We present a computational model of vowel harmony acquisition. Words contain vowels from one set only. Caused by spreading of phonological features. Spreading may be either: Left-to-Right (Turkish, Finnish) or Right-to-Left (Fula, Fula-). The small failure in Uyghur may be caused by orthographic factors, since the model was fed input as characters rather than phonemes.

**Table showing performance of the vowel harmony learning model on various languages.**

<table>
<thead>
<tr>
<th>Language</th>
<th>1stary H?</th>
<th>Correct 2ndary H?</th>
<th>Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkish</td>
<td>✓</td>
<td>✓</td>
<td>4/4</td>
</tr>
<tr>
<td>Finnish</td>
<td>✓</td>
<td>8/8</td>
<td></td>
</tr>
<tr>
<td>Uyghur</td>
<td>✓</td>
<td>7/8</td>
<td></td>
</tr>
<tr>
<td>Warlpiri</td>
<td>✓</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>✓</td>
<td>5/5</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>✓</td>
<td>6/6</td>
<td></td>
</tr>
</tbody>
</table>

**Distributional Hypothesis**

- In a no-harmony language (e.g., English) we don't expect any particular vowel to be more or less likely to follow another.
- In a vowel-harmony language one class of vowels is mutually exclusive to the other.
- The distributional signal of vowel harmony is a divergence from the base uniform distribution of vowel co-occurrences.
- Simply tracking conditional probabilities fails to capture this pattern.
- Instead we normalize conditional probability by the frequency of the preceding vowel context.

**Empirical Predictions and Questions for Future Research**

- Is primary harmony within a language in fact acquired first as predicted by the model?
- Does harmony need to be a function over a single phonological feature (i.e., a natural class)?
- How would performance look given asymmetry within the distribution of only a single vowel?
- How does a learner differentiate input data which shows non-productive disharmony (e.g., Estonian) from a productive harmony process (e.g., Finnish)?

**References**


**Code Available Open Source**

https://github.com/scaplan/VowelHarmonyAcquisition

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