

**Prominence-control and Multiple Triggers in Vowel Harmony:
An ABC Analysis**

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1. Introduction

(1) **Vowel harmony in Agreement by Correspondence (ABC)**

- Although originally proposed for consonant harmony, the ABC approach has been extended to vowel harmony in a number of studies (e.g., Hansson 2006a, Sasa 2009, Walker 2009, Rhodes 2010).
- In pursuing this line of investigation, this study examines implications of the dual vowel harmony systems in Eastern Meadow Mari for the theory and mechanisms of ABC.

(2) **Preview**

- Two vowel harmony patterns in Eastern Meadow Mari:
 - Backness harmony and round harmony
 - Controlled by distinct prominent positions
 - Show potential for action at a distance
- These two harmonies motivate
 - Prominence-sensitive IDENT-XX constraints
 - Nontransitive correspondence relations, where a target vowel corresponds with distinct triggers that do not correspond with one another (cf. Bennett 2013, to appear).

(3) **Organization**

- Data on vowel harmony in Eastern Meadow Mari
- ABC analysis of
 - backness and round harmony in harmonic stems

- harmony in words with disharmonic stems, motivating prominence-sensitive IDENT-XX constraints and nontransitive correspondence relations

- An alternative, discussion and closing

2. Vowel harmony in Eastern Meadow Mari

- The data and description of the Eastern Meadow dialect of Mari (Uralic; Russia) is based on documentation by Vaysman (2009).

(4) Vowel inventory¹

i	y		u
e	ø	ə	o
æ			a

- Vaysman (2009: 61) characterizes [ə] as “reduced” and all other vowels as “full”.
- Eastern Meadow Mari (EMM) displays two distinct vowel harmonies involving full vowels, backness harmony and round harmony, which each cause alternations in suffix vowels.
- Reduced vowels that are vocalized (augmented) to full vowels in metrically determined contexts undergo backness and round harmony, alternating between [e]/[ø]/[o]; otherwise they are realized as [ə].
- Backness harmony and round harmony are each sensitive to positional prominence.
- Note: The suffixes that Vaysman describes contain only non-high vowels and/or consonants.

¹ [æ] occurs only in non-initial syllables and is possibly non-phonemic.

2.1 Backness harmony in EMM

- Backness harmony operates from the **initial** syllable to a suffix vowel (5).
- Backness harmony is most often enforced in full vowels throughout the word; however, there are exceptions in stems.
- Boxed forms in (5), with disharmonic stems, show that backness harmony can operate across full vowels with an opposite backness value to reach a suffix vowel.
- Transparent vowels: Full vowels in disharmonic stems and [ə].²

(5)

a.	<i>Nom. sg. 2 pl. poss. suffix</i>	
	<i>Front</i>	<i>Back</i>
	'em-dæ 'medicine'	u'βer-ta 'news'
	tʃød'ræ-tæ 'forest'	kut'ko-ta 'ant'
	tʃi'jæ-tæ 'paint'	olək-'ta 'meadow'
	tyrə-'tæ 'edge'	
b.	<i>Dative suffix</i>	
	<i>Front</i>	<i>Back</i>
	me'raŋ-læn 'hare'	ol'ma-lan 'apple'
	impə-'læn 'horse'	kor'no-lan 'road'
	kyzə-'læn 'knife'	munə-'lan 'egg'
	ke'hjez-læn 'summer'	'lum-lan 'snow'

- The vowels [a] and [ə] do not trigger backness harmony and [e] does not undergo it. For details, see the appendix.
- The vowel in these suffixes is [a] when the initial vowel is [ə],

² Vaysman (2009: 89) states that nonvocalized [ə] does not show fronting or backing. Cf. Majors (1998) for discussion of [ə] variants conditioned by harmony in a North-West dialect of Mari.

which points to the suffix vowel being underlyingly /a/.³

(6)

rəwəz-'ta	'fox'	ləβə-'lan	'butterfly'
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2.2 Round harmony in EMM

- Round harmony operates from the **stressed** vowel to a suffix vowel (7).
- The suffixes in (7) exhibit [e] when the stressed vowel is unround and [ø] or [o] when it is round, with the backness quality determined by backness harmony.
- Round harmony does not operate within stems; numerous stems contain full vowels that disagree in rounding.
- When vowels in the initial and stressed syllables disagree in rounding, the stressed vowel determines the round value of the suffix vowel.
- Reduced vowels that intervene between the stressed vowel and the suffix vowel are transparent.⁴ There are no examples where an underlying full vowel occurs after the stressed vowel in the stem, because stress is preferentially assigned to a root-final full vowel.

(7)

a.	<i>3 sg. poss. suffix</i>	
	<i>Unround</i>	<i>Round</i>
	pykʃer'me-ʃe 'walnut tree'	'pørtə-ʃø 'pine forest'
	tʃød'ræ-ʃe 'forest'	'kyrtɲə-ʃø 'iron'
	køgør'tʃen-ʃe 'dove'	'ʃoʃə-ʃo 'spring'
	y'remə-ʃe 'street'	kəʔ'mo-ʃø 'shovel' ⁵

³ The [a] realization of the suffix vowels in (6) is also consistent with Vaysman's observation that [æ] does not seem to be a phoneme in EMM.

⁴ Vaysman (2009: 93) states that she could discern no evidence of round harmony affecting nonvocalized [ə].

⁵ The suffix vowel is fronted in this form because of the palatal [ɕ] (Vaysman 2009: 92, n. 34).

b. *Illative sg. nonposs. suffix*⁶

<i>Unround</i>		<i>Round</i>	
'igə-ʃke	'young animal'	'jyksə-ʃkø	'swan'
ʃer'ge-ʃke	'comb'	ʃe'ʎø-ʃkø	'wheat'
me'raŋ-əʃke	'hare'	kor'no-ʃko	'road'
'kində-ʃke	'bread'	ka'βun-əʃko	'pumpkin'

c. *Suffix meaning 'the one that is an X'*

<i>Front</i>		<i>Back</i>	
'kit-se	'hand'	'my-sø	'honey'
pe'ledəʃ-se	'flower'	'joŋələ-so	'mistake'

- Round harmony does not affect suffixes with underlying /e/ or /a/ (8), which points to the suffix vowels in (7) as being [ø], [o], or [ə] underlyingly.

(8) 'sør-ge 'milk' COMMITTATIVE kor'no-lan 'road' DAT

- When backness harmony and rounding harmony cannot both be satisfied, due to the absence of [ɣ] in the language, backness harmony prevails. For details, see the appendix.

2.3 Summary

(9) **Summary: EMM vowel harmony**

- Backness and round harmony operate among full vowels.
- *Backness harmony operates from the initial syllable* to suffix vowels.
- Backness harmony also typically operates among stem vowels, though there are some disharmonic stems, in which case suffix vowels harmonize for backness with the vowel in the first syllable.

⁶ [ə] is inserted before the suffix in some of these forms to break up a consonant cluster.

- *Round harmony operates from the stressed syllable* to suffix vowels. It is not enforced among stem vowels.
- Vowels that intervene between triggers and targets are transparent. These include [ə] and, in disharmonic stems, full vowels. Examples of the latter occur only for backness harmony.

3. ABC Analysis

(10) **Proposal:** The mechanism that gives rise to backness and round harmony in EMM is Agreement by Correspondence (ABC) (Walker 2000a, b, 2001, Hansson 2001, 2010, Rose & Walker 2004)

- ABC serves to enforce correspondence among (specific, similar) segments in an output, and it enforces featural identity among segments that correspond, which can give rise to assimilation.
- Hallmarks of the ABC approach are its capacity to model interactions between *similar segments* and to capture *action-at-a-distance*. (However, ABC may also be applied to local interactions, e.g. Inkelas & Shih 2013, Shih 2013, among others.)

(11) **Motivations for pursuing an ABC account of EMM:**

- *Action-at-a-distance:* Backness and round harmony in EMM show action-at-a-distance, operating across transparent vowels. This is most clearly evident in disharmonic stems, where backness harmony operates across full vowels with opposing backness values.
- *Similarity:* The vowels that participate show similarity in that they are all full, not reduced.
- *Economy:* If ABC is judged to be appropriate for some cases of vowel harmony, then economy favors its application to vowel harmony across-the-board.

3.1 Core constraints for ABC

(12) **Schema: CORR-XX** constraints

- **Assessment:** Assign a penalty to any pair of Xs that are not in correspondence in the output.
- Correspondence is similarity driven. Xs can be restricted so that they share certain features. CORR-XX(α F), enforces correspondence between X's that are specified [α F].
- Implicational relationship: If two segments sharing certain features are required to correspond, then segments that are more similar in the same dimension are also required to correspond. Captured by fixed rankings or stringent constraints.

(13) **Relevant for EMM: CORR-VV_{Non-min-prom}**

- Assign a penalty to any pair of full vowels that are not in correspondence in the output.
(Extends a proposal by Kaplan (to appear) in which certain constraints can target all positions that are non-minimally prominent.)

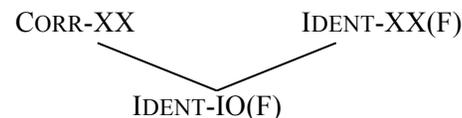
(14) **IDENT-XX(F)** constraints

- **Assessment:** Assign a penalty to any pair of corresponding Xs in the output that do not match in specification for [F].
- Evaluated locally over chain-adjacent pairs (Hansson 2006b, 2007). In other words, in a corresponding sequence [...S₁...S₂...S₃...], IDENT-XX(F) enforces identity for [F] between S₁ and S₂ and between S₂ and S₃.

(15) **IDENT-IO(F)** constraints

- **Assessment:** Assign a penalty to any pair of segments, α and β , where α is a segment in the input and β is a correspondent of α in the output, and α and β do not match in specification for [F].

(16) Basic ranking structure for harmony driven by ABC



3.2 Analysis: Backness harmony in words with harmonic stems

(17) Trigger control

- CORR-VV_{Non-min-prom} enforces correspondence among full vowels in the output, but it does not determine *which* vowel will control harmony.
- When a stem vowel and suffix vowel stand in correspondence, trigger-control by the stem vowel is achieved by IO positional faithfulness (McCarthy & Prince 1995, Urbanczyk 1996, Beckman 1997, 1998). Within harmonic stems, I assume that backness harmony is controlled by the initial syllable.

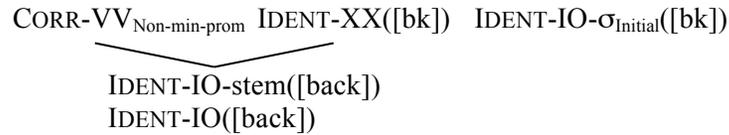
(18) **IDENT-IO- σ _{Initial}([back])**

- **Assessment:** Assign a penalty to any pair of segments, α and β , where α is a segment in the stem in the input and β is a correspondent of α in the output in the initial syllable, and α and β do not match in specification for [F].
- In what follows, it will be assumed that IDENT-IO- σ _{Initial}([back]) belongs to the top tier of the constraint hierarchy.

(19) **IDENT-IO-stem([back])**

- **Assessment:** Assign a penalty to any pair of segments, α and β , where α is a segment in the stem in the input and β is a correspondent of α in the output, and α and β do not match in specification for [F].

(20) **Ranking:** Backness harmony in harmonic stems



(21) Notes on tableau in (23) illustrating the above ranking

- The operation of round harmony is not considered. It is addressed in §3.3.
- [o] is assumed as the back counterpart to [e] in suffixes, even if it does not respect round harmony. (See appendix.)
- To conserve space, only candidates that obey IDENT-IO- $\sigma_{\text{Initial}}([\text{back}])$ are considered, and this constraint is not included in the tableau.
- Only vowels are shown in output candidates.

(22) *Discussion of candidates in (23):*

- Candidate (a): The winner. All vowels correspond with one another, and all harmonize with the initial syllable for backness.
- Candidate (b): Backness harmony is enforced only between the initial vowel and the suffix, but all vowels correspond. This losing candidate supports IDENT-XX([\text{back}]) >> IDENT-IO-stem([\text{back}]), IDENT-IO([\text{back}]).
- Candidate (c): Only the stressed vowel does not undergo backness harmony; the initial vowel corresponds with the unstressed stem vowel and the suffix. This losing candidate motivates CORR-VV_{Non-min-prom} >> IDENT-IO-stem([\text{back}]) and IDENT-IO([\text{back}]).
- Candidate (d): Backness harmony is enforced only between the initial vowel and suffix, and only these vowels correspond. Ruled out by CORR-VV_{Non-min-prom}.

- Candidate (e): All vowels are faithful to the input, and none of them correspond. Ruled out by CORR-VV_{Non-min-prom}.
- Candidate (f): All vowels are faithful to the input and all correspond. Ruled out by IDENT-XX([\text{back}]).

(23) **Backness harmony to stem and suffix vowels**

Example: [køgør'tʃen-ʃe] ‘dove’ 3.SG.POSS

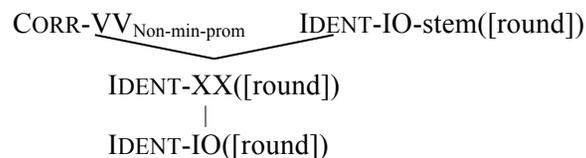
Comments on backness harmony	/køgortʃan-ʃo/ hypothetical input	ID-XX (bk)	CORR-VV	ID-IO stem (bk)	ID-IO (bk)
• All Vs agree • All Vs correspond	→ a. ø ₁ • ø ₁ • 'e ₁ – e ₁			**	***
• V1 & sfx harmonize • All Vs correspond	b. ø ₁ • o ₁ • 'a ₁ – e ₁	*!*	W	L	* L
• All but 'V harmonize • All but 'V correspond	c. ø ₁ • ø ₁ • 'a ₂ – e ₁		*!*** W	* L	** L
• V1 & sfx harmonize • V1 & sfx correspond	d. ø ₁ • o ₂ • 'a ₃ – e ₁		*!*** *W	L	* L
• Faithful to input • No Vs correspond	e. ø ₁ • o ₂ • 'a ₃ – o ₄		*!*** **W	L	L
• Faithful to input • All Vs correspond	f. ø ₁ • o ₁ • 'a ₁ – o ₁	*!W		L	L

3.3 Analysis: Round harmony

(24) Key differences from backness harmony in harmonic stems

- Round harmony does not operate among stem vowels; therefore IDENT-IO-stem([\text{round}]) is situated in the top tier.
- IDENT-IO-stem([\text{round}]) and CORR-VV_{Non-min-prom} dominate IDENT-XX([\text{round}]) to enforce correspondence among stem vowels but block round harmony among them. (Full stem vowels are assumed to correspond, because backness harmony operates among them.)

(25) **Ranking:** Round harmony in harmonic stems



(26) *Discussion of candidates in (27):*

- Candidate (a): The winner. All full vowels correspond, but round harmony occurs only between the stressed vowel and the suffix vowel.
- Candidate (b): Presents the same vowels as (a), but the full stem vowels, which disagree in rounding, do not correspond. Candidate (b) is not considered to represent the appropriate correspondence relations, because if stem vowels do not correspond, then we do not expect backness harmony among them. This losing candidate supports $\text{CORR-VV}_{\text{Non-min-prom}} \gg \text{IDENT-XX}([\text{round}])$.
- Candidate (c): All full vowels agree, and all correspond, with trigger control by the vowel in the initial syllable. This losing candidate motivates $\text{IDENT-IO-stem}([\text{round}]) \gg \text{IDENT-XX}([\text{round}])$.
- Candidate (d): All full vowels are faithful to the input and all correspond. Supports $\text{IDENT-XX}([\text{round}]) \gg \text{IDENT-IO}([\text{round}])$.
- Candidate (e): All full vowels agree, and all correspond, with trigger control by the stressed vowel. Ruled out by $\text{IDENT-IO-stem}([\text{round}])$.
- Candidate (f): All vowels are faithful to the input and none of them correspond. Ruled out by $\text{CORR-VV}_{\text{Non-min-prom}}$.

(27) Round harmony from stressed vowel to suffix vowel only:

[y'remə-ʃe] 'street' 3.SG.POSS

Comments on round harmony	/yremə-ʃø/ hypothetical input	ID-IO stem (rd)	CORR-VV	ID-XX (rd)	ID-IO (rd)
• Stem Vs disagree • All full Vs correspond	→ a. y ₁ • 'e ₁ • ə - e ₁			*	*
• Stem Vs disagree • 'V & sfx correspond	b. y ₁ • 'e ₂ • ə - e ₂		*!*	L	*
• Full Vs agree, V1 trigger • All full Vs correspond	c. y ₁ • 'ø ₁ • ə - ø ₁	*! W		L	*
• Faithful to input • All full Vs correspond	d. y ₁ • 'e ₁ • ə - ø ₁			**! W	L
• Full Vs agree, 'V trigger • All full Vs correspond	e. i ₁ • 'e ₁ • ə - e ₁	*! W		L	** W
• Faithful to input • No Vs correspond	f. y ₁ • 'e ₂ • ə - ø ₃		*!*** W	L	L

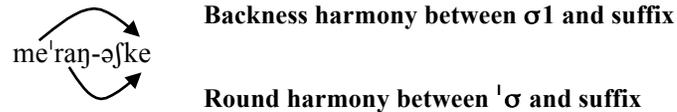
(28) **Review: Local triggers**

- So far, the suffix vowel always agrees with the last preceding full vowel in backness and rounding.
- In other words, in a corresponding sequence of full vowels, V₁ • V₁ - V₁, the suffix vowel can be considered to harmonize with the final stem vowel for backness and rounding.
- This is because in harmonic stems, backness harmony is enforced among all full stem vowels, transmitting the backness value of the vowel in the first syllable to later stem vowels.
- Also, there are no cases where a full stem vowel intervenes between the stressed vowel and the suffix.

3.4 Analysis: Trigger control in disharmonic stems

(29) Multiple triggers in vowel harmony

- Disharmonic stems motivate multiple triggers
- Data in (5) established that in disharmonic stems, the vowel in the initial syllable, and not the stressed vowel, controls backness harmony.
- Data in (7) established that when the vowels in the initial and stressed syllables disagree for rounding, it is the stressed vowel that controls round harmony.
- Thus, in a word with a disharmonic stem, like [me¹raŋ-əʃke], the backness of the suffix vowel is determined by the vowel in the initial syllable, and the rounding by the stressed vowel.⁷



(30) Trigger control by distinct prominent positions

- To obtain feature-specific triggering of harmony by different positions, I propose position-sensitive IDENT-XX constraints, as in (31) (after Bennett to appear; Rose & Walker 2004 propose a similar schema for precedence-sensitive IDENT-CC constraints.)
- These constraints enforce agreement for the feature in question between the vowel in the specified position and vowels that correspond with it (subject to local evaluation, discussed above).

⁷ Vaysman (2009) does not provide examples of words with disharmonic stems where backness and rounding disagree in the stressed and initial vowel and the suffix could alternate for rounding (e.g. [y • a – e], [i • o – ø]). However, descriptions of Eastern Mari dialects agree that round harmony is controlled by the stressed vowel (Sebeok and Ingemann 1961, Vaysman 2009), and Vaysman establishes that the initial syllable controls backness harmony independent of the stressed vowel, driving a need for separate trigger vowels.

(31) Position-sensitive IDENT-XX constraints

a. IDENT-XX- σ_{Initial} ([back])

Assessment: Let S_1 be a segment in the initial syllable in the output and S_2 be a segment in the output that is in correspondence with S_1 . Assign a penalty if S_1 is [ɣback] and S_2 is not [ɣback].

b. IDENT-XX- $^1\sigma$ ([round])

Assessment: Let S_1 be a segment in the stressed syllable in the output and S_2 be a segment in the output that is in correspondence with S_1 . Assign a penalty if S_1 is [ɣround] and S_2 is not [ɣround].

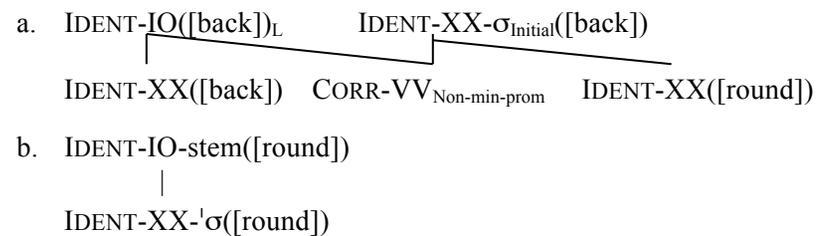
(32) Disharmonic stems

- Exceptional stems that do not show backness harmony are protected by a stem-specific faithfulness constraint that is indexed to the stems in question (Pater 2000, 2009):
- IDENT-IO-stem([back])_L

Assessment: Assign a penalty to any pair of segments, α and β , where α is a segment in the input of a stem with an index L and β is a correspondent of α in the output, and α and β do not match in specification for [F].

(33) Ranking

- The additional constraints are integrated into the existing constraint hierarchy as follows



(34) Notes on tableau in (35)

- Presents evidence for ranking of CORR-VV_{Non-min-prom} in (33a) due to backness harmony at a distance to the suffix vowel, with a trigger distinct from the closest corresponding stem vowel.
- For simplicity, epenthetic [ə] is not shown in the outputs

(35) Enabling separate triggers for BH and RH

[me'raŋ-əʃke] 'hare' ILL.SG.NONPOSS

Comments	/me'raŋ _L -ʃko/ hypothetical input	ID-IO (bk) _L	ID-XX σ ₁ (bk)	CORR- VV
<ul style="list-style-type: none"> • BH from V1 to sfx • RH from 'V to sfx • Stem Vs correspond with sfx but not each other 	→ a. e ₁ • a ₂ - e _{1,2}			*
<ul style="list-style-type: none"> • BH from closest corresponding V to sfx • All Vs correspond 	b. e ₁ • 'a ₁ - o ₁		*!	
<ul style="list-style-type: none"> • BH among all Vs • RH from 'V to sfx • All Vs correspond 	c. e ₁ • 'æ ₁ - e ₁	*!		

(36) Discussion of candidates in (35):

- Candidate (a): The winner. The stem vowels are each in correspondence with the suffix vowel, but not with each other. There is backness harmony (BH) between the initial vowel and the suffix and round harmony (RH) between the stressed vowel and suffix, but no harmony enforced among stem vowels.
- Candidate (b): Shows backness harmony from the last corresponding stem vowel to the suffix. All vowels correspond with one another, but the stem vowels do not show backness harmony. This losing candidate supports ranking IDENT-XX-σ_{Initial}([back]) over CORR-VV_{Non-min-prom}. (The suffix vowel is [o], because [ɤ] is not possible, see appendix.)

- Candidate (c): Backness harmony among all vowels, and all vowels correspond. This losing candidate motivates ranking IDENT-IO([back])_L >> CORR-VV_{Non-min-prom}.

(37) Summary

- A key feature of the hierarchy in (33a) is that the domination of CORR-VV_{Non-min-prom} causes correspondence between the vowel in the initial syllable and the stressed vowel to be blocked in forms where (i) vowels in the initial and stressed syllables disagree for backness in the input, and (ii) they belong to an exceptional stem.
- This inhibition of correspondence between the stressed vowel and initial vowel obtains the transparency of the stressed vowel to backness harmony in disharmonic stems.

(38) Evidence for further rankings

i. IDENT-IO-stem([round]) >> IDENT-XX-σ([round])

- Motivated on the basis of harmonic stems with full vowels that disagree in rounding, e.g. [y'remə-ʃe] 'street' 3.SG.POSS.
- In order to transmit backness harmony, stem vowels must correspond with one another in the output (see (27)).
- This ranking prevents the stressed vowel from giving rise to round harmony with corresponding stem vowels.

ii. IDENT-XX-σ_{Initial}([back]) >> IDENT-XX([round])

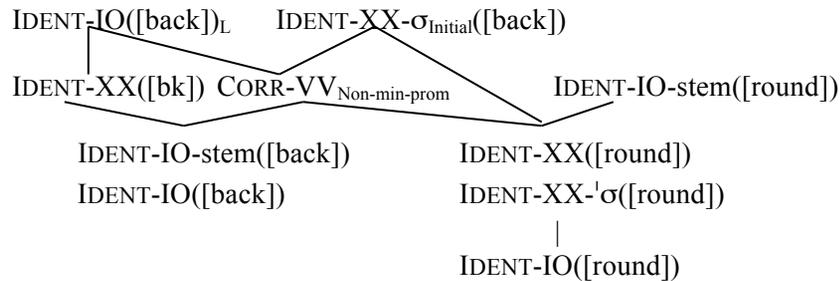
- Motivated by what is expected for disharmonic stems with full vowels that disagree in backness and rounding, e.g. hypothetical [i • 'o - ø].
- The desired correspondence structure among vowels in the output is [i₁ • 'o₂ - ø_{1,2}], with the first vowel controlling backness harmony and the stressed vowel controlling round harmony (see (35)).

- The ranking in question rules out $[y_1 \cdot 'o_1 - \emptyset_1]$, where the initial vowel undergoes round harmony with the stressed vowel to escape the winner's violation of IDENT-XX([round]) between the first vowel and the suffix.

iii. IDENT-IO([back])_L >> IDENT-XX([back])

- Motivated by what is expected for disharmonic stems with full vowels that disagree in backness and rounding, e.g. hypothetical $[i_1 \cdot 'o_2 - \emptyset_{1,2}]$.
- The ranking in question rules out $[i_1 \cdot 'o_1 - \emptyset_1]$, where the stressed vowel undergoes backness harmony with the initial vowel to escape the winner's violation of IDENT-XX([back]) between the stressed vowel and the suffix.

(39) Updated ranking



4. Nontransitive correspondence relations in ABC

(40) **Claim: Correspondence relations can be nontransitive**

- The output correspondence configuration in disharmonic forms (e.g. (35a)) departs from a claim by Bennett (2013, to appear), who posits that surface correspondence relations are transitive.
- Under transitivity, if the initial and stressed stem vowels are each

in correspondence with the suffix, then the initial and stressed vowels must also correspond, but this is not respected in (35a).

- However, if strictly transitive correspondence relations are adopted, together with local evaluation of IDENT-XX constraints in correspondence chains (Hansson 2006b, 2007), then backness harmony is expected from the last stem vowel rather than the initial vowel in disharmonic stems, because harmony from the former fares better on IDENT-XX([back]), as shown in (41).

(41) Problem for transitive correspondence relations

$[u^1\beta\text{er-ta}]$ ‘news’ NOM.SG.2.PL.POSS

$/u^1\beta\text{er}_L\text{-ta}/$	ID-IO (bk) _L	ID-XX $\sigma_1(\text{bk})$	CORR-VV	ID-XX (bk)
→ a. $u_1 \cdot 'e_1 - a_1$		*		** _i
⊗ b. $u_1 \cdot 'e_1 - \text{æ}_1$		*		*
c. $u_1 \cdot 'o_1 - \text{æ}_1$	*!			

- Under transitive correspondence, there is no IDENT-based means by which to drive nonlocal agreement from the first member of a corresponding chain to the last chain member, skipping a disagreeing medial chain member. (But see Krämer 2003 on the concept of “balance.”)
- If nontransitive correspondence is available, the inhibition of correspondence between the stressed vowel and initial vowel in the present account obtains the transparency of the stressed vowel to backness harmony, while still enabling it to control round harmony in the same target vowel in suffixes that alternate for rounding.

5. ABC versus Prominence-based Licensing

(42) **Prominence-based licensing analysis of EMM**

- Backness and round harmony in EMM has also been analyzed using Prominence-based Licensing constraints (Walker 2011).

- This approach licenses [back] and [+round] features of the vowel in the final syllable by their expression in the prominent initial and stressed syllables, respectively.
- Features are expressed in these positions by some member of their feature chain belonging to the relevant position (through spreading or feature duplication).

(43) **Comparison with the ABC analysis**

- **Harmony among suffixes:**
 - ABC analysis predicts harmony will propagate among successive suffixes, which is borne out, at least for backness harmony. (There are no examples to show successive round harmony in suffixes in Vaysman 2009.)
 - The Prominence-based Licensing account predicts that licensing is required by vowels in the final syllable only. This could be revised to suffix vowels more generally or the account could be augmented with identity operating between stems and affixed forms.
- **Backness harmony within stems:**
 - Predicted by the ABC analysis.
 - Requires revision of the Prominence-Based Licensing account to extend the set of weak vowels whose [back] feature is subject to licensing to any non-initial vowel.
- **Role for prominence:**
 - ABC analysis requires position-sensitive IDENT-XX constraints, whose range of application to other harmony patterns remain to be examined (though see Bennett to appear). Constraints of this kind might form part of a basis for uniting ABC and prominence-based licensing accounts of harmony
 - Prominence-based licensing approach already involves constraints that reference asymmetry in prominence.

- **Cases where harmony does not occur in EMM (see appendix):**
 - Not yet analyzed in the ABC account, so it is not yet known whether these cases will be problematic.
 - Can be accounted for in the Prominence-based Licensing approach.

6. Discussion and closing

(44) **Prominence in ABC constraints**

- This account makes use of constraints that reference relative prominence (CORR-VV_{Non-min-prom}, IDENT-XX-σ_{Initial}([back]), IDENT-XX-[!]σ([round]))
- It has been observed that consonant harmony does not show sensitivity to prosodic structure (Hansson 2001, 2010; cf. Rose & Walker 2004).
- However, prominence distinctions could be expected to be more relevant in vowel harmony, as vowels typically bear the brunt of expressing prosodic prominence.
- Accordingly, ABC-driven vowel harmony could be more prone to show sensitivity to properties of prosodic prominence than consonant harmony.

(45) **Take away findings**

- ABC has the capacity to obtain the complex dual vowel harmony systems of EMM, which involve distinct triggers in different prominent positions.
- This account is made possible, in part, by adopting prominence sensitive IDENT-XX constraints, and by permitting nontransitive correspondence relations.
- Avenues for future research include extending these results to (i) other prominence-sensitive vowel harmonies, and (ii) other systems where targets harmonize for different properties with multiple triggers.

Appendix: Circumstances where harmony fails in EMM

Backness harmony

- Backness harmony is not triggered by [ə] or [a]. In a word where one of these vowels is in the initial syllable a nonlow suffix vowel is realized as [e] if the stressed vowel is unround (46). See (7b) for examples of front/back alternations with this suffix. The vowel is expected to be [o] if it harmonizes for [+back] (see (48a)).

(46) 'əʃkəl-ʃke 'step' ILL.SG.NONPOSS
'wastər-ʃke 'maple' ILL.SG.NONPOSS

- Backness harmony also does not affect suffixes with underlying /e/:

(47) ol'ma-ge 'apple' COMMITATIVE
'lum-ge 'snow' COMMITATIVE
cf. 'ij-ge 'year' COMMITATIVE

Round harmony

- Round harmony does not affect vowels that are underlyingly /e/ or /a/ (see (8)).
- When the initial syllable contains a back vowel and the stressed syllable is unround, a nonlow suffix vowel is realized as [o] rather than [ɤ], which never occurs in EMM (48a). The example in (48b) confirms that the rounding in the suffix vowel in (48a) is present because of the backness of the initial vowel, not its rounding. This indicates that in avoidance of [ɤ], backness harmony trumps round harmony.

(48) a. ojlə'maʃ-əʃko 'story' ILL.SG.NONPOSS
kugu'zan-əʃko 'princess' ILL.SG.NONPOSS
b. kəgər'tʃen-əʃke 'dove' ILL.SG.NONPOSS
*kəgər'tʃen-əʃkə

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