Modeling gradual learning in serial and parallel phonological grammars
Anne-Michelle Tessier * University of Alberta * amtessier@ualberta.ca
ICPC * May 2011 * University of York

SUMMARY

What kinds of variation occur during the variable stages in which children are gradually mastering a sound pattern? Current phonotactic learning theories make different predictions about longitudinal variation, based in part on how ‘global’ or ‘local’ information a children can learn from a single error. Using a newly-published corpus this poster argues that the data support serial, local learning and interprets this result as evidence for a serial phonological grammar.

A Way to Study Phonotactic Learning
Step 1: Build theoretical learners that acquire all and only a language’s observed marked structure
Step 2: Compare learners’ developmental paths with child corpora, and analyze their differences

The two grey panels spell out one method for Step 1
The rightmost blue panel provides fodder for Step 2

Error-Driven Learning in a Nutshell
• Learner observes (hears): * ‘boot’ [but];
• Learner produces: ‘bu’ [but];
• The result is an Error:

Hypothesis: Errors are enough to learn phonotactics
Learning: Re-arranging the current grammar so that the next one doesn’t make any of the learner’s known errors

Restrictive Learning: Biased Constraint Ranking
The initial state grammar: most restrictive
- only the most unmarked structures possible
  e.g. H₂: * Velar, *Coda ⇒ Max, Ident
But how to move away from that state?
H₂: Max ⇒ *Coda ⇒ *Velar ⇒ *Velar?
H₁: *Velar ⇒ Max ⇒ *Coda ⇒ H₂?
What ‘boot’ shows the learner:
- in the target language, ‘Coda’ is not obeyed
What ‘but’ doesn’t show the learner:
- whether or not ‘Velar’ is obeyed

Biased Constraint Derivation
(BCD: Prince and Tesar 2004)
says ‘boot’ to learn a ranking nearly as restrictive as H₂: *Velar ⇒ *Coda ⇒ Max;
Via BCD learning: errors are resolved, i.e. no more coda deletion
- but otherwise markedness is enforced (*Velar)!

LEARNING FRAMEWORK

A Global Approach: Parallel OT
One possible learning path:
H₁: *Velar ⇒ Max ⇒ *Coda ⇒ Ident-Velar
New error: /k*/ [k] New set of errors:
V *Coda
L L W L
W W L
H₂: *Velar ⇒ Max ⇒ *Coda ⇒ Ident-Velar
New error: /k*/ [k] New set of errors:
V *Coda
L L W L
W W L

Interpreting this error (Prince 2002)
Build H₂ from the two stored errors Keep making/storing errors/learning... until H₂ makes no more errors.

A More Local Approach: Harmonic Serialism (HS)
In HS, each output differs from its input in only one way. Changing multiple input properties may result in multiple derivations.

How to Learn with HS:
Step 1: Store the current OT grammar if there is a unique way to make the new error.
Step 2: If there is no unique way to make the new error, then change the grammar in an attempt to resolve the error.

The Child: Zack (Smith, 2010)
Smith (2010) provides a corpus of Zack’s speech from 1.8 – 3.8, with sessions about once a week
Approach taken here:
- every output with a 2-member complex onset extracted
- each extracted output coded for additional marked structure
- stages determined by first session with at least two faithful outputs
- only patterns with sufficient data discussed on this poster

DIFFERENT PREDICTIONS

Using a Parallel OT Grammar: this learner will regress over time in multiply-marked words:

Using a Serial OT Grammar: this learner will not regress in any way (at least as described here)

RESEARCH QUESTION
Do LS longitudinal corpora provide evidence of consistent phonological regressions, whose time course matches the order of acquisition of multiple marked structures within single words?

ACKNOWLEDGEMENTS

Special thanks to Anne Murphy for extensive comments and improvements on related works, and to Noam Chomsky for the opportunity of his collaboration. Thanks also to Phil Lin and John恋爱 for data transcription, and to Ian MacKay, John MacKay, Adam Aizer, Paul Stemberger, and Jonathan Blevins for the 2007 Phonology Cycles for Multiple Linguists. Everything else is solely my fault.

REFERENCES
