Exceptional and derived environments in Assamese vowel harmony

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Main claim

Assamese vowel harmony with **exceptional triggers** and **exceptional undergoers** follows in an account without direct reference to morphology in the phonology:

1. **exceptional triggers=** floating features
2. **exceptional undergoers=a** marked structure is avoided if it is derived but preserved if it is underlying: a **gang effect in HG**

(Legendre et al., 1990; Smolensky and Legendre, 2006)

Assamese

- all data and generalizations from Mahanta (2008) and Mahanta (2012)

(1) **Vocalic inventory (Mahanta, 2012, 1111)**

<table>
<thead>
<tr>
<th>+back, +low</th>
<th>+high, +low</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>u</td>
<td>ə</td>
</tr>
</tbody>
</table>

(2) **Suffix-triggered harmony (Mahanta, 2012, 1112-1113)**

<table>
<thead>
<tr>
<th>a. goil ‘mix’</th>
<th>–i</th>
<th>guli ‘to mix’</th>
</tr>
</thead>
<tbody>
<tr>
<td>pet ‘belly’</td>
<td>–u</td>
<td>petu ‘pot belled’</td>
</tr>
<tr>
<td>b. boror ‘year’</td>
<td>–i</td>
<td>bosori ‘yearly’</td>
</tr>
<tr>
<td>gereka ‘fat’ (masc)</td>
<td>–i</td>
<td>gereki ‘fat’ (fem)</td>
</tr>
<tr>
<td>box ‘settle’</td>
<td>–3-i</td>
<td>bosiroti ‘settlement’</td>
</tr>
<tr>
<td>mus ‘die’</td>
<td>–3-i</td>
<td>moroti ‘cursed to die’</td>
</tr>
</tbody>
</table>

(3) **No [-ATR] harmony (Mahanta, 2012, 1113)**

<table>
<thead>
<tr>
<th>a. bu ‘ghost’</th>
<th>–e</th>
<th>b’utug ‘ghost’ (Erg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>kin ‘buy’</td>
<td>–e</td>
<td>kinte ‘buy’ (Erg)</td>
</tr>
<tr>
<td>p’ur ‘travel’</td>
<td>–i</td>
<td>p’utru ‘travel (1.Pes)’</td>
</tr>
<tr>
<td>b. gurum ‘hot’</td>
<td>–i</td>
<td>gurumut ‘heat’ (Acc)</td>
</tr>
<tr>
<td>poxek ‘week’</td>
<td>–i</td>
<td>popoxekot ‘week’ (Loc)</td>
</tr>
</tbody>
</table>

Opaque /a/:

- the **low vowel /a/ is opaque** and blocks any further harmony to its left
- this opaque /a/ can be in the stem (4-a) or the suffix (4-b)

(4) **Opaque low vowel /a/ (Mahanta, 2012, 1119)**

<table>
<thead>
<tr>
<th>a. kopah ‘cotton’</th>
<th>–i</th>
<th>kopahsi ‘made of cotton’</th>
</tr>
</thead>
<tbody>
<tr>
<td>zikor ‘shake’</td>
<td>–i</td>
<td>zikori ‘shake’ (bat)</td>
</tr>
<tr>
<td>hier ‘trade’</td>
<td>–i</td>
<td>hieri ‘trader’</td>
</tr>
<tr>
<td>b. lih ‘write’</td>
<td>–ar</td>
<td>lihuru ‘writter’</td>
</tr>
<tr>
<td>gak ‘grow’</td>
<td>–al</td>
<td>gakali ‘sprout’</td>
</tr>
<tr>
<td>zon ‘silver’</td>
<td>–al</td>
<td>zonali ‘silverly’</td>
</tr>
</tbody>
</table>

(5) **Exceptional raising (Mahanta, 2012, 1121)**

<table>
<thead>
<tr>
<th>sal ‘roof’</th>
<th>–i</th>
<th>salij ‘roof-ed’</th>
</tr>
</thead>
<tbody>
<tr>
<td>dil ‘branch’</td>
<td>–i</td>
<td>dilij ‘branch-ed’</td>
</tr>
<tr>
<td>mor ‘beat’ (Vb)</td>
<td>–i</td>
<td>morij ‘beat’</td>
</tr>
<tr>
<td>mitsu ‘lie’</td>
<td>–i</td>
<td>mitsulij ‘lie’</td>
</tr>
<tr>
<td>k’itup ‘title’</td>
<td>–i</td>
<td>k’itupij ‘renowned/titled’</td>
</tr>
<tr>
<td>d’ur ‘debt’</td>
<td>–uvn</td>
<td>d’ornu ‘debtor’</td>
</tr>
</tbody>
</table>
Exceptional and derived environments

Worbs & Zimmermann

Exceptional and derived environments

Background assumptions

- Harmonic Grammar
  - Weighted constraints (Smolensky and Legendre, 2006; Legendre et al., 1990)
- Stratal OT
  - Pre-optimization at the stem level ensures that all stems are (featurally) fully specified (cf. Trommer, 2011)
- Autosegmental feature representations: Max(F) and Dep(F) preserve feature specifications in correspondence theory (McCarty and Prince, 1995)

(14) a. **Max(±F)**
   Assign a violation mark for every [+F] input feature without an output correspondent.

b. **Dep(±F)**
   Assign a violation mark for every [-F] output feature without an input correspondent.

1. in the absence of an adjacent /ui/, the two suffixes trigger regular [+ATR] harmony

Exceptional triggers: Regular triggers for [+ATR]-harmony

- **Analysis**
  - fronting only for phonologically derived mid vowels, never for underlyingly mid ones

Summary: The empirical picture

10. Regular ATR-Harmony
11. Opaque low vowel

<table>
<thead>
<tr>
<th>( /\text{a} )</th>
<th>( /\text{i} )</th>
<th>( /\text{e} )</th>
<th>( /\text{u} )</th>
<th>( /\text{i} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{[a]} )</td>
<td>( \text{[i]} )</td>
<td>( \text{[e]} )</td>
<td>( \text{[u]} )</td>
<td>( \text{[i]} )</td>
</tr>
</tbody>
</table>

12. Exceptional trigger
13. Exceptional undergoer

<table>
<thead>
<tr>
<th>( /\text{a} )</th>
<th>( /\text{i} )</th>
<th>( /\text{e} )</th>
<th>( /\text{u} )</th>
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Analysis

Regular harmony

- Harmony is the result of feature spreading.
  - Triggered by an alignment constraint, that aligns [+ATR]-features with the left edge of a prosodic word.
  - It can only become active, when it reduces markedness by keeping the [-ATR]-features from being realized.
Constraints for regular harmony

(15) a.  \[\text{ALGN}\{\text{[+ATR]} \text{,} \text{[low]}\}\]
Assign a violation mark for every [+ATR] feature that is not associated with the leftmost vowel in a prosodic word.

b.  \[\text{[+ATR]}\]
Assign a violation mark for every [ATR] feature in the output.

Opaque α

- The opacity of /a/ follows from a high ranked markedness constraint against [+ATR,-low] vowels.
(17) \[\text{[+ATR,-low]}\]
Assign a violation mark for every vowel that is associated to [+ATR] and [-low].

Constraints for opaque α

- Changing the \[\text{[\pm\text{low}]}\] feature would entail more violation, because either the \[\text{[\pm\text{back}]}\] or the \[\text{[\pm\text{round}]}\] value would have to be changed as well.
(19) a.  \[\text{[+rd]}\]
Assign a violation for every [+round]-feature in the output.

b.  \(\text{FAITH}(\text{[rd]} \text{= DEP(\text{[rd]} + \text{MAX}(\text{[rd]}))} \)

Exceptional triggers: Floating features

- /-ja/ and /-wa/ bear a floating [-low]-feature that strives to associate to a stem-final vowel.
- That only an adjacent /a/ can be raised follows mainly from the inviolable ban on the crossing association lines.

- The raised vowel can now undergo regular ATR-harmony.
(21) a.  \[\text{MAXFL}\]
Assign a violation mark for every floating input feature without an output correspondent.

b.  \[\text{FLOAT}\]
Assign a violation for every floating feature in the output.
(cf. Wolf (2007))
Exceptional triggers: Default realization

- Although [+bk] is marked, the /u/ becomes /o/ in the default case since changing the [+back]-feature is too costly.

(23) "[+bk]
Assign a violation for every [+back]-feature in the output.

Exceptional undergoers

- Exceptional harmony in derived environments is triggered by a Share constraint that requires mid vowels to agree in backness. (~Parasitic vowel harmony; cf. Jurgec, 2011, 2013)

(25) \text{Share}_{[bk]} \quad \text{Assign a violation mark for every pair of [low]-vowels in adjacent syllables that have a different [+back] value.}

- In combination with the Faith(r), "[+rd]" and "[+bk]" it 
  \text{gangs up against Max(bk)}.

Underlying /Co/

- Underlying mid back vowels do not front after /e/, because changing [+back] is too costly:

- It does not help to avoid a violation of Faith(±rd) – The faithful candidate has no Faith(±rd) violation.

The gang effect

(28) \text{Underlying mid vowel}

(29) \text{Derived mid vowel}

- Imposible! Staying /e/ requires add. change of [rd]
Alternative: morpheme-specific constraints

The account in Mahanta (2012)

- directional 'agree' constraint \([-\text{ATR}][+\text{ATR}]\)
- exceptional triggers: lexically indexed constraints \([-\text{ATR}][+\text{ATR}], \Rightarrow \text{lo}[\text{lo}] \Rightarrow [\text{-ATR}][+\text{ATR}]\)
- exceptional fronting: markedness avoidance effect \((-\text{LICENSE}[-\text{HIGH}, -\text{LOW}, +\text{BACK}])\)

Potentially problematic:

→ undergeneration: the exceptional undergoers are not correctly predicted
→ economy: specific morphological information is accessible in the phonology

Exceptional undergoer ~ Phonologically Derived Environment Effect

- the gang effect responsible for the exceptional fronting is in fact the implementation of a Phonologically Derived Environment Effect (Kiparsky, 1973; Lubowicz, 2002; Burzio, 2011)

Possible extension to other instances of PDEE

- only a derived long vowel in Slovak undergoes diphtongization, an underlyingly long vowel is realized faithfully (31)

\[ \Rightarrow \text{HG: a marked long vowel and addition of a \(\mu\)-association to a vowel is too much: diphtongization applies for mid vowels} \]

(31) PDEE in Slovak (Lubowicz, 2002)

\[ [\text{plv}+\mu] \quad [\text{čel}+\mu] \quad [\text{dce}r+\mu] \]

1. Affix-triggered V-lengthening:

- plv: čel: –
- čel: čel: –

2. Diphtongization for mid V:

- plv: čel: –
- čel: čel: –

\[ \text{Summary} \]

The complex pattern of vowel harmony in Assamese involving two levels of exceptionality follows in an account relying on independently motivated mechanisms:

- strengthening and extending the claim for floating features made for especially non-concatenative morphology (Zoll, 1996; Wolf, 2007)
- a gang effect in HG: deriving a marked structure is avoided whereas the same marked structure is preserved if underlying (~PDEE)

References

Archangeli, Diana and Douglas Pulleyblank (2002), 'Kniande vowel harmony: domains, grounded conditions and one-sided alignment', Phonology 19, 139–188.
Staubs, Robert, Michael Becker, Christopher Potts, Patrick Pratt, John J. McCarthy and Joe Pater (2010), 'Or-help 2.0: software package'.

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