A contrastivist approach to the emergence of sound inventories

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25. May 2019

Contrasts and features

Basic observation:

- size/shape of a language's sound inventory ~ active phonological features

(Hall 2007; Dresher 2009, 2018; Mackenzie 2013, 2016; Iosad 2017)

Contrasts and features

(1) **Contrastivist Hypothesis** (Hall 2007, p. 20)
The phonological component of a language L operates only on those features which are necessary to distinguish the phonemes of L from one another

Step 1: Identify contrasts

(2) **Sample of Chewa (N.31) vowel contrasts** (Downing & Mtenje 2017, ch. 3)

a. túm- ‘send’
b. gɔ́n- ‘sleep’
c. phík- ‘cook’
d. tsɛ́k- ‘close’

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☞ **Acquired contrasts:** {u, ɔ, i, ɛ}

Step 2: Define features

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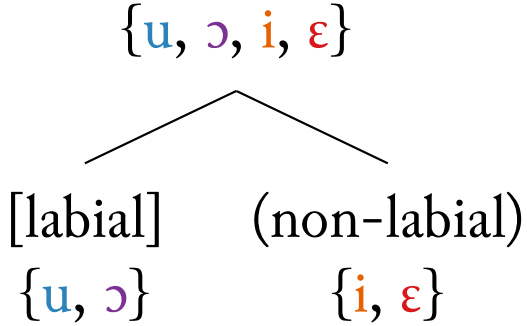

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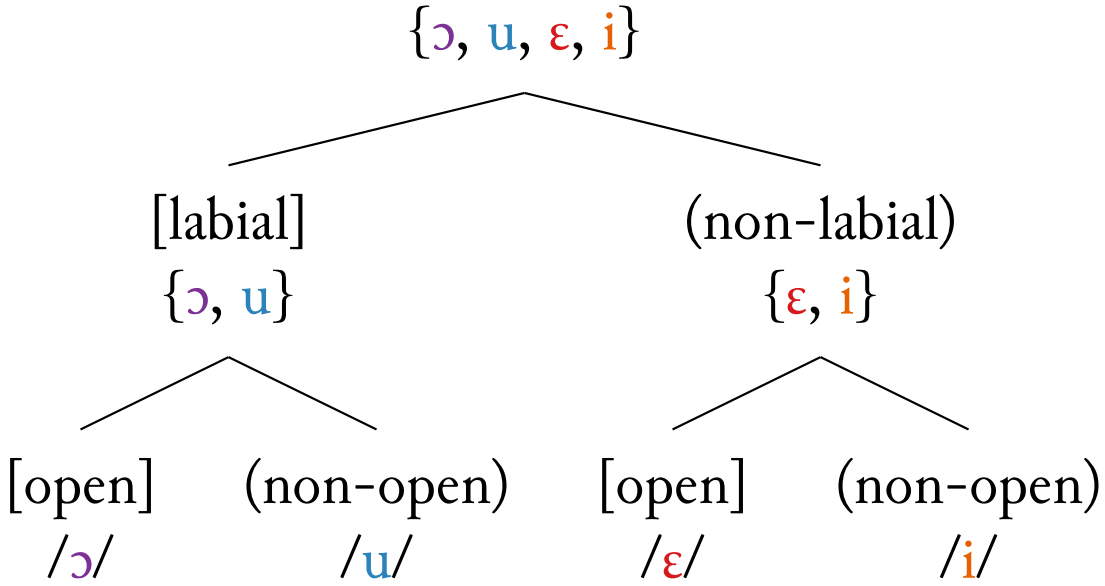

What about acquisition?

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Implication:

1. Acquire segmental contrasts
2. Define features

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Questions:

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   - e.g. /ɛ/ vs. /i/ : [open], [close], [ATR], [RTR], something else?
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☞ it is unclear how we go from contrasts → features

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The top-down focus of contrastivist approaches:

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  * requires serious abstraction
    - seems to be the wrong direction

Outline

1. A bottom-up contrastivist approach
   - Micro-cue model of acquisition
   - Chewa test case: distinctions in lexical meaning and phonological behaviour

2. Conclusions

A bottom-up contrastivist approach

Top-down limitations on sets of features are not the only way:

- we can go from the bottom-up by re-defining the Contrastivist Hypothesis

A bottom-up contrastivist approach

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The phonemes of a language L are equal to the sum of features and feature co-occurrence restrictions which are minimally necessary for the expression of phonological regularities in L.

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☞ features $\rightarrow$ phonemes
- not features $\nleftarrow$ phonemes

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  - 'phonetics does not determine phonological destiny', nor vice versa (cf. Hall 2014; Anderson 1981; Hale & Reiss 2000)

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☞ speech signal → features → contrasts

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Phonological acquisition:

- based on insights from Westergaard's (2009, 2013, 2014) model of micro-cues

Acquisition via micro-cues

Assumptions:

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- generalise small pieces of abstract linguistic structure ('micro-cues')
  - e.g. a cue for OV word order is generalised as $_{\text{VP}}$[DP V]

☞ Micro-cues accumulate in the course of language acquisition
  - the sum of which defines the linguistic grammar

Adapting the micro-cue model to phonology

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Emerging inventories:

- micro-cues accumulate in the course of language acquisition
  - defining a set of contrasts

Adapting the micro-cue model to phonology

(4) **Segment inventory defined by [F], [G], and *[F, G] cues**

Micro-cues	Phonemes
[F]	/a/
[ ]	/b/
[G]	/c/
*[F, G]	*/d/

A working phonological learning algorithm

When parsing phonological input:

1. For every observed contrast/alternation
   - generalise a unique representational micro-cue in the form of a feature [F]

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1. For every observed contrast/alternation
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   - e.g. [phi̱k-] vs. [tsɛ̱́k-] = [F]

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Chewa vowel contrasts and alternations

(5) **Chewa contrasts and height harmony**

HIGH	phík-il-	'cook'-APPL.	túm-il-	'send'-APPL.
MID	tsék-ɛl-	'close'-APPL.	gɔ́n-él-	'sleep'-APPL.

Generalising Chewa representational micro-cues

(6) **Generalising Chewa vocalic representational micro-cues**

Patterns	Surface generalisations	Micro-cue

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c.	g<u>ɔ́</u>n-él-	[ɔ]	vs.	[u]	[labial, (open)]
	t<u>ú</u>m-il-	[labial, open]	vs.	[labial] contrasts	

Defining inventories using a set of emergent features

(7) **Chewa vowels defined by [open] and [labial] cues**

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Reinterpretation of the issues

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2. ~~Once a contrast is acquired, how do language learners select their features?~~
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1. recapitulates contrastivist insights
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   - correlation between sound inventories ~ features
   - predicts a minimalist representational architecture
2. provides an explicit account of how representations are acquired

The broader picture

A highly simplified version of the model:

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- Small, symmetric inventory and only two features
  - /ɛ, i, ɔ, u/ and [open]/[labial]

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  - e.g. locality variation (hierarchical organisation of features)
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☞ Sandstedt (2018, ch. 2–3)

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