Licensing in Multiple Contexts: An Argument for Harmonic Grammar

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1. Introduction


- Assign violation marks when a marked feature [+voice] appears unassociated with a licensing context C in the output
  e.g., VOICE


- Assign violation marks when an output segment in privileged context C differs in value for [+voice] relative to its input correspondent
  e.g., IDENTVOICE/ONSET: Assign a violation mark for any output onset segment that differs in specification for [+voice] relative to its input correspondent

The two sets of constraints largely replicate each other, creating a fair bit of redundancy. ... but both types of constraints appear to be necessary in ranked-constraint Optimality Theory.

Positional licensing constraints are more powerful in a model like Harmonic Grammar (HG; Legendre, Miyata & Smolensky 1990, Pater to appear, Potts et al. 2008, Smolensky & Legendre 2006; see also Goldsmith 1993) where constraints are weighted rather than ranked. A full array of positional asymmetries can be modeled using positional licensing constraints alone in HG.

Benefits:

- Redundancy in constraints is reduced
- A full range of attested patterns can be modeled
- A rich typology of positional asymmetries is revealed
- The typology is broader in some areas than is possible in OT with positional faithfulness and licensing constraints
- Unattested patterns that arise through interaction of positional faithfulness and licensing constraints are excluded if we do not require these constraints
- Licensing constraints are more powerful in a model like HG.

2. Patterns of Licensing in OT and HG

The differences between positional constraints in OT and HG emerge when we consider licensing a single feature in multiple contexts.

Illustration:

- One marked feature: [+voice]
- Two licensing/privileged contexts: onset and initial syllable

The difference between positional constraints in OT and HG emerges when we compare the effects of the two types of constraints on licensing a single feature in multiple contexts. This redundancy is not always benign; the effects of the two types of constraints can be contradictory.

- Positional licensing constraints are more powerful in HG.
- The typology is broader in some areas than is possible in OT with positional faithfulness and licensing constraints.
- Unattested patterns that arise through interaction of positional faithfulness and licensing constraints are excluded if we do not require these constraints.
- The typology is narrower in other areas than in OT.
- Positional licensing constraints are more powerful in a model like HG, giving a more restricted typology.

Structure of the talk:

2. Patterns of Licensing in OT and HG
3. Illustration: Licensing in Multiple Contexts
4. Illustration: Licensing in Doubly-Privileged Contexts
5. Discussion

Thanks to Diana Apoussidou, John McCarthy, Joe Pater, Chris Potts, Matt Wolf, and the participants in the Spring 2009 UMass Phonology Group.

Harmonic Grammar for Modeling a Range of Positional Asymmetries.

A Grammar for Modeling a Range of Positional Asymmetries in Harmonic Grammar

This redundancy is not always benign; the effects of the two types of constraints can be contradictory. The differences between positional constraints in OT and OT emerge when we consider licensing a single feature in multiple contexts. The two sets of constraints largely replicate each other, creating a fair bit of redundancy. The two sets of constraints largely replicate each other, creating a fair bit of redundancy.

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Harmonic Grammar For Modeling a Range of Positional Asymmetries.
This gives six possible patterns:

1. **voice licensed in no context**
   - \( \text{voice licensed in no context} \)

2. **voice licensed in all contexts**
   - \( \text{voice licensed in all contexts} \)

3. **voice licensed in onsets**
   - \( \text{voice licensed in onsets} \)

4. **voice licensed in onset of \( \text{sonorants only} \)**
   - \( \text{voice licensed in onset of \( \text{sonorants only} \)} \)

5. **voice licensed in onsets and \( \text{coronal place features} \)**
   - \( \text{voice licensed in onsets and \( \text{coronal place features} \)} \)

6. **voice licensed in onset of \( \text{sonorants only} \)**
   - \( \text{voice licensed in onset of \( \text{sonorants only} \)} \)

In OT:

- Positional licensing constraints give all of the patterns except (1e) and (1f).
- Positional faithfulness constraints give all of the patterns except (1f).
- Both types of constraint are needed to model the full range of systems in OT.

In HG:

- Positional licensing constraints give all of the patterns.
- Possible: licensing in multiple contexts (1e) and licensing in doubly-privileged contexts (1f).
- The full range of systems can be modeled with only one set of constraints.

### 3. Illustration: Licensing in Multiple Contexts

While, in many cases, there is only one licensing environment, sometimes multiple sources of licensing are possible.

#### 3.1 Initial Syllables (Sonorants only)

<table>
<thead>
<tr>
<th></th>
<th>voice licensed in onsets and ( \text{sonorants only} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>( \text{voice licensed in onsets and ( \text{sonorants only} )} )</td>
</tr>
<tr>
<td>e</td>
<td>( \text{voice licensed in all contexts} )</td>
</tr>
<tr>
<td>i</td>
<td>( \text{voice licensed in ( \text{sonorants only} )} )</td>
</tr>
<tr>
<td>o</td>
<td>( \text{voice licensed in ( \text{sonorants only} )} )</td>
</tr>
<tr>
<td>u</td>
<td>( \text{voice licensed in ( \text{sonorants only} )} )</td>
</tr>
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</table>

This gives six possible patterns:

- Initial syllables (sonorants only)
- Voice licensed in both types of constraint.
- Voice licensed in doubly-privileged contexts.
- Voice licensed in onset of \( \text{sonorants only} \).
- Voice licensed in onsets and \( \text{sonorants only} \).
- Voice licensed in onsets.
- Voice licensed in \( \text{sonorants only} \).

### 3.2 Tamil Illustrates This Type of Pattern

(Tamil illustrates this type of pattern, with independent coronal place features licensed in two distinct contexts (data from Christdas 1988, via Beckman 1998: 250):

- **onset**
- **initial syllables (sonorants only)**

**Example Words**:

- /maa\_ka\_iy/ \( \text{maa} \_ \text{ka} \_ \text{iy} \)  'a month'
- /te\_yam/ \( \text{te} \_ \text{yam} \)  'god'
- /an\_b/ \( \text{an} \_ \text{b} \)  'love'
- /mun\_iy/ \( \text{mun} \_ \text{iy} \)  'teacher'

For licensing Place in onset, we require:

- \( \text{PLACE} \) \( \text{ONSET} \) \( \text{IDENTPLACE} \)

For licensing coronal Place in initial syllables, we require:

- \( \text{CORONAL} \) \( \text{SON} \) \( \text{IDENTPLACE} \)

- In OT, this constraint must dominate IDENTPLACE.

- In HG, both constraints must dominate IDENTPLACE.

- In OT, if both constraints dominate IDENTPLACE, independent coronal place is only licensed in the most specific case – on sonorants in the onset of the initial syllable.

- In HG, only licensing environments can be modeled with only one set of constraints.

- In OT, if the full range of systems can be modeled with only one set of constraints:

  - Licensing in doubly-privileged contexts.
  - Licensing in multiple contexts.

- In HG, both types of constraint give all of the patterns.

- In OT, if both types of constraint can be modeled with only one set of constraints:

  - Licensing in doubly-privileged contexts.
  - Licensing in multiple contexts.

- In HG, the full range of systems can be modeled with only one set of constraints.
Licensing in multiple contexts is a general problem for OT.

With positional licensing constraints in OT it is predicted that there should be only a single context where a given feature is licensed. Positional licensing constraints can capture the pattern without difficulty in Harmonic Grammar. In HG, constraints are weighted rather than ranked, and the optimum is the candidate with the highest Harmony ($H$).

To calculate $H$ for a given candidate, that candidate's violation score $sk$ for each constraint $CK(k = 1 \ldots K)$ is multiplied by the constraint's weight $wk$, and the results are summed.

\[ H = \sum_{k=1}^{K} sk wk \]

Because violations are negative numerals, the optimum has the Harmony score closest to zero.

Weights are limited to positive real numbers (see Keller 2000, 2006, Prince 2003).

Multiple violations lower-weighted constraints can "gang up" to overcome violations of higher-weighted constraints. In HG, features are licensed when the weight of faithfulness is greater than the summed weights of the licensing constraints that are violated by the faithful candidate.

\[ w(FAITHFULNESS) > \sum w(VIOLATED LICENSING) \]

These conditions are independent of one another; it is quite possible to have a set of constraint weights that satisfy both of them simultaneously.

Licensing in multiple contexts is unproblematic for HG.
To capture the distribution of [h] in word-initial syllables, two weighting conditions are required:

The full system is problematic in Harmonic Grammar, however:

If all three of the licensing constraints dominate MAX, we predict that [h] will appear in the onset of the stressed word-initial syllables. But as soon as we expanded to consider the full system, OT fails.

Two licensing constraints must be satisfied in order for [h] to appear in the onset of a word-initial syllable:

If we consider just one aspect of the pattern—like the licensing of [h] in the onset of stressed syllables—OT is successful. But, as soon as we expand to consider the full system, OT fails.

The full system is problematic in Harmonic Grammar, however:

If all three of the licensing constraints dominate MAX, we predict that [h] will appear in the onset of the stressed word-initial syllables.
HG with positional licensing constraints can capture both simple double-licensing effects, and cases where more than one double-licensing possibility exists. In contrast, positional faithfulness constraints in OT do not allow patterns of licensing in doubly-privileged contexts to be captured.

In HG, positional licensing constraints can model a greater range of patterns than in OT. This is because HG can capture the licensing of marked features in multiple contexts, whereas OT’s positional faithfulness constraints are limited to the intersection of two contexts. Adding positional faithfulness constraints in OT allows the pattern missing from the positional licensing account – licensing in multiple contexts – to be captured.

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- IDENTPLACE/ONSET: Assign a violation mark to output onset segment that differs in specification for place relative to its input correspondent
- IDENTCOR/SON1: Assign a violation mark to output sonorant segment in the initial syllable that differs in specification for coronal place relative to its input correspondent

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result: 6 HG languages using positional licensing constraints.

- two licensing /privileged contexts: onset and initial syllable (g)
- two inputs: /bad.na.bad/, /pat.na.pat [+voice]/

Illustration:

less restrictive typology than HG with positional licensing alone.

- positional licensing constraints (e.g., onsets)

HG requires only positional licensing constraints to capture cases of licensing in

• OT with both positional faithfulness and positional licensing gives a

result: 6 HG languages using positional licensing and positional faithfulness

• two licensing /privileged contexts: onset and initial syllable (g)
• two inputs: /bad.na.bad/, /pat.na.pat [+voice]/

Summary:

- positional faithfulness constraints that refer to double contexts – like

  "onset of an initial syllable" or "onset of a stress syllable" – are required to capture

  more specific positional licensing constraints that refer to double contexts – like

  "onset of an initial syllable" or "onset of a stress syllable" – are required to capture