

Two Degree Vowel Reduction in Uyghur: “Umlaut” as Moderate Reduction

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Background on Umlaut/Metaphony

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

- (1) Servigliano partial height assimilation (Calabrese 2011)

	<i>No Metaphony</i>	<i>Metaphony</i>	
high-mid → high	'v <u>er</u> de	'v <u>i</u> r <u>d</u> i	'green' <i>sg./pl.</i>
low-mid → high-mid	'p <u>e</u> d	'p <u>e</u> di	'foot' <i>sg./pl.</i>

- (2) Ascrea metaphony in stressed syllables (Walker 2005)

<i>No Metaphony</i>	<i>Metaphony</i>	
me't <u>e</u> sse	me't <u>i</u> ff <u>i</u>	'reap' <i>2sg./pl. impf. subj.</i>

Uyghur Umlaut

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

(3) a. /χæt-i/ [χe.ti] letter-3.POSS
 b. /bar-f/ [be.rif] go-GER

(4) a. /æt-siz/ [te.siz] meat-PRIV
 b. /bar-di/ [be.di] go-3.PST

(5) /bar-am-siz/ [be.ram.siz] go-NONPAST.Q-2SG.FML

- Claimed to be an instance of partial harmony (Hahn 1991; Yakup 2005; Abdurehim 2014)

Uyghur Umlaut in Roots

Uyghur	Uzbek	Kazakh	Kyrgyz	Gloss
[jeʃil]	[jaʃil]	[ʒasʊl]	[dʒasʊl]	green
[beliq]	[baliq]	[balɯq]	[balɯq]	fish

- Uyghur has an emphatic reduplication process in which a word's initial CV is copied into a preceding CVp sequence.
- Michael Fiddler (p.c.) reports that emphatic reduplication of [jeʃil] results in [jæp-jeʃil] ~ [jap-jeʃil].

More Uyghur “Umlaut”

- Also occurs before the low front vowel [æ] (Mayer et al. 2022)

(6)	a. /j <u>æ</u> -mæk/	[j <u>e</u> .mæk]	eat-INF
	b. /b <u>æ</u> r-æm-siz/	[b <u>e</u> r.æm.siz]	give-NONPAST.Q-2SG.FML
	c. /k <u>æ</u> l-æj/	[k <u>e</u> .læj]	come-1SG.OPT
	d. /b <u>ɑ</u> r-ɑj/	[b <u>ɑ</u> .rɑj]/*[be.rɑj]	go-1SG.OPT

- Not assimilatory

Uyghur Vowel Reduction

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

(7) a. /tikæ-dæ/ [ti.ki.dæ] billy.goat-LOC
 b. /bala-da/ [ba.li.da] child-LOC

(8) a. /tikæ-m-dæ/ [ti.kæm.dæ] billy.goat-1SG.POSS-LOC
 b. /bala-m-da/ [ba.lam.da] child-1SG.POSS-LOC

Background on Vowel Reduction

Vowel Reduction: neutralization of vowels in unstressed syllables

- e.g. Russian /a/ and /o/ (Barnes 2007)

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

The output is different in the immediately pretonic syllable.

- (10) a. /napa'dat^j/ [nəpə'dat^j] to attack
 b. /golo'dat^j/ [gələ'dat^j] to starve

Uyghur Umlaut and Vowel Reduction Compared

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

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

- I argue Uyghur umlaut is better analyzed as moderate vowel reduction (Crosswhite 2004)

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 $[\pm\text{high}]$.
 - /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/

Let's look at the Uyghur Vowel Inventory (Mayer et al. 2022):

	Front		Back	
	Unrounded	Rounded	Unrounded	Rounded
High	i	<u>y</u>		<u>u</u>
Mid	e	<u>ø</u>		<u>o</u>
Low	<u>æ</u>		<u>ɑ</u>	

- /i/, /e/ not active in harmony
- Mid vowels only occur in initial syllables (McCollum 2020; Nadzhip 1971)
- In the Lopnor, Turfan dialects: umlaut results in [i] (Abdurehim 2014; A. Yakup 2005)

Initial Syllable Prominence

- Cross-linguistically, initial syllables are known to exhibit strength effects (Barnes 2006)
- As previously mentioned, mid vowels only occur in initial syllables in Uyghur
 - This coincides with where umlaut applies; reduction never occurs in initial syllables

Uyghur Umlaut is not Assimilation

- The fact that [æ] “triggers” umlaut of itself indicates Uyghur umlaut is not an assimilatory process
- Uyghur umlaut does not affect dorsal consonants
- 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 (Engesæth et al. 2009; Hahn 1991; McCollum 2020; M. Yakup 2013; M. Yakup and Sereno 2016)
- Argued to have sonority-driven stress, with sonority encoded as syllable weight (McCollum 2020)

Uyghur Stress (McCollum 2020)

- Word-final high vowels in open syllables undergo final lengthening
 - /kifi/ → [ki.'fi:]
- 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 _μ ·ʃi _μ	*!		
b. ki _μ ·ʃæ _{μμ}		*	*!
 c. ki _μ ·ʃi _{μμ}		*	

Uyghur Vowel Reduction in OT

- McCollum uses these same constraints to account for vowel reduction

/tikæ-dæ/	W2S	*HEAVY	ID-IO[HI]
a. $t_{\mu}.kæ_{\mu\mu}.^{\prime}dæ_{\mu\mu}$		**!	
b. $t_{\mu}.ki_{\mu\mu}.^{\prime}dæ_{\mu\mu}$		**!	*
 c. $t_{\mu}.ki_{\mu}.^{\prime}dæ_{\mu\mu}$		*	*


Uyghur Vowel Reduction in OT

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

/tikæ-m-dæ/	MAX-C	W2S	*HEAVY	ID-IO[HI]
☞ a. ti _μ .kæ _{μμ} m _μ . [!] dæ _{μμ}			**	
b. ti _μ .ki _μ m _μ . [!] dæ _{μμ}			**	*!
c. ti _μ .ki _μ . [!] dæ _{μμ}	*!		*	*

Uyghur Umlaut as Vowel Reduction in OT

- Incorporating positional faithfulness, positional neutralization, and positional prominence allow this analysis to extend to umlaut (Beckman 1997, 1998; Steriade 1994; Zoll 1996, 1998)
 - 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 $[\pm high]$
- (14) * MID : assign a violation to every $[-high, -low]$ vowel in the output

/jan-i/	$ID-IO_{\sigma 1}[HI]$	* $HEAVY$	* MID	$ID-IO[HI]$
a. ja _{μμ} . 'ni _{μμ}		**!		
 b. je _μ . 'ni _{μμ}		*	*	
c. ji _μ . 'ni _{μμ}	*!	*		*

Uyghur Umlaut as Vowel Reduction in OT

- MAX-C also accounts for non-umlauting in closed syllables:

/jan-lar/	MAX-C	ID-IO _{σ1} [HI]	*HEAVY	*MID	ID-IO[HI]
☞ a. ja _{μμ} n _μ .'la _{μμ} r _μ			**		
b. je _μ n _μ .'la _{μμ} r _μ			**	*!	
c. je _μ .'la _{μμ} r _μ	*!		*	*	*

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) /bar-aj/ [ba.'raj] 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]

/bar-aj/	AGREE-[BK]/[-HI]	ID-IO _{σ1} [HI]	*HEAVY	*MID
☞ a. ba _{μμ} ·'ra _{μμ} j _μ			**	
b. be _μ ·'ra _{μμ} j _μ	*!		*	*
c. bi _μ ·'ra _{μμ} r _μ		*!	*	

Uyghur Umlaut Constrained by Harmony in OT

- Umlaut of /æ/ is still predicted:

/bær-æj/	AGREE-[BK]/[-HI]	ID-IO _{σ1} [HI]	*HEAVY	*MID
a. bæ _{μμ} . 'ræ _{μμjμ}			**!	
☞ b. be _μ . 'ræ _{μμjμ}			*	*
c. bi _μ . 'ræ _{μμrμ}		*!	*	

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.	/bala-lar/	[ba.li.'lar]	child-PL
	b.	/bar-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 (Vaux 2023)
- 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

Mora-Delinking

(19) *FLOAT: a mora must be associated with a syllable (Myers 1997)

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

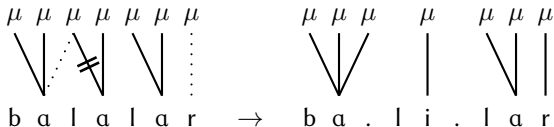
(20) * $4\mu/\sigma$: assign a violation to every syllable associated to 4 or more moras

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

Apparent Counterfeeding in OT

- The ranking $*\text{HEAVY}/\text{WK} \gg * \text{HEAVY}$ prioritizes reduction in medial syllables
- $*\text{FLOAT}$ prevents delinking of moras that relink to another segment

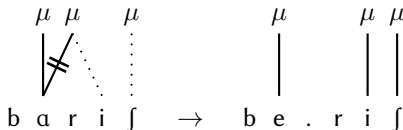
/bala-lar/	$*4\mu/\sigma$	$*\text{HEAVY}/\text{WK}$	$*\text{FLOAT}$	$*\text{HEAVY}$
a. $b\alpha_{\mu\mu}.l\alpha_{\mu\mu}.!l\alpha_{\mu\mu}r_{\mu}$		*!		**
b. $b\epsilon_{\mu}.li_{\mu}.!l\alpha_{\mu\mu}r_{\mu}$			*!	*
c. $b\epsilon_{\mu}.li_{\mu}.!l\alpha_{\mu\mu\mu}r_{\mu}$	*!			*
 d. $b\alpha_{\mu\mu\mu}.li_{\mu}.!l\alpha_{\mu\mu}r_{\mu}$				**



Epenthesis in OT

- Epenthesis is captured straightforwardly in this account

/bar-f/	*4 μ / σ	*HEAVY/WK	*FLOAT	*HEAVY
a. ba $\mu\mu$. ¹ ri μ f μ				**!
b. be μ . ¹ ri μ f μ				*



- 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

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Lexical Exceptions

- This analysis can be extended to account for lexical exceptions to Uyghur umlaut based on the analysis of lexical exceptions to Uyghur vowel reduction, following Mayer (2021) in assuming underlying stress:

(22) /'sɑn-i/ ['sɑ.ni] number-3.POS

Morphologically-Conditioned Exceptions

- This analysis can hopefully be extended to morphologically-conditioned exceptions to vowel reduction and umlaut using facts about Uyghur stress and word-formation (Major et al. 2023):

(23) /aŋlɑ-wɑt-i-du/ [aŋ.lɑ.wɑ.ti.du] listen-PROG-NONPAST-3


- This could be modeled as domain mismatches in the syntax and phonology similar to work done on Turkish and Japanese (Fenger 2020)
- Fiddler (2021) shows that, like the lexical exceptions to umlaut/reduction, these forms also have exceptional stress

Dorsal Consonants


Backness alternations: a. /qol-ɤɑ/ [qol.ɤɑ] hand-DAT
 b. /kø1-ɤɑ/ [kø1.gæ] lake-DAT

No alternations with umlaut: a. /ɛβz/ [e.βiz] mouth
 b. /ɛβz-lar/ [e.βiz.lar] mouth-PL
 c. /ɛβz-i/ [ɛβ.zi] mouth-3.POSS

Crosswhite-style Analysis

/tikæda/	LIC[-HI,-LO]/ σ_1	*HEAVY	MAX[-HI]	*e/ μ	*i/ μ
a. ti $_{\mu}$.kæ $_{\mu\mu}$ 'dæ $_{\mu\mu}$		**!			*
b. ti $_{\mu}$.ke $_{\mu}$ 'dæ $_{\mu\mu}$	*!	*		*	*
 c. ti $_{\mu}$.ki $_{\mu}$ 'dæ $_{\mu\mu}$		*	*		*

Crosswhite-style Analysis

/jan-i/	LIC[-HI,-LO]/ σ_1	*HEAVY	* α/μ	MAX[-HI]	* e/μ	* i/μ
a. ja _{$\mu\mu$} .'ni _{$\mu\mu$}		**!				
 b. je _{μ} .'ni _{$\mu\mu$}		*			*	
c. ji _{μ} .'ni _{$\mu\mu$}		*		*!		*