Preferences Among Permitted Sequences: A Weighted Markedness Constraint Model

Jeremy Perkins
University of Aizu

Introduction & Background

A lexical gap in Thai exists where high tone never occurs following voiced or unaspirated voiceless onsets (C$_{0}$= [+voice]) (Ruangjaroon 2006; Morin & Zeiga 2006; Lee 2008, 2011).

1) Consonant-tone gaps in native Thai words (unchecked syllables)

<table>
<thead>
<tr>
<th>Stressed</th>
<th>Initial Tone</th>
<th>Low Tone</th>
<th>Falling Tone</th>
<th>High Tone</th>
<th>Rising Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Absent</td>
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</tbody>
</table>

A perception experiment revealed Thai speakers have preferences between attested consonant-tone sequences in addition.

The perception experiment involves a choice between two nonce candidates.

This involves comparison between markedness constraints only; the grammar is applied in a non-standard way.

An OT phonological account of the grammar is adopted (Perkins 2013)


A task-specific weighted constraint model is compared with the experimental results, with a close fit.

Methods

A. Perception Experiment

1) Native Thai speakers were presented with two CV nonce words, differing in only their tone or the aspiration of the onset.

2) Participants chose the nonce word that sounded more likely to be a Thai word.

3) The results are plotted in (2) below for each comparison, with the unattested sequences coded with a value of 1.

4) L, H, A, and R stand for “unattested”, “voiced”, and “ unaspirated onsets” L, H, A, R are low, high and rising tones; so UH = unaspirated-high tone sequence.

B. Weighted Constraint Model

1) Predictive Model based on a categorical OT grammar is proposed.

2) Bias Constraint Demotion (BCD; Prince & Tesor 2004) was run on output-input mappings for the Thai grammar

3) Markedness constraints are initially undominated.

4) Learning involves demoting markedness constraints below faithfulness constraints.

5) It yields ranked constraint strata, each with a weighting, $\delta$.

6) As a default method, increasing whole number values for each higher stratum were used.

3) BCD Strata Results with Constraint Weights, $\delta$

For each comparison in the perception experiment, the constraints evaluate both output candidates, yielding a score, c.

There are 3 possible outcomes for a given constraint on a given comparison:

1) The first stimulus is the winner ($c_1 = c$).

2) The second stimulus is the winner ($c_0 = 0$).

3) Neither stimulus is preferred ($c_0 = c_1$).

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4) Constraint violation scores, c, for each comparison

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A predicted response mean for each comparison, $\bar{P}$, ranging from 0 to 1 is calculated via a weighted normalized sum of the c-scores:

$$\bar{P} = \frac{\sum_{i=1}^{n} c_i \cdot \delta_i}{\sum_{i=1}^{n} \delta_i}$$

Where $\delta_i$ is the weight of constraint $i$.

The predicted response scores for each comparison are then compared to the results from the perception experiment.

2. Weighted Constraint Model

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Results

1) Initial Weighted Constraint Model with Experimental Results

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A weighted constraint model correlates closely with experimental results for consonant-tone interaction in Thai.

1. Forced-choice tasks with nonce words involve a non-standard application of the phonological grammar.

2. The fit improves when L* is removed from the model.

3. Comparisons with the same tone in both stimuli yielded results closer to random than expected due to tone confusion.

4. Constraints that are not active on the surface of a grammar can show effects in this kind of task.

5. There is a general bias for rising tone over low tone that is unaccounted for.

References


Posterpresenter@gmail.com

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Jeremy Perkins
jperkins@u-aizu.ac.jp