Introduction


- It presents blocking effects and transparency in the same system.

1. ATR harmony in Menominee

Menominee vowels

<table>
<thead>
<tr>
<th>Vowel</th>
<th>+ATR</th>
<th>-ATR</th>
</tr>
</thead>
<tbody>
<tr>
<td>i, u</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I, U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>θ</td>
<td>+ATR</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>-ATR</td>
<td></td>
</tr>
</tbody>
</table>

- Vowels may be long or short

(Vowel transcriptions after Archangeli & Suzuki 1995)

[+ATR] harmony in adjacent syllables

- Triggers and Targets: Non-low vowels
- Direction: Regressive (rightward)

1. 

a. sipiah 'river (loc.)' (A&P-377)
   + +
   sipia:hsöh 'creek' (A&S-8)
   + + - +
   sipiw 'river' (A&P-377)
   - -

  - /i/ is a trigger and /t/ is a target.
  - /a/ is not a trigger.

(Data from Archangeli & Pulleyblank 1994 (A&P) and Archangeli & Suzuki 1995 (A&S), based on Bloomfield 1962, 1975)
Harmony in adjacent syllables

b. utu:puakanw  ‘he has X as a pipe’ (A&P:377)
   +  +  
   utu:ta:mzw  ‘he has X as a totem’ (A&P:377)
   -  +  
   /u/ is a trigger and /o/ is a target.
   /a:/ is not a trigger.

c. ahku:pi:kat  ‘the water extends so far’ (A&P:381)
   +  +  
   ahku:hnaw  ‘he walks so far’ (A&P:381)
   -  +  
   /i/ is a trigger and /o/ is a target.

Short non-low vowels

- Ambiguities about the target status of [i u] arise from Bloomfield’s phonemic orthography and phonetic mergers.
- Basic conclusions about non-low vowels:
  - [ATR] contrasts are perceived in long vowels.
  - [ATR] contrasts are not perceived in short vowels, except before glottal stop.

Summary: Harmony in adjacent syllables

- Triggers and targets are non-low vowels.
- Harmony is for [+ATR] only.
- Harmony is regressive.
2. Analysis

Opaque vowels

- [+ATR] low [a a:] block [+ATR] harmony.
  a. prɪːtəhkiːʔtaw ‘he sticks his head in’ (A&P:383)
  - + +
  b. mʊːntəpəniːw ‘he digs potatoes’ (A&P:383)
  - - + +
  c. krəskinaːhciːhaw ‘he cuts off his fingers’ (A&P:383)
  - - + +

(After Archangeli & Pulleyblank 1994)

Transparent vowels

- [-ATR] low [a a:] are transparent.
  a. wayiːtuːhkiːtwaʔ ‘they work together??’ (A&P:378)
    + + - +
  b. niciːpaːhkɪm ‘cook (nom.)’ (A&P:379)
    + - +
  c. crpaːhkaw ‘he cooks’ (A&P:379)
    -

(Question marks indicate glosses reconstructed by Archangeli & Pulleyblank 1994)

Overview

- Constraints that require similar vowels in an output to be in chained correspondence are active.
  - Agreement by Correspondence
  - Blocking by Correspondence
  - Transparency by Lack of Correspondence
2.1 Theoretical background

- Similarity-driven correspondence
  - Corr-SegSeg constraints require segments to correspond with one another in an output.
  - The bulk of prior research has centered on Corr-SegSeg constraints applicable to consonants.
  - Corr-SegSeg can be restricted to segments that are identical for a particular set of features, e.g. non-low vowels ([]-low]).

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2.2 Preview

  (cf. Krämer 2001 for a different approach to vowel harmony using correspondence.)

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Similarity-driven correspondence

- If segments differing only in features [F, G] are among those required to stand in correspondence, segments that are more similar, i.e. that differ in [F] only, [G] only, or neither, are also required to correspond.

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Ident-SegSeg only, or neither, are also required to correspond.

For vowel harmony, V will be substituted for Seg in Corr-SegSeg and Ident-SegSeg constraints.

Ranking structure for vowel harmony driven by ABC:

Corr-VV | Ident-VV(F) | Ident-IO(F)
---|---|---

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Summary of theoretical background:

Corr-VV constraints are active that operate over:

- Non-low vowels
  - [+]ATR vowels

Agreement by Correspondence (ABC):

Corresponding vowels can show harmony.

Input: /V1 V2 V3/ -F -F +F

Output: [V1, V2, V3] +F +F +F
Preview

Blocking by Correspondence (BBC):
Intervening low [+ATR] vowels block because they correspond with potential trigger vowels and do not correspond with a potential target.

\[ [V_1 \ y \ V_2 \ x \ V_3] \]
- \( F \)
+ \( F \)
+ \( F \)

Preview

Transparency by Lack of Correspondence (TLC):
Low [-ATR] vowels are transparent because they correspond with potential trigger vowels and do not correspond with a potential target.

\[ [V_1 x \ V_2 y \ V_3 x] \]
+ \( F \)
- \( F \)
+ \( F \)

2.3 The basic pattern
Constraints: Output correspondence

- **Corr-\( V_{[-\text{lo}]}/V_{[-\text{lo}]} \):**
  Let \( S \) be an output string of segments and let \( X \) and \( Y \) be [-cons, -low] segments. If \( X \) and \( Y \in S \), then \( X \) and \( Y \) correspond.

- **Ident-VV(+ATR)**
  Let \( X \) be a segment in the output and \( Y \) be a correspondent of \( X \) in the output. If \( X \) is [+ATR], then \( Y \) is [+ATR].

Constraint formulations after Rose & Walker 2004; prior applications of ABC to vowel harmony by Hansson 2006b, Rhodes 2008

Constraints: IO Faithfulness

- **Ident-IO(+ATR)**
  Let \( X \) be a segment in the input and \( Y \) be a correspondent of \( X \) in the output. If \( X \) is [+ATR], then \( Y \) is [+ATR].

- **Ident-IO(-ATR)**
  Let \( X \) be a segment in the input and \( Y \) be a correspondent of \( X \) in the output. If \( X \) is [-ATR], then \( Y \) is [-ATR].

(McCarthy & Prince 1995)

[+ATR] harmony

- **Ident-IO(+ATR)**, **Corr-\( V_{[-\text{lo}]}/V_{[-\text{lo}]} \)**, **Ident-VV(+ATR)** >> **Ident-IO(-ATR)**

Ex. 

<table>
<thead>
<tr>
<th>( \cdot u_1 \cdot u_2 \cdot )</th>
<th>( \text{Id-IO(+ATR)} )</th>
<th><strong>Corr-( V_{[-\text{lo}]}/V_{[-\text{lo}]} )</strong></th>
<th><strong>Id-VV(+ATR)</strong></th>
<th><strong>Id-IO(-ATR)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( \cdot u_1 \cdot u_2 \cdot )</td>
<td>( + )</td>
<td>( + )</td>
<td>( - )</td>
<td>( + )</td>
</tr>
<tr>
<td>b. ( \cdot 0_1 \cdot u_2 \cdot )</td>
<td>( + )</td>
<td>( + )</td>
<td>( - )</td>
<td>( - )</td>
</tr>
<tr>
<td>c. ( \cdot 0_1 \cdot u_2 \cdot )</td>
<td>( + )</td>
<td>( - )</td>
<td>( + )</td>
<td>( - )</td>
</tr>
<tr>
<td>d. ( \cdot 0_1 \cdot 0_2 \cdot )</td>
<td>( + )</td>
<td>( - )</td>
<td>( - )</td>
<td>( - )</td>
</tr>
</tbody>
</table>

Summary: Basic pattern

- **Further details:**
  - Analysis of regressive directionality and restriction of harmony to [+ATR] only – see appendix.
2.4 Blocking segments

- Low [+ATR] [ə, ɐ] block harmony.
- Blocking by Correspondence
  [ ...V₁,...V₂,...V₃,... ]
  \[ \text{I: e: i} \]
- Blocking [+ATR] low vowel (V₂) corresponds with potential trigger (V₃), because of identical [+ATR] specification (Corr-V₁[+ATR]V₂[+ATR]).
- Potential non-low target (V₁) is prevented from harmonizing with [ə] (V₂) because of difference in height (Ident-VV(low)).
  (Approach to blocking by similarity after Rhodes 2008)

2.5 Transparent segments

- Low [-ATR] [a, ɑ] are transparent.
- Caused by lack of similarity to trigger vowels, which are non-low.
- Ident-IO(-ATR) dominates Corr-VV, the constraint driving correspondence between any vowels, including non-low [+ATR] and low [-ATR].

Blocking by Correspondence

- Ident-IO(+ATR), Ident-IO(low), Corr-V₁[+ATR]V₂[+ATR]
  >> Ident-VV(low)
  >> Corr-V₁[+ATR]V₂[+ATR]
- Ident-IO(+ATR) and Ident-IO(low) prevent alterations to an underlying [+ATR] specification or height.
- Ident-VV(low) >> Corr-V₁[+ATR]V₂[+ATR] minimizes links in correspondence chains where vowels differ in height, even if it causes non-low vowels not to correspond.
- Result: Vowels that differ in height will only correspond if they are both underlyingly [+ATR].

Summary: Blocking effects

- Ident-VV(low)
- Corr-V₁[+ATR]V₂[+ATR]

Transparency by Lack of Correspondence

- Ident-IO(-ATR) >> Corr-VV
  Ex. mci:pa:phkim ‘cook (nom.)’

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>... l' ø' i' ...</td>
<td>Id-IO (+ATR)</td>
<td>Corr-V₁[+ATR]V₂[+ATR]</td>
<td>Id-IO (-ATR)</td>
<td>Corr-VV</td>
</tr>
<tr>
<td>a. [l] ø' i' i'</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. l' ø' i' i'</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c. l' ø' i' i'</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>d. l' ø' i' i'</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>e. l' ø' i' i'</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
Summary: Transparent vowels

<table>
<thead>
<tr>
<th>Corr-(V_{[\text{lo}]}V_{[\text{lo}]} )</th>
<th>Corr-(V_{(+\text{ATR})}V_{(+\text{ATR})} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ident-IO(-ATR)</td>
<td>Corr-VV</td>
</tr>
</tbody>
</table>

3. Discussion

Discussion

- Relative similarity drives correspondence and conditions which vowels participate in the [+ATR] harmony system of Menominee.
- Harmonizing vowels: \([\text{t}(\cdot) \cup \text{d}(\cdot)]\)
  - Correspond with [+ATR] non-low triggers.
  - Match in height with [+ATR] non-low vowels.
- Transparent vowels: \([\text{a}(\cdot)]\)
  - Do not correspond with [+ATR] triggers.
  - Differ (at least) in [low] and [ATR] with [+ATR] non-low vowels.

Discussion

- Blocking vowels: \([\text{a}(\cdot)]\)
  - Correspond with [+ATR] triggers but not with [-ATR] targets.
  - Match for [+ATR] with [+ATR] vowels. They (covertly) correspond with triggers and function as non-alternating targets.
  - Differ (at least) in [ATR] and [low] with \([\text{t}(\cdot) \cup \text{d}(\cdot)]\).
  - They do not correspond with targets \([\text{a}(\cdot)]\) and terminate the correspondence chain in this context.

Discussion

- Predictions about ABC harmony patterns:
  - Transparent segments that show an opposite specification to harmonizing segments are possible.
  - Transparent segments will be less similar to triggers along some dimension than targets are.
4. Conclusion

- Categories of transparent and opaque vowels are suggestive that Menominee ATR harmony is similarity-driven.
- ABC analysis provides a formal implementation that is compatible with the pattern’s capacity for assimilation at a distance.
- Contributes to characterizing the typology of harmony systems predicted under ABC:
  - Supports extension to some cases of vowel harmony.
  - Bears out prediction of blocking by correspondence, an area that has only begun to be explored.

Orthography versus phonological representation

- [ATR] contrasts are not perceived in non-low short vowels, except before glottal stop.
- In contexts where an [ATR] distinction is not perceptible, Bloomfield wrote short non-low vowels that are underlyingly [-ATR] with the symbol corresponding to the [-ATR] form in harmony environments.
- Milligan (2000) assumes this orthographic choice represented the absence of an audible change in ATR quality, an assumption that I adopt.

Orthography versus phonological representation

- The underlying [+ATR] status of a short non-low vowel can often be deduced from its phonological patterning:
  - By whether it triggers [+ATR] harmony
  - From alternations with long vowels for prosodic reasons:
    - ntkut ‘one’ [AAP:381]
    - nko:te:yaw ‘one affair’ [AAP:381]
    - nku:titakaw ‘one-legged being’ [AAP:381] (by harmony)
Orthography versus phonological representation

- As an alternative, short non-low vowels could be analyzed as transparent, except before [?] (e.g. Archangeli & Pulleyblank 1994, 2007, Archangeli & Suzuki 1995).
- But treating these vowels as transparent complicates the analysis (Milligan 2000), and concrete evidence for it is lacking.

Menominee forms in Bloomfield’s Orthography

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>nu:ke:sek</td>
<td>man’s name “Big Sky”</td>
</tr>
<tr>
<td>otu:hpuakanew</td>
<td>‘he has X as a pipe’</td>
</tr>
<tr>
<td>oto:tsmew</td>
<td>‘he has X as a totem’</td>
</tr>
<tr>
<td>pe:htchki.?aw</td>
<td>‘he sticks his head in’</td>
</tr>
<tr>
<td>sipi:ah</td>
<td>‘river (loc.)’</td>
</tr>
<tr>
<td>si:piahse:hsch</td>
<td>‘creek’</td>
</tr>
<tr>
<td>se:pe:w</td>
<td>‘river’</td>
</tr>
<tr>
<td>tu:hkopiahncw</td>
<td>‘he walks with buttocks spread’</td>
</tr>
<tr>
<td>to:hkop:hsen</td>
<td>‘he lies with buttocks spread’</td>
</tr>
<tr>
<td>wayi:tu:hiqtwa?</td>
<td>‘??they work together??’</td>
</tr>
<tr>
<td>we:napow</td>
<td>‘he durities together’</td>
</tr>
<tr>
<td>we:to:hkatowak</td>
<td>‘they work together’</td>
</tr>
</tbody>
</table>

Regressive directionality

- Calls for a refinement to Ident-VV(+ATR)
- Ident-V(R)(+ATR)

Let X be a segment in the output and Y be a correspondent of X such that Y precedes X in the sequence of segments in the output. If X is [+ATR], then Y is [+ATR].

(Rose & Walker 2004)
No [-ATR] harmony

\[
\begin{array}{cccc}
\text{Ident-IO}(-\text{ATR}) & \text{Ident-VV}(-\text{ATR}) \\
\text{Ident-IO} & \text{Corr} & \text{Ident-VV} & \text{Ident-IO} & \text{Ident-VV} \\
\text{[a(\cdot)] is not a target} & \text{Dissimilar to non-low, [+ATR] triggers} & \text{Markedness: ATR/Lo} \\
\text{[a(\cdot)] is not trigger} & \text{Dissimilar to non-low, [+ATR] triggers} & \text{Sequential grounding: *ATR...Lo} \\
\text{[a(\cdot)] is transparent} & \text{Dissimilar to non-low, [+ATR] triggers} & \text{Local conjunction: ATR/Lo & *ATR...Lo} \\
\end{array}
\]

References

Dondreht: Foris.

Comparison: Prior Alignment-driven analysis

References