Complexity vs. Naturalness in L1 Learning
A Surfeit of the Stimulus Experiment
Brandon Prickett - BLPrickett@outlook.com - www.unc.edu/~bpricket - UNC Chapel Hill

Which has more of an effect on phonological learnability—Naturalness or Complexity?

<table>
<thead>
<tr>
<th>Variable</th>
<th>Natural Languages</th>
<th>Artificial Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

In this study, naturalness was found to be the predominant factor in natural language phonological learning.

Methodology

1. Constraints were chosen from a list of apparent English constraints created by the Hayes and Wilson (2000) Phonotactic Learner.
2. Grouping of Constraints: Constraints were placed into four groups: Natural Simple, Natural Complex, Unnatural Simple, and Unnatural Complex.
3. Novel words were created that violate each constraint. Non-violating partners were then created for each of the words.
4. Subjects were presented with the words and asked to make a magnitude estimation (Lodge 1981) of how “good” the words sounded.

Examples of Stimuli Used in Each Category

Typologically common and phonetically grounded | Typologically uncommon and not phonetically grounded

Less Features: [*voice][+voice] | *[-diphth unus] [cont.-ant] | [bough] [bO] [boosh] [buʃ]

More features: *[-low,-tens][+son,-DOR] | [+contant][+high,-yll] | shween [ʃweːn] sween [swiːn]

Complexity

Defining Constraints

Complexity: This was found by calculating the mean number of phonetic features in each of the segments described in a constraint.

Example of Complexity Scores:

* [+syllabic] [+syllabic] = 1
* [-diphth][+round][LABIAL] = 1.5
* [-low,-tens][+son,-DOR][DORSAL] = 2

Naturalness:

Constraints were judged for phonetic justification (assimilation, sonority ordering, etc.)
P-Base (Mielke 2007) was used to test for the typological commonness of each of the constraints.

Endnotes

For a copy of the thesis that describes this project in more detail, visit: http://www.unc.edu/~bpricket.

Hayes, Bruce (1999). “Phonetics Driven Phonology.”

Results

There is a significant difference between the ratings of words that violate natural constraints and their non-violating partners. The unnatural groups do not have a significant difference.

Conclusion

<table>
<thead>
<tr>
<th>Variable</th>
<th>Natural Languages</th>
<th>Artificial Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

The current study found an effect of naturalness, but did not conclusively find an effect of complexity. This is the opposite of many artificial language studies, such as Shoruppa and Peperkamp (2011).

Explanation of the Effect of Naturalness in this Study

Phonetic Grounding

Conclusion

Would cause an effect of naturalness in learning, since natural constraints would be the first (and possibly the only) constraints being learned.
Could explain the effect of complexity found in artificial language studies. These could be testing a more superficial kind of phonological learning that does not create constraints in the same way.
Would also explain the lack of naturalness effects in artificial language studies, since this superficial learning would be different than the initial creation of constraints in one’s childhood.