et al. 2022

Uyghur Vowel Reduction

- Targets low vowels /æ, ɑ/ in word-medial, open syllables
- Outputs a high front vowel [i]

(7) a. /tikæ̲-dA/ [ti.kḭ.dæ] billy.goat-LOC
b. /bɑlɑ̲-dA/ [bɑ.lḭ.dɑ] child-LOC

(8) a. /tikæ̲-m–dA/ [ti.kæ̲m.dæ] billy.goat-1SG.POSS-LOC
b. /bɑlɑ̲-m-dA/ [bɑ.lɑ̲m.dɑ] child-1SG.POSS-LOC

Background on Vowel Reduction

Vowel Reduction: neutralization of vowels in unstressed syllables

- e.g. Russian /a/ and /o/[4]

(9) a. /'kosmos/ ['kosməs] space, cosmos
b. /'skazka/ ['skaskə] fairy tale

The output is different in the immediately pretonic syllable.

(10) a. /napa'datʲ/ [nəpɐ'datʲ] to attack
b. /golo'datʲ/ [gəlɐ'datʲ] to starve

[4] Barnes 2007

Uyghur Umlaut and Vowel Reduction Compared

- Target the same segments – the low vowels [æ, ɑ]
- Output similar segments – the nonlow front vowels [e], [i]
- Uyghur umlaut looks like Russian vowel reduction in the pretonic syllable:

	Uyghur /æ, ɑ/	Russian /a, o/
Degree 1	e	ɐ
Degree 2	i	ə

Uyghur Umlaut and Vowel Reduction Compared

- Three differences between umlaut and vowel reduction in Uyghur:

i. the outputs of umlaut and vowel reduction disagree for the feature [±high].
   - /i/ and /e/ pattern together in other phonological processes in Uyghur

ii. umlaut targets word-initial syllables only and vowel raising targets word-medial syllables only.
   - This is derived from initial syllable prominence effects.

iii. umlaut requires either [i] or [æ] in the following syllable; reduction applies in any open, medial syllable.
   - This is a mis-characterization of Uyghur umlaut, and is a result of parasitic backness harmony.

Similarities of /i/ and /e/ - Against Difference i.

Let's look at the Uyghur Vowel Inventory[5]:

	Front		Back	
	Unrounded	**Rounded**	**Unrounded**	**Rounded**
High	i	y		u
Mid	e	ø		o
Low	æ		ɑ	

- /i/, /e/ not active in harmony
- Mid vowels only occur in initial syllables[6]
- [i] occurs as an allophone of /e/ in Standard Uyghur[7]
- In the Lopnor, Turfan dialects: umlaut results in [i][8]

[5] Mayer et al. 2022
[6] McCollum 2020; Nadzhip 1971
[7] Mayer et al. (2022)
[8] Abdurehim 2014; A. Yakup 2005

Initial Syllable Prominence - Against Difference ii.

- Cross-linguistically, initial syllables are known to exhibit strength effects[9]
- As previously mentioned, mid vowels only occur in initial syllables in Uyghur
  - This coincides with where umlaut applies; reduction never occurs in initial syllables

[9] Barnes 2006

Umlaut is not Assimilation - Against Difference iii.

- The fact that [æ] "triggers" umlaut of itself indicates Uyghur umlaut is not an assimilatory process
- Analyzing umlaut as moderate vowel reduction does not require [i] or [æ] as triggers. Rather, it is triggered just in open syllables.
- Lack of umlaut in [ɑ...ɑ] forms is a consequence of umlaut being constrained by backness harmony
  - The output [e..æ] is harmonic but [e...ɑ] is not

Uyghur Stress

Before presenting an account of Uyghur vowel reduction, it is necessary to mention stress.

- Generally word-final and correlates with vowel length[10]
- Argued to have sonority-driven stress, with sonority encoded as syllable weight[11]

[10] Engesæth et al. 2009; Hahn 1991; McCollum 2020; M. Yakup 2013; M. Yakup and Sereno 2016
[11] McCollum 2020

Uyghur Stress (McCollum 2020)

- Word-final high vowels in open syllables undergo final lengthening
  - /kiʃi/ → [ki.'ʃiː]
- McCollum analyzes this as a weight requirement on stressed syllables
- Claims low vowels are bimoraic; high vowels and coda consonants are monomoraic

Uyghur Stress Assignment in OT

(11) Weight-to-Stress (W2S): assign a violation to every stressed syllable that is monomoraic

(12) *Heavy: assign a violation to every syllable that has more than one mora

/kiʃi/	W2S	*Heavy	Id-IO[hi]
a. $ki_{\mu}.'ʃi_{\mu}$	*!		
b. $ki_{\mu}.'ʃæ_{\mu\mu}$		*	*!
☞ c. $ki_{\mu}.'ʃi_{\mu\mu}$		*	

Uyghur Vowel Reduction in OT

- McCollum uses these same constraints to account for vowel reduction

/tikæ-dA/	W2S	*Heavy	Id-IO[hi]
a. $ti_{\mu}.kæ_{\mu\mu}.'dæ_{\mu\mu}$		**!	
b. $ti_{\mu}.ki_{\mu\mu}.'dæ_{\mu\mu}$		**!	*
☞ c. $ti_{\mu}.ki_{\mu}.'dæ_{\mu\mu}$		*	*

Uyghur Vowel Reduction in OT

- A highly-ranked MAX-C constraint accounts for non-reduction in closed syllables:

/tikæ-m-dA/	MAX-C	W2S	*HEAVY	ID-IO[HI]
☞ a. $ti_{\mu}.k\text{æ}_{\mu\mu}m_{\mu}.'d\text{æ}_{\mu\mu}$		**		
b. $ti_{\mu}.ki_{\mu}m_{\mu}.'d\text{æ}_{\mu\mu}$		**		*!
c. $ti_{\mu}.ki_{\mu}.'d\text{æ}_{\mu\mu}$	*!	*		*

Uyghur Umlaut as Vowel Reduction in OT

- Incorporating positional faithfulness, positional neutralization, and positional prominence allow this analysis to extend to umlaut[12]
- Initial, stressed syllables are strong; other syllables are weak

(13) Id-IO$_{\sigma 1}$[hi]: assign a violation to an input-output pair in an initial syllable that disagree for the feature [±high]

(14) *Mid: assign a violation to every [-high, -low] vowel in the output

/jɑn-i/	Id-IO$_{\sigma 1}$[hi]	*Heavy	*Mid	Id-IO[hi]
a. jɑ$_{\mu\mu}$.'ni$_{\mu\mu}$		**!		
☞ b. je$_{\mu}$.'ni$_{\mu\mu}$		*	*	
c. ji$_{\mu}$.'ni$_{\mu\mu}$	*!	*		*

[12] Beckman 1997, 1998; Steriade 1994; Zoll 1996, 1998

Uyghur Umlaut as Vowel Reduction in OT

- F/str » M » F[13]
- Max-C also accounts for non-umlautting in closed syllables:

/jɑn-lAr/	Max-C	Id-IO$_{\sigma 1}$[hi]	*Heavy	*Mid	Id-IO[hi]
☞ a. jɑ$_{\mu\mu}$n$_{\mu}$.'lɑ$_{\mu\mu}$r$_{\mu}$			**		
b. je$_{\mu}$n$_{\mu}$.'lɑ$_{\mu\mu}$r$_{\mu}$			**	*!	
c. je$_{\mu}$.'lɑ$_{\mu\mu}$r$_{\mu}$	*!		*	*	*

[13] Smith 2002

Uyghur Umlaut as Vowel Reduction in OT

- This account of umlaut makes no reference to [i] or [æ] in the following syllable
- Thus, the difference in the following examples is currently unexplained:

(15) /bær-Aj/ [be.'ræj] give-1SG.OPT

(16) /bɑr-Aj/ [bɑ.'rɑj] go-1SG.OPT

Uyghur Umlaut Constrained by Harmony in OT

- Umlaut is constrained by parasitic backness harmony
- In some instances, backness harmony is parasitic on height agreement

(17) AGREE-[BK]/[-HI]: assign a violation to adjacent [-HI] segments that disagree for the feature [BK]

/bɑr-Aj/	AGREE-[BK]/[-HI]	ID-IO$_{\sigma 1}$[HI]	*HEAVY	*MID
☞ a. bɑ$_{\mu\mu}$.'ra$_{\mu\mu}$j$_{\mu}$			**	
b. be$_{\mu}$.'ra$_{\mu\mu}$j$_{\mu}$	*!		*	*
c. bi$_{\mu}$.'ra$_{\mu\mu}$r$_{\mu}$		*!	*	

Uyghur Umlaut Constrained by Harmony in OT

- Umlaut of /æ/ is still predicted:

/bær-Aj/	Agree-[bk]/[-hi]	Id-IO$_{\sigma 1}$[hi]	*Heavy	*Mid
a. bæ$_{\mu\mu}$.'ræ$_{\mu\mu}$j$_{\mu}$			**!	
☞ b. be$_{\mu}$.'ræ$_{\mu\mu}$j$_{\mu}$			*	*
c. bi$_{\mu}$.'ræ$_{\mu\mu}$r$_{\mu}$		*!	*	

Apparent Counterfeeding

- Analyses of Uyghur umlaut with [i] as a trigger struggle to explain an asymmetry between vowel reduction and epenthesis
- Reduced [i] does not trigger umlaut (18a.), but epenthetic [i] does (18b.)

(18)

a.	/bɑlA-lAr/	[bɑ.li.'lɑr]	child-PL
b.	/bɑr-ʃ/	[be.'riʃ]	go-GER

- The apparent counterfeeding between reduction and umlaut has been used to argue against using constraint-based formalisms to analyze these patterns[14]
- But, the present analysis does not treat [i] as a trigger for umlaut
- Refining the present analysis with ASRs and mora-delinking rather than mora-deletion captures the asymmetry between reduced and epenthetic in OT

[14] Vaux 2023

Mora-Delinking

(19) *Float: a mora must be associated with a syllable[15]

Besides punishing floating moras, constraints that do the following are also required:

- ensuring maximum of 3 moras per syllable
- punishing heavy syllables in weak positions

(20) *$4\mu/\sigma$: assign a violation to every syllable associated to 4 or more moras

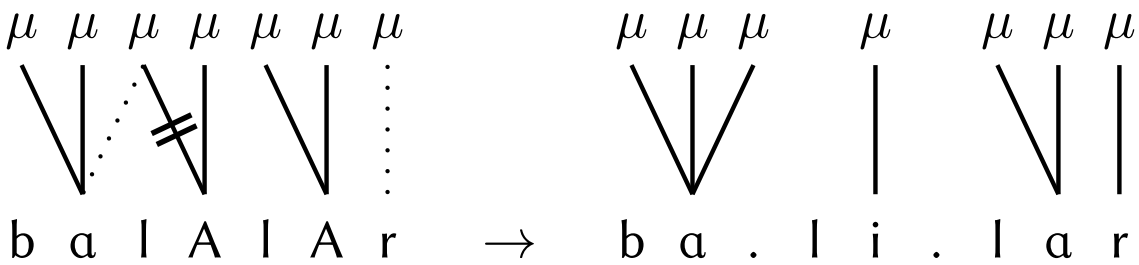
(21) *Heavy/wk: assign a violation to every heavy syllable in a weak position

[15] Myers 1997

Apparent Counterfeeding in OT

- The ranking *Heavy/wk >> *Heavy prioritizes reduction in medial syllables
- *Float prevents delinking of moras that relink to another segment

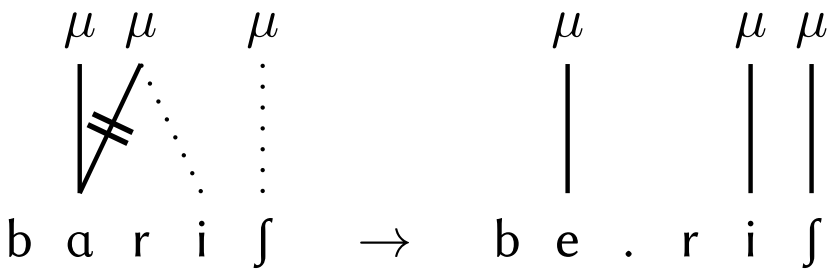
/bɑlA-lAr/	*4μ/σ	*Heavy/wk	*Float	*Heavy
a. $\text{bɑ}_{\mu\mu}\text{.lɑ}_{\mu\mu}\text{.'lɑ}_{\mu\mu}\text{r}_{\mu}$		*!		**
b. $\text{be}_{\mu}\text{.li}_{\mu}\text{.'lɑ}_{\mu\mu}\text{r}_{\mu}$			*!	*
c. $\text{be}_{\mu}\text{.li}_{\mu}\text{.'lɑ}_{\mu\mu\mu\mu}\text{r}_{\mu}$	*!			*
☞ d. $\text{bɑ}_{\mu\mu\mu}\text{.li}_{\mu}\text{.'lɑ}_{\mu\mu}\text{r}_{\mu}$				**



Epenthesis in OT

- Epenthesis is captured straightforwardly in this account

/bɑr-ʃ/	*4μ/σ	*Heavy/wk	*Float	*Heavy
a. bɑ$_{\mu\mu}$.'ri$_{\mu}$ʃ$_{\mu}$				∗∗!
☞ b. be$_{\mu}$.'ri$_{\mu}$ʃ$_{\mu}$				∗



- Low vowels that reduce to [i] have two moras associated with them in the input, whereas epenthetic vowels are not present in the input

Conclusion

- Uyghur “umlaut” is really a type of moderate vowel reduction
- Uyghur vowel reduction and umlaut are both driven by a preference for light syllables
- Differences between the two raising patterns are the result of initial syllable prominence

Future Directions

- This analysis can be extended to account for lexical exceptions to Uyghur umlaut based on the anlaysis of lexical exceptions to Uyghur vowel reduction[16]:

(22) /sɑ̲n-i/ [sɑ̲.ni] number-3.POS

[16] Mayer 2021

Future Directons

- This analysis can also be extended to morphologically-conditioned exceptions to vowel reduction and umlaut[17] using facts about Uyghur stress[18], contextual phasehood[19], and Uyghur word-formation[20]:

(23) /ɑŋlɑ̲-wɑ̲t-i-du/ [ɑŋlɑ̲-wɑ̲t-i-du] listen-WAT-NONPAST-3

- This could be modeled as domain mismatches in the syntax and phonology similar to work done on Turkish[21] or in a Cophonologies by Ph(r)ase[22] framework similar to recent work on A'ingae glottalization[23]

[17] Mayer et al. 2022
[18] Fiddler 2021
[19] Bošković 2014
[20] Major et al. 2023
[21] Fenger 2020
[22] Sande et al. 2020
[23] Dąbkowski 2023

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