The Acquisition of L2 Laryngeal Features: The Processing of Robust Transitional Phonetic Cues

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Introduction

Wright (2004:35) defines a perceptual cue as "information in the acoustic signal that allows the listener to apprehend the existence of a phonological contrast." A number of recent studies show that L2 learners are initially more sensitive to transitional release cues than to internal cues in the acquisition of sounds which are not built on L1 features. The processing of these robust contrasts sets the stage for the developmental paths observed in the acquisition by delimiting the set of sounds which become intake to the processor. In this context, I argue that robust cues illustrate harmony as faithfulness to the intake.

L2 Grammars: Harmony-As-Faithfulness

• Following Hove & Pollick (2004) optimal grammars are characterized by Harmony-As-Faithfulness. Perceptually-motivated hierarchies are best captured in the top (rather than via markedness scales). Deviations from input are optimal when perceptuality is minimal. Preserve more robust cues.

Vanderweide (2005) proposes a family of release constraints to operationalize robustness in child cluster acquisition. Faithfulness constraints are based on release cues in the domain.

FAITH(\([CG]\), \(V\)) = FAITH(\(V\))

Thus, pre-voiced plosives are more harmonic than pre-voiced fricatives.

Let's explore the family of plosives in more detail.

Case #1: L2 Yucatec Mayan Ejectives

Gonzalez (2011) shows that NS of Spanish \([\text{contrast} \text{glottis}]\) can acquire Yucatec Mayan ejectives \([\text{contrast} \text{glottis}]) via both discrimination (AX: \(\text{IS} = 100\,\text{ms}\)) and lexical selection tasks. NSs are nativitale in onsets but not in codas.

- Transitional release bursts explain the developmental paths observed within these sequences.

- As with Vanderweide, Gonzalez argues that perceptual saliency drives the demotion of markedness constraints. Ejectives are robust due (in part) to their dual release bursts (oral & glottal).

Case #2: L2 Hindi Voiced Aspirated Stops

Jackson (2009) looks at the perception of Hindi mumbled stops by NS of English and French.

- An ABX task (\(\text{ISI} = 1500\,\text{ms}\)) reveals the following accuracy scores:

<table>
<thead>
<tr>
<th>Production accuracy:</th>
<th>Production accuracy:</th>
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<tr>
<td>(\text{sl} &gt; \text{st} &gt; \text{sn})</td>
<td>(\text{sn} &gt; \text{st} \approx \text{sl})</td>
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- CBX subjects performed significantly better than English subjects on contrasts which differed by [voiced] alone. English subjects performed significantly better than French subjects on contrasts which differed by [spread glottis] alone (see Ivensen & Salmonson, 1995).

- Both language groups, though, were unexpectedly sensitive to the properties of the voiced, aspirated stops (including the pre-voiced component with both periodic vibration and turbulent noise, i.e. voiced aspiration).

- Jackson postulates that phonetic properties might be relevant here. In a synthesized demonstration task, both the release burst and the pre-voiced voiced aspiration (transitional cues) were attended to by the English listeners. Closure-voicing deletion (at least initial) was not attended to at all, by the NSs, though it was important for NS of Hindi.

Case #3: L2 Consonantal Sequences

Release bursts (a transitional cue) also accounts for the accuracy patterns described in the acquisition of consonant clusters by Brazilian Portuguese learners of English.

Markedness Versus Frequency Versus Release

Cardoso (2007; 2009) in an elegant series of experiments argues that, while markovable best accounts for production patterns of consonant clusters, frequency better accounts for perceptual accuracy.

The Learning Algorithm: Cue-based Algorithm for Demotion (CAD)

- Initial state = high-markedness of new segments: \(\text{*KonstructedGlottis/Son}^*\text{KonstructedGlottis/Son}\)
- \(\text{SpecGlottis}\)
- As the grammar changes, some new segments will be allowed (via markedness demotion) but not all at once.
- Release bursts determine which markedness constraints are demoted to be interfaced with Faithfulness constraints. Thus, Blame Assignment is made feasible so that grammars can converge. Landing sites for demotion are determined by universal properties (e.g. \(\text{V} \text{V} > \text{Son} \text{Son}\)).
- An example of an interfaced L2 grammar would look like this:

| IDENT(\(\text{CG}\))ON/Son\(\text{v} 5\) | IDENT(\(\text{CG}\))ON/Son\(\text{v} 5\) |

Conclusion

In this paper, I am arguing that it is the varied instantiation of this property of release burst which accounts for the successful acquisition of L2 contrasts which are not based on L1 properties. These phonetic properties are perceived by the listener and, hence, allow certain stimuli to become intake to the processor. Over time, these are the primary data which pave the way for the phonologization of a particular feature. These phonological features \([\text{CG}], \text{son}, \text{etc.}\), however, are not merely road off a phonetic signal. The varied signal cues to a feature demonstrate that this is a learning problem, not a processing problem when it comes to phonology. It is a processing issue when it comes to phonetics.

References

• Cardoso, W. (2007), The development of \(\text{St}\) onsets in interlanguage: markedness vs. frequency effects. (Unpublished paper. Canrad School.)

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